



Project: RURENER

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Inventory of existing methodologies and tools

Task 2.1.3 & 2.1.4

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Table of Contents

1. Introduction 3

2 Inventory 4

3 Tools comparison - results..... 11

1. Introduction

Within RURENER the communities (network members) need to evaluate their starting point and progresses toward energetic-neutrality. For this purpose, RURENER wants to propose a measure grid for the network members. The difficulty lies in the diversity of the situations among the rural communities. Thus, it may not be possible to determine a single tool that would fit for all the communities (Task 2.2.2).

For that purpose, as a start point, the existing tools will be identified (sectoral or transversal) and RURENER will identify the right structure/person to contact when a network member decides to use them. In this case, RURENER Network is used as a link toward other projects at national or European level.

This report present the results of the investigation dealing with existing tools and methods primary for energy but also for CO₂ balance. The scope of this investigation is to find out if there are any existing tools and methods suitable for energy balancing in rural areas and communities and how they can be used (as it is or with adaptation) for the purpose of RURENER project.

Energy production, consumption, saving and efficiency is a main component of every community project, thus energy planning can help communities to achieve sustainability (energetic neutrality and environmental protection) in a long-term horizon. These steps will help also the communities to reduce their environmental impacts. We should clarify that “community” can take many forms. For the planning purposes of RURENER “community” means an area or group of collective members with common interests. Thus, the meaning is broader of the municipality that means the governmental body of a community, city or district.

2 Inventory

Energy planning can be classified in many categories according to their methodological steps and many criteria. A main category is the “bottom-up” and “top-down” approaches. Bottom-up models include the description of given energy-related tasks than energy demands when the top-down models focus on energy demand. In principal the energy planning should be addressed with the tool and a basic criterion to formulate or to use one is the simplicity and to gives answers to the main questions.

Within RURENER an inventory of the existing energy and CO₂ balancing methods and tools that can be used or at least guide the formulation or adaptation of an existing one for the purpose of RURENER network was carried out. The scope was to find out if there were existing tools in place which can be used by RURENER network members.

The most of the existing tools are dealing with CO₂, are presented in excel sheet and some of them are web based. The main differences are related to level of analysis (eg transversals or sectoral), the form and details of inputs and the outputs. A not extensive list of Energy and CO₂ balancing tools follows:

- CO₂ Rapid Assessment Method (MedClima project)
- ECO₂regio software
- Clean Air and Climate Protection Software (CACP) - ICLEI
- Harmonized Emissions Analysis Tool (HEAT) - ICLEI
- Low Carbon Cities Programme (LCCP)
- Resource and Energy Analysis Program (REAP)
- Bilan Carbone - ADEME
- Greenhouse Gas Regional Inventory Tool (G.R.I.P.)
- GHG Inventory Quantification Support Spreadsheet
- Global Emission Model for Intergates Systems (GEMIS)
- Community Energy Planning Toolkit (CEAP)
- Energy Planning Tool (Transplan project)
- Greenhouse gas strategy software for cities (ICLEI)
- Covenant of Mayors
- CO₂-Grobbilanz
- CO₂ calculator

1. CO₂ Rapid Assessment Method

This method was developed within the framework of LIFE-ENVIRONMENT project MedClima. The project was an initiative taken by three Mediterranean cities (Municipality of Holargos - Greece, Municipality of Palermo - Italy, Municipality of Slovenska Bistrica-Slovenia) in the field of climate protection strategies. The method evaluates CO₂ emissions on local level and can be used in order to identify activities that contribute to GHG emissions.

The tool is an excel sheet, it is based on a minimal number of data requirements and is concentrating in the following sectors:

- Residential,
- Commercial,
- Industrial,
- Public,
- Transport

The final output is CO₂ per inhabitant and is orientated for the planning of climate protection measures by municipalities.

The tool (excel sheet) and useful information for its use can be found free at:

<http://www.medclima.gr/technical-progress.html>

2. ECO₂regio software

The tool is online software that assess and calculates energy consumption and greenhouse gas emissions on both the personal as well as the regional level developed by Ecospeed. The tool was developed especially for the needs of regions (cities, provinces, states) and calculates sectoral consumptions (households, economy and transportation). There are different versions. ECOregion-Communities allow analysing the energy use of a community. It helps to improve the efficiency of the energy use by defining the most effective measure. The CO₂ calculator can help to analyse the greenhouse gas emission and with it to reduce them.

The following Energy consumption and CO₂ emissions are possible:

- per energy carrier or sector (economy, households, transportation, governmental facilities),
- of economic sector per energy carrier or sub-sector
- of household sector per energy carrier
- transportation sector per energy carrier of vehicle types
- for end-energy or gross-energy consumption.

There is a trial version of the software. Further information relating to the tool can be found at <http://www.ecospeed.ch>

3. Clean Air and Climate Protection Software (CACP) - ICLEI

ICLEI - Local Governments for Sustainability is an international association of local governments as well as national and regional local government organizations that have made a commitment to sustainable development. ICLEI has developed many greenhouse software tools.

CACP 2009 is a one-stop emissions management tool that calculates and tracks emissions and reductions of greenhouse gases (carbon dioxide, methane, nitrous oxide) and criteria air pollutants (NO_x, SO_x, carbon monoxide, volatile organic compounds, PM₁₀, PM_{2.5}) associated with electricity, fuel use, and waste disposal. CACP 2009 was created to support emissions inventorying and climate action planning based on the principles and methods of the Local Government Operations Protocol (LGOP).

This tool can help Communities to do the following:

- Create emissions inventories for the community as a whole or for the government's internal operations.
- Quantify the effect of existing and proposed emissions reduction measures.
- Predict future emissions levels.
- Set reduction targets and track progress towards meeting those goals.

Further information relating to the tool can be found at <http://www.icleiusa.org/action-center/tools/cacp-software>

4. Harmonized Emissions Analysis Tool (HEAT) - ICLEI

With support from US Agency for International Development (USAID), ICLEI developed the Harmonized Emissions Analysis Tool (HEAT) online software to support local greenhouse gas and air pollution emission reduction planning. The software provides capacity to local governments to seek to reduce GHG emissions based on sound governance, economic development, improved waste management, energy efficiency, better urban mobility, and better air quality.

In general the software can:

- build an emissions inventory based on local energy use, transportation demand, and waste practices
- assist a user to create a simple emissions forecast
- set a target/goal for reducing emissions (e.g., reduce GHG emissions by 10%)
- quantify emission reduction activities and their co-benefits
- Develop, report, and track progress made in meeting that target.

Initial countries for which HEAT is being prepared include India, Indonesia, South Africa, and Brazil.

The online version can be found at <http://heat.iclei.org:80/ICLEIHEAT/portal/main.jsp>

5. Low Carbon Cities Programme (LCCP)

Low Carbon Cities Programme – Supporting Bristol, Leeds and Manchester in developing city-wide carbon reduction strategies. The Low Carbon Cities Programme was funded by Defra and delivered by Carbon Trust and Energy Saving Trust. The consultancy team is a consortium of experts in carbon management, event facilitation and change management.

In the framework of this programme a Baseline tool was developed. The main input categories are:

- Stationary emissions sources (buildings and street lighting)
- Transport emissions (Commuting, fleet and business)
- Waste and Water

The outputs generates summary statistics fro energy use and emissions.

The tool can be found at <http://www.lowcarboncities.co.uk/cms/baseline-tool>

6. Resource and Energy Analysis Program (REAP)

REAP was designed by Stockholm Environment Institute (SEI), Centre for Urban Regional Ecology (CURE) and World Wildlife Fund (WWF). It was a product of Ecological Budget UK and can be used to help policy makers understand and measure the environmental pressures associated with human consumption. It can be used at the local, regional and national levels.

REAP uses some of the most sophisticated modelling approaches to understand the material flows, carbon dioxide emissions, greenhouse gas emissions and Ecological Footprint of the UK, regions and local authorities

REAP is only available to licence holders. Further information relating to the tool can be found at <http://www.resource-accounting.org.uk/software>

7. Bilan Carbone - ADEME

The Bilan Carbone method is a greenhouse gas (GHG) emissions assessment tool. It can be used to account for the greenhouse gas (GHG) emissions of all types of organisation: industrial or tertiary companies, administrations or local authorities. The Bilan Carbone method has been developed by ADEME and it applies to industrial or tertiary companies, administrations, local authorities and even the territories managed by local authorities

There are 2 versions of the Bilan Carbone® tool:

- The “business” version which is used to evaluate the emissions of an industrial or tertiary activity , and
- the “local authorities” which has two modules a) the “assets & services” module which assesses the authority’s operating emissions for its own activities and b) the “territory” module which assesses the emissions of all activities in a territory (eg. industry, tertiary, residential, agriculture, transport, etc.).

Further information relating to the tool can be found at <http://prod1-w2ademe.integra.fr/servlet/KBaseShow?sort=-1&cid=23674&m=3&catid=23675>

8. Greenhouse Gas Regional Inventory Tool (G.R.I.P.)

This online tool provides the regions of Europe with a consistent methodology that enables them to produce an inventory of greenhouse gas emissions, and to monitor them annually. The tool also enables regions to compare themselves to other regions in terms of their energy consumption and emissions, on both a per capita and economic basis. In addition as regions populate the tool, and therefore the database it will provide graphical representations of metropolitan emissions across Europe. This will include total as well as sector (Domestic, Industry, Transport) representations.

The GRIP initiative has taken place in two stages. The first stage was funded by the Tyndall Centre and The Environment Agency, this led to the production of an inventory methodology for use by the English Government Office Regions. The second stage was funded by METREX, this led to the production of the "GRIP for Europe Methodology". This latter methodology is a progression of the original and is therefore backwards compatible with it. The GRIP initiative, which comprises both methodologies and a novel approach to scenario formation (via the GRIP Scenario Tool) was devised by Sebastian Carney PhD at Tyndall Manchester.

Further information relating to the tool and the online version can be found at <http://www.grip.org.uk/inventory.html>

9. GHG Inventory Quantification Support Spreadsheet

The Inventory Quantification Support Spreadsheet is a tool created to assist municipal governments in the calculation of their greenhouse gas (eCO₂) emissions. It is based upon the Partners for Climate Protection (PCP) GHG Software. This tool will help you calculate your municipal government's corporate and community eCO₂ (equivalent CO₂) emissions based on energy consumption and waste to landfill. See more details about PCP toolkit at <http://www.sustainablecommunities.fcm.ca/Partners-for-Climate-Protection/Toolkit.asp>

The tool can be found at http://www.sustainablecommunities.ca/files/Capacity_Building_-_PCP/GHG-inventory-quantification-spreadsh.xls-En.xls

10. Global Emission Model for Intergates Systems (GEMIS)

GEMIS is a life-cycle analysis program and database for energy, material, and transport systems. GEMIS was developed in 1987-1989 as a tool for the comparative assessment of environmental effects of energy by Öko-Institut and Gesamthochschule Kassel (GhK). Since then, the model was continuously upgraded and updated. GEMIS includes the total life-cycle in its calculation of impacts - i.e. fuel delivery, materials used for construction, waste treatment, and transports/auxiliaries. The tool is available freely and can be found at <http://www.oeko.de/service/gemis/en/index.htm>

11. Community Energy Planning Toolkit (CEAP)

The Arctic Energy Alliance (AEA) developed this toolkit with help from Mary McGreadie, NWT Literacy Council. The toolkit was produced for the Northwest Territories Communities (NWT) of Canada.

The Community Energy Planning toolkit has everything that NWT communities need to develop and implement a community energy plan and is based on a 6-step process. The SEAP is very detailed and analytical with practical information, guidelines, worksheets and samples and most of all an excel worksheet.

The tool can be found at http://www.aea.nt.ca/resources/resource_library/

12. Energy Planning Tool (Transplan project)

Transparent Energy Planning and Implementation (TRANSPLAN) project is co-financed by the Intelligent Energy - Europe programme (IEE).

The TRANSPLAN project will produce 5 new energy plans for 5 islands. These plans will contain tools for the:

- systematic monitoring of the development in energy consumption,
- demonstration of more efficient implementation methods, and
- dissemination and creation of networks for sharing experience.

The Energy Planning Tool (EPT) will offer systematic and transparent monitoring of energy consumption within a geographic area through the elaboration of energy balances.

TRANSPLAN will demonstrate how to integrate this tool in the democratic process by evaluating the progress in the replacement of fossil fuels in a municipality or a region every second year and providing politicians with the most important key figures for decision making (cost of imported fuel to the area, CO2 emission, utilisation of RES, conversion efficiency, reduction in end use).

Further information relating to the project and the EPT can be found at <http://www.transplanproject.eu/?secid=10&pid=54>

13. Covenant of Mayors

The **Covenant of Mayors** is a commitment by signatory towns and cities to go beyond the objectives of EU energy policy in terms of reduction in CO₂ emissions through enhanced energy efficiency and cleaner energy production and use. All Covenant signatories commit to submitting their Sustainable Energy Action Plans (SEAPs), within the year following their adhesion, and therefore showing how to reach their CO₂ reduction target by 2020.

For that reason, a SEAP template has been developed by the Covenant of Mayors Office in close collaboration with the Joint Research Centre of the European Commission. Among others, the template includes a part dedicated to Key results of the Baseline Emission Inventory (indicating the current level of energy consumption and identifying the principal sources of CO₂ emissions). The template was designed to use final energy consumption and summarise the main data of a Municipality and it is not a calculator tool for CO₂ emissions.

The template (excel sheet) and the instructions can be found at http://www.eumayors.eu/library/documents_en.htm

14. CO₂-Grobbilanz (German)

The CO₂ Grobbilanz has been widely used in Austria and was developed by the energy agency of the Austrian regions (Energieagentur der Regionen). The scope of this tool was to take account of the GHG emissions generated by cities. There are two modes of the tool a) a “standard mode” and b) a more detailed mode “expert mode”. This tool can be applied from the scale of small communities to larger ones and it is based on emission factors of Austria. The CO₂ Grobbilanz takes account of three gases: CO₂, methane and NO_x. All the emissions caused by activities carried out in the territory are taken into account. The tool measures the emissions of the following sectors: heat, electricity, mobility, waste and agriculture. The CO₂ Grobbilanz is simple to use and allows also small communities to compile an inventory. Further information relating to the tool can be found at <http://co2rechner.klimabuendnis.at/Intro.aspx>

15. CO₂-Calculator

The tool was developed by the Danish National Environmental Research Institute (NERI) in cooperation with a private consultancy firm (COWI) back in 2008. The main goal of the tool was to give an opportunity to Municipalities to monitor their GHG emissions, but also to ensure that the tool was free of charge and was easy to use. The tool can calculate emissions of the Municipality as an administrative structure or as a territory. The tool has over 400 input fields and needs a variety of data. Further information relating to the tool can be found at <http://www.miljoportal.dk/CO2-beregner/>

3 Discussion

The already existing tools have many similarities. Most of the tools are excel sheets and some of them are web based. Most of the tools are available in English and some of them only in one language (the national one). Furthermore, there are some tools that can be used freely and some others need license. The main differences are related to the necessary inputs, the analysis level and the output presentation.

The main findings from this investigation shows that there are several good quality tools in place and many municipalities and cities take benefits of their use. In some cases these tools are applied at a national level and the mandatory introduction of a new tool will be not of an added value.

From a first preliminary examination of the identified tools (the free versions) it seems that TRANSPLAN tool can be applicable to municipalities and regions and not only to islands. Moreover, the SEAP template which has been developed by the Covenant of Mayors Office is a simple tool indicating the current level of energy consumption and identifying the principal sources of CO₂ emissions.

In the context of Task 2.2.2 RURENER has proposed a common basic grid to collect data and measure energy needs and supply at a community level.

The basic criteria and requirements for an Energy balancing tool so that can be used for the RURENER purposes are given below:

- Simple structure, concise, web based in a simple form (eg excel worksheet)
- Flexible (easy to update or add new subcategories by the user)
- Applicable in several communities despite their diversity and characteristics
- Easy access and understand the structure by the user, easy load of the data
- Bottom-up approach and check with regional or national figures or indicators (combination of bottom-up and top-down approach)
- Inputs can be detailed if exists or approximately based on estimations
- Outputs will give energy use of the Community per each end use