



Project no. IEE/09/250661

Project acronym: ENNEREG

**Full title of the action:
ENNEREG - Regions paving the way for a Sustainable Energy Europe**

Intelligent Energy – Europe (IEE)

Type of action: Sustainable Energy Communities

Key action: Horizontal

**D2.1:
Guidelines for RES and RUE assessment at regional level**

Date: 15.09.2010

Issue: 2

Responsible for D2.1:

Ente Vasco de la Energía (EVE)

Website: www.regions2020.eu



Contents

1	Introduction	3
2	Regional energy survey	4
2.1	<i>Physical and social framework.....</i>	4
2.2	<i>Regulatory framework.....</i>	4
2.3	<i>Energy consumption</i>	4
2.4	<i>Electricity demand and coverage.....</i>	5
2.5	<i>Local energy production, including renewable</i>	5
2.6	<i>Baseline emission inventory.....</i>	6
2.7	<i>Summary of the regional energy survey</i>	7
3	Preliminary regional objectives for 2020	9
4	Contents of the Sustainable Energy Action Plan.....	10
4.1	<i>The planning stage.....</i>	10
4.2	<i>Planning of policies and measures.....</i>	11
4.3	<i>Implementation of the measures.....</i>	12
4.4	<i>Evaluation and reporting</i>	12
5	References	13

The sole responsibility for the content of this deliverable lies with the authors. It does not necessarily reflect the opinion of the European Community. The European Commission is not responsible for any use that may be made of the information contained herein.

1 Introduction

This document corresponds to Deliverable 2.1 of the ENNEREG Project and its purpose is to provide guideline criteria to the project partners for preparing the following regional documents of the Project:

- Regional energy survey and targets to 2020 (D2.2 and D2.5)
- Regional SEAPs (Sustainable Energy Action Plans) (D2.11)

These guidelines have been thought to provide orientation to the project partners for carrying out their work in the ENNEREG project; due to the different individual characteristics of the partners and associated regions, the scope of each of the Regional SEAP will be different. Therefore, there will be flexibility to allow deviations in the development of the SEAP from the contents defined in this document.

However, using the proposed approach it will be possible to identify the strengths and weaknesses of the most important elements of the energy system, and define the most appropriate actions to move our regions towards a more sustainable energy future.

2 Regional energy survey

The aim of the assessment is to analyse the regional energy system, as a basis for identifying areas on which to work to improve sustainability. The survey consists of gathering the data needed for the planning stages of the SEAP, implementing and assessing it. The conclusions drawn by this analysis will be the basis for later defining the priorities for the Action Plan.

2.1 Physical and social framework

The developer of the SEAP needs to have an in-depth understanding of the physical and social situation and trends in the region. Aspects such as climate, population characteristics, economy and land use all have a major impact on energy use.

However, an overly detailed description of these aspects in the SEAP might divert attention from the basic energy aspects of the study and therefore only a very summarised form of this part of the evaluation should be included.

2.2 Regulatory framework

If it is to be effective, the SEAP must take into account the regulatory framework at national and European level and make use of the levers it offers for local action. This section must therefore include the regulatory framework on energy at a regional, national and European level, particularly with reference to the strategic targets for renewables, CO₂ emissions and efficiency and the measures established in these fields through energy policies. One example of the sort of framework to be taken into account are the new national action plans on renewable energy (NREAP) drawn up by European member states under Directive 2009/28/EC on the promotion of the use of energy from renewable sources, which have been submitted this year, or the National Energy Efficiency Action Plans submitted in the framework of the Energy Services Directive 2006/32/EC.

2.3 Market analysis

Also the framework of the energy markets, which are normally supra-regional, are important for the definition of the Action Plan and therefore need to be analysed. The availability and price of energy and the security of supply depends on the energy markets and the situation of the region with respect to transport, transformation and storage infrastructures. This is very relevant in particular for electricity and natural gas.

2.4 Energy consumption

The SEAP must include a description of the structure of regional energy consumption, showing the principal sectors with consumption, trends and historical data if available (5-10 years). In order to ensure that the information is consistent, it will be helpful to have information available from several years and to use comparable physical or energy units.

The analysis should include the following sectors, describing the types of energy consumed and the main uses made of that energy.

- Industry (both SMEs and large energy consumers participating in the European Emission Trading Scheme).
- Buildings in the residential, services and government sectors.
- Transport.
- Primary sector, if relevant.

The level of analysis of these sectors and energy uses will depend on the availability and quality of information and the specific characteristics of the region. If sufficient information is lacking for some sector, a specific study might be required. Sector studies will be carried out, analysing the use made of the principal energy types, also by region: electricity, natural gas, petroleum derivatives, coal, biomass, solar thermal, etc.

2.5 Electricity demand and coverage

This section should include a description of electricity demand at a regional level and its coverage. It should include an electricity balance showing the energy produced in different types of thermoelectric power station, in CHP facilities and district heating and from renewable energy.

Include a description of the electricity industry and infrastructures in the region:

- Power generating plants
- CHP, industries in which it is applied and potential
- Degree of development of the power grid

2.6 Local energy production, including renewable

This section will describe local energy production, divided into two sections: production from fossil fuels, where this exists, and production from renewable energy.

The section on renewable energy will include a description of the current situation in the region in terms of renewable energy production and its potential, where information is available. The main energy types to be described are:

- Wind
- Hydro
- Biomass
- Solar PV.
- Municipal Solid Waste
- Biomass
- Solar thermal
- Geothermal, high and low enthalpy
- Other future potential sources of renewable energy such as wave or tidal energy, thermoelectrical, etc.

If no information on regional potential is available, European sources may be used that provide basic information on the regional potential for renewable energy:

- JRC Map of PV potential, including country maps and an interactive calculator:
<http://re.jrc.ec.europa.eu/pvgis/>

- Europe's onshore and offshore wind energy potential:
[http://air-climate.eionet.europa.eu/reports/EEA TR 6 2009 wind energy potential](http://air-climate.eionet.europa.eu/reports/EEA_TR_6_2009_wind_energy_potential)
- Wave energy resource distribution in Europe:
http://www.aquaret.com/index.php?option=com_content&view=article&id=136&Itemid=279&lang=en

2.7 Baseline emission inventory

It is basic to create a regional inventory of CO₂ emissions resulting from energy use, given that carbon emissions are probably the most effective indicator of a region's energy sustainability. Member states do not normally publish regional breakdowns of CO₂ balances, and the regions will therefore have to establish a methodology of their own, depending on the information available.

Due to the difficulty to provide a detailed CO₂ inventory within the framework of the Project, flexibility for the methodology of calculating CO₂ emissions is accepted; however, at least a very basic CO₂ emission calculation is required.

The basic minimum information for creating an emission inventory is a basic energy balance, with inputs and outputs of different fuels. In addition, if a sectoral breakdown of energy consumption is available or can be estimated, a more detailed balance of CO₂ emissions can be drawn up. Providing enough information is available, the IPCC methodology designed for member states may also be applicable to the regions. This methodology is described in the publications "2006 IPCC Guidelines for National Greenhouse Gas Inventories" <http://www.ipcc-nggip.iges.or.jp/>. IPCC establishes different levels for performing the emissions inventory, from a "top-down reference approach" to different tiers for making bottom-up inventories.

However, the IPCC methodology does not take into account emissions resulting from electricity consumption. At a national level, these emissions are generally relatively insignificant. However, at a regional level, they may be much more important: a region's greenhouse gas emissions will vary greatly depending on whether it is an electricity importer or exporter. At the same time, a region that imports a large proportion of its electricity consumption is responsible for the emissions required to produce this energy.

The European Commission offers criteria on its Covenant of Mayors website for performing an emission inventory at sub-national scale. In this case, the guidelines do recommend that the inventory should take into account emissions at source from imported electricity.

- See Guidebook "How to develop a sustainable energy action plan (SEAP)" Part II: Baseline Emission Inventory
http://www.eumayors.eu/mm/staging/library/seap_gl/docs/004_Part_II.pdf

The Covenant of Mayors guide offers the option of making the emissions inventory using standard IPCC emission factors or LCA (Life Cycle Assessment) emission factors. IPCC emission factors only take into account direct emissions of CO₂ resulting from combustion or industrial processes. The LCA method, on the other hand, is a standardised (ISO 14040) method that takes into account the entire life cycle of the energy carrier, including the complete supply

chain. For example, in IPCC, emissions from biomass consumption are zero, whereas in LCA, they include all energy consumption required to make the biomass available to the consumer.

The choice of using “standard” or LCA emission factors is optional. The Covenant of Mayors Guide sets out the emission factors in each case for the main types of fuel.

There are several different tools for drawing up emissions inventories; the JRC identifies and assesses 8 different tools for use at local level in its document. “Methodologies and Tools for CO₂ inventories in cities”. Each region will have to analyse and assess which tool best suits its specific characteristics.

2.8 Summary of the regional energy survey

A summary of the regional energy survey can be carried out through a SWOT scheme. This will be the basis for determining the strategic objectives and the strategies and measures to move towards these objectives. The SWOT, and specifically the “opportunities” section of the SWOT, should cover the following ENNEREG topics:

- Physical, social and economic framework
- Regulatory framework
- Energy markets and infrastructures
- Energy consumption in the different sectors: transport, industry, buildings, primary sector
- Local energy production, self-supply, renewable energies.

TABLE 5. NATIONAL AND EUROPEAN EMISSION FACTORS FOR CONSUMED ELECTRICITY

COUNTRY	STANDARD EMISSION FACTOR (t CO ₂ /MWh _e)	LCA EMISSION FACTOR (t CO ₂ -eq/MWh _e)
Austria	0.209	0.310
Belgium	0.285	0.402
Germany	0.624	0.706
Denmark	0.461	0.760
Spain	0.440	0.639
Finland	0.216	0.418
France	0.056	0.146
United Kingdom	0.543	0.658
Greece	1.149	1.167
Ireland	0.732	0.870
Italy	0.483	0.708
Netherlands	0.435	0.716
Portugal	0.369	0.750
Sweden	0.023	0.079
Bulgaria	0.819	0.906
Cyprus	0.874	1.019
Czech Republic	0.950	0.802
Estonia	0.908	1.593
Hungary	0.566	0.678
Lithuania	0.153	0.174
Latvia	0.109	0.563
Poland	1.191	1.185
Romania	0.701	1.084
Slovenia	0.557	0.602
Slovakia	0.252	0.353
EU-27	0.460	0.578

CASE STUDY: SWOT Matrix of Vila-real City

Strengths	Weakness
<ul style="list-style-type: none"> S.1. High solar radiation S.2. Availability of a considerable area of roof polygons, easily connectble to the power grid S.3. A large amount of biomass S.4. Provision of local government to leverage resources and enhance a more sustainable local energy system S.5. Existence of trained staff in city council S.6. Existence of a large network of energy distribution, both electric and natural gas S.7. Access to Valencia IT energy with Geothermal S.8. Access to Valencia IT energy with Biomass S.9. Existence of businesses in the city S.10. Existence of municipal action creating precedent (evaluation of available roof surfaces, two-tier plan for replacement of more efficient lamps, voltage reduction, software that inventories municipal fleet's fuel type, 5 persons responsible for maintenance, etc.) S.11. Rate of emerging new businesses is quite dynamic S.12. Highly innovative; pioneers S.13. Generate more jobs in the energy market S.14. Workers have increased environmental awareness S.15. Able to meet the energy demand of less developed countries 	<ul style="list-style-type: none"> W.1. Lack of fossil energy resources W.2. Low installed electric power generation W.3. There is sensitivity to energy problems W.4. Insufficient awareness of the use of renewable energy W.5. Buildings are not in compliance with bioclimatic criteria W.6. Alternative energies have a weak supply chain W.7. Poor quality of electric service in some areas (out of reach of the electricity grid) W.8. There is no specific budget dedicated to municipal energy W.9. Small-sized businesses and industry W.10. Small investments in R & D W.11. Insufficient training RRHH W.12. Absence of proactive marketing to connect with the market W.13. Dispersion in the value chain W.14. Negligible contribution to the energy structure W.15. In the CV only 2,3% of primary energy is renewable, goals for 2010 need to be defined W.16. Only 0,54% of electricity comes from renewable sources W.17. Low potential for harnessing renewable energy sources (Mini, Wind) W.18. High consumption in the industrial sector of the municipality
Opportunities	Threats
<ul style="list-style-type: none"> O.1. Existence of industry sectors with the possibility of cogeneration (mainly tile sector) O.2. Suitable climate for the successful implementation of the bioclimatic architecture criteria O.3. There is a new potential for development of local employment associated with new ways of harnessing renewable energy in mini-wind / photovoltaic, solar thermal and geothermal enthalpy O.4. Possibility of being more competitive and give added value to products developed by companies in the municipality through cost savings and greater respect for the environment O.5. Existence of an interesting development potential associated with solar and biomass through ESCOS O.6. Growing demand in the CV, Spain and UE O.7. Limitations on fossil fuels. Advantages in favor of renewable O.8. Favorable environment for the development of the sector from all area administrations O.9. Available technologies and training O.10. Development of a potential market O.11. Possibility of using mini-wind in the town with the new regulations being developed nationally 	<ul style="list-style-type: none"> T.1. Progressive deterioration of the environment T.2. Excessive fossil fuel dependency T.3. Risk of high cost of energy resources T.4. Reduced competitiveness of the productivity of the town because of rising energetic costs T.5. Population growth and voracious urban development T.6. Inadequate communications infrastructure T.7. Pressure in the area and patterns of inadequate mobility systems T.8. Internal competition between large and powerful operating companies and SMEs T.9. No substantial indigenous applicants T.10. Access to new technologies and to sector not easy T.11. Uncertainty and inflexibility in regulations

Source: Easy Project, IEE, 2010

3 Preliminary regional objectives for 2020

Based on the information on the regulatory framework and the renewable energy potential at a regional level, regional targets have to be established to 2020. The regional targets should contribute to advancing towards the European and national strategic targets, although they must be specific to the region and will depend on the initial potential for action in the area of energy efficiency and energy saving in the different industries and the starting situation in terms of introduction of renewable energy and the actions under consideration.

Each region can establish its own indicators that will serve to measure the advances made towards sustainability energy. However, these aims can be summarised in some basic indicators which can be used for benchmarking among regions:

- CO₂ emissions (percentage increase on baseline year)
- Percentage of final consumption from renewable energy
- Percentage of electricity consumption from renewable electricity production
- Percentage of energy self-sufficiency

In addition, some indicators have been requested to the project partners for the ENNEREG project by the European Commission, for the end of the project and for 2020:

- Cumulative investment in sustainable energy
- Renewable energy production (Mtoe/year)
- Primary energy savings (Mtoe/year)
- Reductions in greenhouse gas emissions (Mt CO₂e/year)

The region must establish 2020 targets for these indicators. As stated, these targets should be in line with European and national targets, but they also need to be realistic and at the same time ambitious. They must be realistic in the sense that they must be possible to meet with the actions planned at all levels, from local through to European. And they must also be ambitious; if the initial situation makes it easy to achieve numerically high targets, the targets should be made more challenging so that the region plays its part in achieving the common European objective.

In addition, qualitative objectives should be set by the regions indicating their motivation and their vision of a desired sustainable energy community.

4 Contents of the Sustainable Energy Action Plan

4.1 The planning stage

The objective of the SEAP is to establish a vision with specific objectives for a sustainable energy future and organize all the strategies and actions for advancing towards this vision. The SEAP will define and organize the actions to be carried out and the necessary resources, and must be consistent with the strategic objectives that have been set.

Participation by regional “players” is essential for successful development of the plan and implementation of the actions. [A separate document on the involvement of stakeholders in this matter is being prepared in parallel to this one]

Various different agents should be involved in drawing up the SEAP, especially government departments with the capacity to assess the activities proposed by the work team and adhere to them. An Action Plan must never be a document drawn up unilaterally by a consultancy service or a government department responsible for energy or the environment.

It is recommended that the action plan be approved at the highest level within the authority. In the case of the Covenant of Mayors, the covenant initiating the whole process of the municipal action plan is signed by the mayor in person, helping make the plan more consistent.

The European Commission provides a number of materials for preparing SEAPs at a municipal level on its Covenant of Mayors webpage: (http://www.eumayors.eu/library/documents_en.htm).

Although municipal and regional levels are not the same and may involve different kinds of action, most of the criteria developed in the Covenant of Mayors materials in this webpage may be useful for working at a regional level.

The SEAP uses the results of the Energy Survey and the Baseline Emission Inventory to identify the best areas of action and opportunities for reaching the strategic objectives. The role of the Regional Authorities in the SEAP has different perspectives:

- Energy consumer, producer and model. Regional Authorities have direct responsibilities over infrastructures and buildings whose management will serve as an example to the general public. In some cases they may also have a direct influence on energy production.
- Planning, development and regulation. On occasions regions occupy a tier of power for acting in this field between local and national authorities. But even where they have no legal powers, regional governments have the capacity to influence more local policies and to coordinate them, and also to influence state regulation. Especially relevant is the potential action of the region as a Covenant of Mayors Support Structure, encouraging municipal authorities to act in areas that come within their powers.
- Advisor and motivator. Of particular importance is the regional authorities’ capacity to raise public awareness, on occasions substituting or coordinating local action by local authorities with less capacity to perform awareness-raising activities.

4.2 Planning of policies and measures

There are many different methodologies for preparing a SEAP. In its document “Methodologies and Tools for the Development and Implementation of SEAPs”, the JRC describes and compares ten different methodologies that can be used as a reference point for preparing the SEAP at municipal level.

However there may be some differences between performing a SEAP at regional and municipal level:

- For the municipal SEAP, consideration of industrial consumption is optional, whereas for a regional SEAP, it is an important part of the area of activity.
- In particular, the Covenant of Mayors excludes industries participating in the European CO₂ Emission Trading System, whereas at regional level they should not be excluded.
- Many actions, such as management of inter-urban public transport, which are difficult to manage at municipal level, can be carried out at regional level.

There may be also links between the regional plans and the national ones by one side, and the municipal ones by the other side. National plans need of course to be considered in the development of regional plans, as they set at least partially the framework for action in energy efficiency and renewable energies, for example. But also in some cases where regions or municipalities have the capacity to map the RES, and more specifically to map the wind farms, or other energy infrastructures, the regional plans need to be considered at a national level.

The European Commission provides some criteria on policies and measures that can be implemented in the Covenant of Mayors guidebook “How to develop a sustainable energy action plan (SEAP)”. The policies and measures are described in Part I and Part III of the guidebook:

- Part I The SEAP Process, step-by-step towards the -20% target by 2020. Chapter 8 of the report sets out the general policies and measures in the following sectors:
 - Buildings sector
 - Transport
 - Renewable energy sources and distributed energy generation
 - Public procurement
 - Urban & land use planning
 - Information and communication technology (ICT)
- Part III Technical measures for energy efficiency and renewable energy. This report includes specific considerations related to:
 - Buildings. New buildings, existing buildings, public buildings.
 - Domestic, professional and public lighting
 - Heating/cooling, including renewable
 - Electricity production, including renewable
 - District heating and cooling
 - Office appliances
 - Biogas
 - Demand side management
 - Energy audits
 - Specific measures for industry

POLICY INSTRUMENTS AT DISPOSAL OF THE LOCAL AUTHORITY	PRIVATE BUILDINGS			PUBLIC BUILDINGS		
	New	Renovated	Existing	New	Renovated	Existing
Energy performance regulations	X	X	-	+	+	-
Financial incentives and loans	X	X	+	+	+	-
Information and training	X	X	X	X	X	X
Promote successes	X	X	+	X	X	+
Demonstration buildings	X	X	-	X	X	-
Promote energy audits	-	X	X	-	X	X
Urban planning and regulations	X	+	-	X	+	-
Increase the rate of refurbishment	-	X	-	-	X	-
Energy taxes	+	+	+	+	+	+
Coordinate policies with other levels of authority	X	X	X	X	X	X

X = most relevant + = somehow relevant - = low relevance

Source: Covenant of Mayors Guidebook

The Covenant of Mayors also provides templates to describe the main aspects of the SEAP in a standard format.

4.3 Implementation of the measures

The implementation stage puts the measures defined in the SEAP into real action. The SEAP must set out the deadlines and responsibilities for implementing the measures. Priority should be given to measures that will have the greatest impact on the energy system and the environment with the least outlay in terms of time and money.

This work is linked within the ENNEREG project with WP4, concerning the implementation of SEP measures.

4.4 Evaluation and reporting

The SEAP should define the way the assessment is carried out and its periodicity. Implementation of the measures is assessed on the basis of trends in the basic sustainability indicators and a progress report on the planned activities.

This work is linked within the ENNEREG project with the WP4 task on the topic “monitoring”.

5 References

- Covenant of Mayors, 2010: Guidebook “How to develop a sustainable energy action plan (SEAP)” http://www.eumayors.eu/library/documents_en.htm.
- JRC, 2009a: “Methodologies and Tools for the Development and Implementation of SEAPs ” http://www.eumayors.eu/mm/staging/library/seap_r/docs/001_Report_I.pdf
- JRC, 2009b: “Methodologies and Tools for CO₂ inventories in cities” http://www.eumayors.eu/mm/staging/library/seap_r/docs/003_Report_II.pdf
- Easy (Energy Actions and Systems for the Mediterranean Local Communities), 2010: “Tools and Concepts for the Local Energy Planning”. (Intelligent Energy Europe) http://www.easyaction.eu/images/docs/easy_model_cd_en_lite.pdf