



## Comunità Montana Associazione dei Comuni "Trasimeno-Medio Tevere"

### Summary of key aspects of the Environmental Energy Plan (LEAP) of the Lake Trasimeno – Medio Tevere area

One cannot live without energy, and one cannot live badly - that is live with little energy: every person, every family, every territory needs to not only safeguard the level of one's quality of life, but also constantly improve it.

Energy is therefore a primary resource: it is essential that we have it, use it and enhance it to the maximum.

This is a fact of life and, at the same time, a problem and an opportunity that every person, every group, every company, every territory must face and learn to manage, that is must be able to use to improve their standard of living.

Science, technology, economy, good governance and citizen responsibility are the primary tools that should be used to best govern the complexity of the issue and identify the required solutions to then implement and manage them so that they can yield concrete and lasting economic, environmental and social benefits, thereby improving the quality of life of the Lake Trasimeno - Medio Tevere area.

To this end, the following planning process was adopted:

- a) *Being informed in order to understand*
- b) *Understanding in order to assess*
- c) *Assessing in order to decide*
- d) *Deciding in order to act*
- e) *Acting in order to achieve constant improvement over time*

to produce the Lake Trasimeno - Medio Tevere area's Energy and Environmental Plan (LEAP), exploiting the knowledge, experiences, best practices and results of the work carried out in cooperation with Italian and European partners, thanks to the European project Sustainable\_Now ([www.sustainable-now.eu](http://www.sustainable-now.eu)).

In 2008 the Comunità Montana (the Italian administrative body that coordinates the municipalities located in the mountainous areas) – Associazione dei Comuni "Trasimeno – Medio Tevere" joined the European transnational cooperation 'Sustainable\_Now' project, which is co-financed by the European 'Intelligent Energy Europe' programme, to define the Lake Trasimeno - Medio Tevere area's Environmental Energy Plan (LEAP), in pursuit of the ongoing goal of sustainable development in the area.

Let us better explain what this means and will mean in the future:

#### **a) *Being informed in order to understand***

First, it was necessary to understand what we were dealing with as regards the whole Trasimeno - Medio Tevere area:



- how much energy do we need?
- what sources do we get it from?
- how is it consumed, i.e. used?
- what impacts in terms of greenhouse gas emission are produced, with specific reference to CO<sub>2</sub> (carbon dioxide) emissions?
- is it possible to improve the situation?

all this to gather as much detailed and reliable information as possible regarding the area's energy resources and then define a framework - a starting point - to improve the situation.

The work done during the past year has allowed us to understand that:

- a) there were no exhaustive and homogeneous sources of information that were updated regularly with a recognised method on a useful territorial scale, that is, for each municipality in our area;
- b) an internationally recognised method was not being used by the parties that had the information needed to calculate the energy consumption and therefore the CO<sub>2</sub> equivalent emissions;
- c) there were however some best practices at a local level, though each disconnected from the other;
- d) the need arose to create an indicator, a 'measurement unit' readily understandable by all, to report and therefore make understood the way things really stood.

Therefore, work began and was adapted, as much as possible, to the estimate officially recognised by the European Commission - Covenant of Mayors:

[http://www.eumayors.eu/IMG/pdf/seap\\_guidelines\\_en-2.pdf](http://www.eumayors.eu/IMG/pdf/seap_guidelines_en-2.pdf).

The results are explained in detail in the following chapters. In short, they can be summarised by the following 'measurement unit': **4.43 t/CO<sub>2</sub> (tonnes of CO<sub>2</sub> equivalent emission per capita) per citizen**, which summarises the Trasimeno - Medio Tevere situation in terms of energy and greenhouse gas emissions.

### ***b) Understanding in order to assess***

We then proceeded to assess the contribution in percentage of the various economic sectors, behaviours/lifestyles, the territorial environmental resources, at the calculated value of t/CO<sub>2</sub> (**tonnes of CO<sub>2</sub> equivalent per capita) per citizen**.

The result of the assessment is as follows:



## Inventory of emissions up to 2006

Category	Energy end-consumption (MWh)						
	Electricity	Methane	LPG	Diesel fuel	Petrol	Wood	TOTAL
agriculture	18422			64760			83183
industry	133104	14218					147322
residential buildings - domestic use	113606	374134	5961	17546		101016	612263
service sector	113745	30714					144459
public lighting	13157						13157
mobility			40512	410159	280614		731284
<b>Total</b>	<b>392.035</b>	<b>419.066</b>	<b>46.473</b>	<b>492.465</b>	<b>280.614</b>	<b>101.016</b>	<b>1.731.668</b>

### CO<sub>2</sub> emissions (equivalent tonnes)

Category	Electricity	Methane	LPG	diesel fuel	petrol	Wood	TOTAL
agriculture	8843			17291			26134
industry	63890	2872					66762
residential buildings - domestic use	54531	75575	1484	4685		0	136275
Service sector	54597	6204					60802
public lighting	6316						6316
mobility			10087	109512	69873		189473
<b>Total</b>	<b>188.177</b>	<b>84.651</b>	<b>11.572</b>	<b>131.488</b>	<b>69.873</b>		<b>485.761</b>

**Thereby obtaining a value of 4,43 t/CO<sub>2</sub> for each inhabitants - 109.685 total inhabitants -(tonnes of CO<sub>2</sub> equivalent per capita)**

**Which immediately begs the question: Is that a lot? Is that too little?**

So, as an example, let us take as a reference:

the report "*Cittalia 2010. Cittadini sostenibili*" (Cittalia 2010. Sustainable citizens) by the Anci Ricerche Foundation, December 21, 2010

([http://www.cittalia.it/index.php?option=com\\_content&view=article&id=2841:rapporto-cittalia-2010-cittadini-sostenibili&catid=1:documenti-cittalia&Itemid=14](http://www.cittalia.it/index.php?option=com_content&view=article&id=2841:rapporto-cittalia-2010-cittadini-sostenibili&catid=1:documenti-cittalia&Itemid=14))

The Cittalia 2010 Report provides an estimate of the environmental impact based on the evolution of residential consumption of electricity, natural gas and water, the production and management of municipal waste and consumption of the different types of fuel in relation to private transport.



The analysis does not include the environmental impact from the consumption of food and non-food products, while the level of use is employed to calculate durable goods, expressed in the demand for electricity, natural gas and fuel.

The 15 metropolitan areas looked at in the Cittalia 2010 Report are: Bari, Bologna, Cagliari, Catania, Florence, Genoa, Messina, Milan, Naples, Palermo, Reggio Calabria, Rome, Trieste, Turin and Venice.

In the Cittalia 2010 Report the environmental impact caused by citizens (measured in terms of CO<sub>2</sub> released into the environment) was calculated with reference to:

- domestic electricity consumption;
- domestic gas consumption;
- the production and management of waste (evaluated in terms of CO<sub>2</sub> generated by incineration operations only);
- private transport of people (motor vehicles and mopeds, therefore not including public transport).

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The **Cittalia 2010 Report**, therefore, analysed the **carbon footprint of a metropolitan Italian citizen**, over a span covering the last decade (2000-2009).

In 2009 Rome was the city that emitted the largest amount of CO<sub>2</sub> (about 6,600 thousand tonnes; a figure however that is also determined by the demographic weight of the resident population in the capital); which is followed by Milan (2,408 thousand tonnes) and Turin (about 2,094 thousand tonnes), well above the average value of emissions calculated for the 15 cities (1,261 thousand tonnes).

Reggio Calabria and Cagliari are the cities with the lowest emissions of CO<sub>2</sub> by inhabitants (respectively 223.5 and 239.1 thousand tonnes).

The largest percentages of CO<sub>2</sub> emissions, therefore, are found in three cities in the centre-North of Italy (the most populated metropolitan areas), while the lowest emissions are shown to be from the South.

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**AN ESTIMATE OF THE COST OF CO<sub>2</sub>**

CO<sub>2</sub> emissions - being harmful to the environment and human health - are the source of a significant number of negative factors for the community and, as such, sources of a cost that is also expressed in economic terms.

*[The introduction of Directive 2003/87/EC covering the European system for emission permits marked the birth of the carbon dioxide trading market. The system is a tool of environmental regulation, through which the competent authority identifies a ceiling for emissions for a certain period of time, which will be distributed in the form of allowances giving individuals in the system (specifically, in this case, intensive Energy companies), permission to pollute. The permit prices are determined on the basis of trading that takes place on the permits market and is influenced primarily by the quantity of pollution titles that the competent authorities agree to grant to companies under the system and by the companies' behaviour.*

The price used as a reference is the average trading price for the January-September 2010 period, equal to € 14.52 per tonnes of CO<sub>2</sub> emitted.]

Pricing the carbon dioxide emitted into the atmosphere is a way of placing a value on a pure public utility: clean air.

The availability of a market price for CO<sub>2</sub> enables an estimate of costs to be provided for greenhouse gas emissions calculated for citizen, thereby offering an assessment of what the costs related to greenhouse gas emissions generated annually in each city might be.

On average, in 2009, the city with the highest citizen CO<sub>2</sub> emission costs was, of course, Rome, with over €92.6 million, followed by Milan (33.8 million) and Turin (just under €30 million).

Reggio Calabria and Cagliari had the lowest cost per citizen emission, with €3.5 and €2.95 million respectively (Table 3).

**Tab. 3. Costo totale e pro capite delle emissioni di CO<sub>2</sub> del cittadino, 2009 (euro)**

	<b>Costo totale</b>	<b>Costo pro capite</b>
Roma	92.668.908,2	34,9
Milano	33.872.819,4	26,7
Torino	29.960.769,7	33,4
Genova	17.848.485,0	30,5
Napoli	17.638.317,6	18,9
Bologna	12.262.642,3	33,2
Firenze	12.182.813,8	33,3
Palermo	12.180.693,6	19,4
Venezia	8.036.998,2	30,0
Bari	6.635.711,5	21,2
Trieste	6.447.860,9	32,2
Catania	5.610.463,1	20,0
Messina	4.726.145,4	20,2
Reggio Calabria	3.538.523,2	19,7
Cagliari	2.959.956,2	19,2

*Fonte: elaborazione Cittalia*

In terms of cost per capita of citizens' emissions, Rome is still the city that bears the highest environmental costs associated to CO<sub>2</sub> (€34.9), followed by Turin (€33.4) then Florence and Bologna (both €33.2). Yet again it is the centre-North cities that register the highest values, above the cities average (€26.2).

It should be noted that Milan, which has the second highest total cost, is ranked slightly above the average (Figure 5). In contrast, all cities in the South lie below the average. Specifically, Naples, which registered one of the highest overall costs, is the city with the lowest cost per capita of citizens' CO<sub>2</sub> emissions.

It is considered to be right, cost effective and definitely sustainable, to assess the situation that has emerged for Trasimeno - Medio Tevere, to be able to decide how to act to improve the situation.

### ***c) Assessing in order to decide***

At this point, since energy is a resource that can certainly be renewed and used in a decidedly more efficient and effective manner, thereby saving on resources, it is essential to evaluate what should be done.

The world and therefore communities with a higher level of quality of life have long since developed policies and, consequently, energy plans and concrete actions:

- founded on a progressive and sustainable increase in production and the use of energy from renewable sources;
- constantly increasing their capacity for self-production;
- developing technological, organisational and economic solutions that reward energy saving thereby increasing the effectiveness and efficiency in energy use;
- producing new sources of income and therefore new jobs deriving from these solutions;
- safeguarding the environment and improving the quality of life of the peoples involved.

We believe that this is the ideal solution, also taking into account the most recent decisions by the European Commission as reported in Directive 2009/28/EC of April 23, 2009 to achieve the '20-20-20' objectives accepted by all EU member states and that are therefore binding on Italy. It means that:

- consumption of primary sources will be reduced by 20% compared to forecast trends, through increased efficiency;
- a 20% increase in the quota of renewable sources in covering final consumption (for electrical, thermal and transport use);
- a 20% reduction in emissions of greenhouse gases, according to commitments already undertaken, for example the Kyoto Protocol, ETS (Emission Trading Scheme).

First, it is important to clarify from all viewpoints that these objectives can only and solely be achieved if every community, therefore, in the case of our territory, if each municipality establishes its choices, actions, resources, regulations and results it deems credible, useful, affordable and lasting.

To do this, given the complexity of the issue, due to technical-scientific aspects, technology, laws and regulations, the availability of technical expertise and financial resources and the time constraints and development and enhancement policies pursued, the Comunità Montana offers its expertise, knowledge, planning capabilities and strategic management to facilitate the work that each Municipality will have to do, for the sole purpose of establishing synergies, reduce the implementation times and costs, facilitate the identification of resources and provide assistance during each step of the project.

Thanks to the work done to date, the Comunità Montana places the following resources at the disposal of the Municipalities:

1. the reliable cognitive framework on a municipal scale of the energy resource (Kw/h) and therefore the t/CO<sub>2</sub> per capita;
2. evaluation of the entities/sectors responsible for a percentage of such values;

3. the general reference strategy (strategic vision): E-Trasimeno\_Medio Tevere [which basically means developing a network of self-production and marketing of energy from renewable sources (biomass, photovoltaic, wind, mini hydro, geothermal) with technology and innovative organisational and financial solutions that are efficient, effective and sustainable by developing new supply chains and improving the lifestyle of the area], the economic and environmental benefits of which are clearly defined, to be adapted to the specifics of each municipality for achieving the "20-20-20" objectives in a sustainable way;
4. consequently a number of projects have been developed, made up of a first set of project proposals, to which municipalities can refer/draw on, so they can proceed more easily, more efficiently and more quickly to achieve the results they consider to be most consistent with the development and enhancement policies of their communities by making use of the assistance of the Comunità Montana – Associazione dei Comuni "Trasimeno – Medio Tevere".

Which then leads to

#### **d) Deciding in order to act**

At this point, 'deciding in order to act' means evaluating and approving the results of the work undertaken and now presented, to then proceed to a reasoned and shared assessment of those groups of projects from which to derive the projects to be implemented in terms of technical-economic and organisational feasibility, to be put into practice by local authorities with their SEAP - Sustainable Energy Action Plans, making use of the regional (e.g. POR Competitività, etc.), national and European funds (e.g. ELENA - European Investment Bank, etc.) which will become available from time to time. In practice, to fully achieve the European quality objective, recognised and signed by the Italian government for the Trasimeno - Medio Tevere area, this means arriving at a production of:

**3.54 Tonnes CO<sub>2</sub> per inhabitant**  
**i.e.**  
**a reduction of 0.89 t CO<sub>2</sub>/inhabitant**  
**= 20% of emissions per inhabitant**

#### **e) Acting in order to achieve constant improvement over time**

*In practice, this will result in the implementation of the SEAP (Sustainable Energy Action Plans) by adhering Municipalities and then the execution of selected and funded projects, also refining the tools for assessing results and the subsequent, long-term and constant improvement actions, with the strategic goal of implementing the territory's sustainable development model.*

*The municipalities will be assisted by the Comunità Montana in the manner and terms established during the various decision-making stages.*

*Effectively, this will mean:*

**Local Energy Action Plan Comunità Montana Associazione dei Comuni "Trasimeno-Medio Tevere"  
Forum Energia Progetto "Sustainable Now"**

- 1. applying the workflow for the implementation process of the EMAS regulation in the activation stage by the Comunità Montana and the municipalities;*
- 2. progressively adopting an energy management system based on ISO 16000/ISO 50001, closely integrated with the EMAS regulation;*
- 3. in keeping with the resources that will be available, follow the method at the disposal of the Covenant of Mayors for updating the LEAP*

A preliminary sample of what are considered to be the most significant actions is offered below to guide an energy policy shared by the municipalities for achieving the '20-20-20' objectives.

This sample is certainly the starting point for shared and joint processing by the municipalities of the actions planned to achieve the objectives previously outlined.

It is by no means exhaustive nor closed to further enrichment and proposals. Its function is to provide concrete and practical examples to begin the process of improvement in energy use in the territory, in order to further facilitate local sustainable development.

To facilitate this planning process, taking care to minimise the difficulties, risks and technical, organisational and economic resource requirements, the competent municipalities from the Comunità Montana - Associazione Comuni "Trasimeno - Medio Tevere", will adopt the internationally recognised methodological model, which is also an integral part of the 'Covenant of Mayors' which is the basis of the SEAP (Sustainable Energy Action Plan).

In particular, given the socio-economic and territorial characteristics of Trasimeno - Medio Tevere area, the following sample of project actions is proposed, broken down by individual economic sector:

Through the implementation of this first group of project actions, overall, by 2020, the territory could reach the reduction target of 304.780 Mw/h equal to 103,251 t/CO <sub>2</sub> representing 20.1% of the total reported emissions for 2006		
Sector	Strategic objective	Planned project actions
<b>Agriculture</b>	<b>Save 30,676 Mw/h</b> <b>equal to 12,067 t/CO<sub>2</sub></b>	<ol style="list-style-type: none"> <li>1. Install 1 MW photovoltaic plants = 18,200 Mw/h by 2020 in each Municipality;</li> <li>2. purchase 5,000 Mw/h of green energy;</li> <li>3. reduce diesel fuel consumption by 10% equal to 6,476 Mw/h (thanks to the activation of solutions/good practices elaborated under the EU pilot programme Life + Environment 'Accion Agroclimatica');</li> <li>4. promote sustainable biomass energy, including through actions to offset CO<sub>2</sub> emissions equal to 6.000 MWh production</li> </ol>
<b>Industry</b>	<b>Save 44,821 Mw/h</b> <b>equal to 21,514 t/CO<sub>2</sub></b>	<ol style="list-style-type: none"> <li>1 installation on the roofs of industrial buildings of 13 Mwp equal to 18,200 Mw/h (1 for each municipality or subdivision in proportion to the territorial size and the economic importance of the sector);</li> <li>2 10% increase in efficiency of final consumption, amounting to a total of 13,310 Mwh in savings</li> <li>3 purchase of 13,310 Mw/h of energy from certified renewable source, equal to 10% of total industry consumption;</li> </ol>
<b>Residential buildings - domestic use</b>	<b>Save 20,000 Mw/h</b> <b>equal to 9,600 t/CO<sub>2</sub></b>	<ol style="list-style-type: none"> <li>1 construction of cogeneration plants for combined production of electricity and heating in industrial and/or urbanised areas of the various municipalities for a total production of 20,000 Mw/h, amounting to a saving of 5 MW installed;</li> <li>2 energy efficiency of residential buildings (thermal insulation of floors and walls, replacement of fixtures in buildings, control of air conditioning systems, replacement of boilers, use of solar panels, heat pumps, etc. ..)</li> </ol>
<b>Services</b>	<b>Save 13,305 Mw/h</b> <b>equal to 6,386,4t/CO<sub>2</sub></b>	<ol style="list-style-type: none"> <li>1 purchase of green power for use in public buildings, representing a total saving of 3,000 Mw/h;</li> <li>2 installation of 6.5 Mwp of photovoltaic plants on the roofs of public buildings, amounting to a saving of 9,100 Mw/h;</li> <li>3 GPP (Green Public procurement) by the Public Administrations, equal to a saving of 1,205 Mw/h</li> </ol>
<b>Public lighting</b>	<b>Save 13,157 Mw/h</b> <b>equal to 6,315,6t/CO<sub>2</sub></b>	<p>Improve efficiency of existing facilities and purchase of green energy. Below are some measures that can be employed to improve efficiency:</p> <ul style="list-style-type: none"> <li>o replace components with others that can control and manage information relating to switching on and off, voltage regulation, metering and malfunctions, to allow remote management</li> <li>o use of reactors/electronic igniters for the rephasing of light points</li> <li>o use of energy efficient lights</li> <li>o apparatus for limiting power surges</li> <li>o installation of LED lights in the historic city centres and regulating control units</li> <li>o the lighting in the inhabited areas</li> <li>o more energy-efficient bulbs (for example LED, which are estimated to produce energy savings of up to 74%)</li> <li>o electronic switches to reduce the turning-on times of the lighting systems</li> <li>• remote management system for lighting modulation based on external parameters and for monitoring the proper functioning of the installations</li> </ul>
<b>Transport and Mobility</b>	<b>Save 182,821 Mw/h</b> <b>equal to 47,368t/CO<sub>2</sub></b>	<ul style="list-style-type: none"> <li>- replacement of the private car fleet with vehicles that have a lesser environmental impact</li> <li>- replacement of the fleet of municipal cars with EURO 5 vehicles</li> <li>- replacement of existing public transport vehicles with those running on methane *</li> <li>- construction of two new cycle routes *</li> <li>- enhancement of rail transport</li> <li>- implementation of an urban mobility plan with a view to improving alternative public transport *</li> </ul>

<b>Total Emissions Save</b>	103.251 t/CO <sub>2</sub>	- Reduction <b>21,3%</b> emissions <b>CO2</b> in the period 2006-2020
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It should be said that other measures to be put in place to facilitate the achievement of the objectives are

Sector	Strategic objective	Planned project actions
<b>Services production activities</b>		<ul style="list-style-type: none"> <li>• construction of a wood chip heating plant by private parties</li> <li>• preparation of the new building regulation aimed at energy saving, the use of renewable energy sources and the use of bioclimatic technologies *</li> <li>• Introduction in calls for tender of specific requirements for the integration of environmental aspects taking into account the proposed objective</li> </ul>
Sector	Strategic objective	Planned project actions
<b>Building</b>	For buildings under construction	<ul style="list-style-type: none"> <li>- provide external insulation with glass surfaces facing south</li> <li>- require the inclusion of certain components such as shading mechanisms (e.g. internal or external shutters, awnings and solar photovoltaic modules) and meters for recording energy consumption</li> <li>- include the building's expected energy consumption as a criterion in the tender</li> <li>- prevent air infiltration by having good door and window designs that make use of plastic or wood or other insulating materials for the construction of fixtures</li> <li>- assess what materials to use, giving preference to those that are natural and produced locally as well as being less polluting during production and disposal</li> <li>- study of the behaviour of the sites to the wind for natural ventilation strategies to be incorporated into the design of the building</li> <li>- use efficient warm water production systems, preferably through the use of solar panels</li> <li>- design lighting environments making use of natural light, avoiding excessive heat intake through the use of skylights in the appropriate positions</li> </ul>
	For existing public buildings already in use	<ul style="list-style-type: none"> <li>- maintain adequate internal temperatures in the summer and winter</li> <li>- maintain adequate internal and external lighting avoiding waste and benefiting from natural light</li> <li>- keep technical installations under proper maintenance</li> <li>- through grants and loans, encourage the installation of renewable energy systems and the purchase of low-energy materials (more efficient light bulbs and equipment)</li> <li>- identify buildings according to their intended use and detect their consumption in relation to the number of users</li> <li>- increase the awareness level of building occupants through energy audits and encourage correct behaviour providing motivation with a breakdown of savings</li> <li>- monitor consumption to detect anomalies so as to implement immediate corrective actions</li> <li>- assess the need for lighting in relation to the use of the building and the presence of the occupants through sensors</li> </ul> <p>For buildings with a historic (or cultural, aesthetic, etc. ...) value, improving energy efficiency is complicated. Some of the buildings may be protected by law and the options available for improvement are fairly limited. Each municipality must therefore strike a balance between the protection of its architectural heritage and the overall improvement of its buildings.</p>
Sector	Strategic objective	Planned project actions
<b>Energy renewable sources</b>	Photovoltaic market	<p>In order to be able to create an increasingly important photovoltaic market, one must not only strive to achieve key improvements in the manufacturing processes, but also financially support the demand through incentives and funding, especially with regard to applications that are integrated in the buildings. The support programmes will have to be well designed especially given the high level of investment for this technology. Contributions should not be less than 75% of the total investment made.</p> <p>Generally speaking, in this context, the following factors will play a pivotal role:</p> <ol style="list-style-type: none"> <li>1) a genuine desire by the public authorities to develop the sector through specific incentive programmes;</li> <li>2) ability to effectively organise and manage the development programmes. It is of prime importance that the operations users have to carry out in order to build the plants be kept as simple as possible.</li> </ol> <p>Furthermore, it is also essential to include a massive information campaign firstly to ensure that the benefits are fully exploited and, secondly, so that awareness of photovoltaic technology becomes more and more widespread;</p> <ol style="list-style-type: none"> <li>3) widespread co-operation on the part of the local and national electricity and gas companies so that they provide valuable support for users interested in installing a photovoltaic system;</li> <li>4) the support of Municipalities and Local bodies to ensure that building permits are issued quickly. Landscape restrictions often create problems for the installation of solar panels, even if the same area almost always houses imposing electricity towers. Attention to the environment must necessarily be accompanied by greater common sense.</li> </ol>

Sector	Strategic objective	Planned project actions
Citizens' involvement		<ul style="list-style-type: none"> <li>• during the winter season, turn down the heating by about 1°C, thereby obtaining an energy saving of up to 10% in terms of primary end-use energy consumption;</li> <li>• programme the heating system thermostat so that it is lowered by three degrees Celsius during the night (this has the potential to reduce CO2 emissions by about 440 kg per year per household);</li> <li>• replacing single glazing with double glazing allows emissions to be reduced by about 350 kg CO2 per household annually;</li> <li>• avoid leaving TVs, stereos and computers on 'standby'; here too, energy savings are estimated to be 10% of end use consumption;</li> <li>• when buying a new appliance, choose one that is marked European Grade A +, which can cut back on 210 kg of CO<sub>2</sub> emissions per year;</li> <li>• turn off the lights when leaving an area, allowing for an annual benefit of 270 kg of avoided CO<sub>2</sub>;</li> <li>• turn off the cooling system when not at home in the summer, avoids 300 kg of CO<sub>2</sub>emissions a year;</li> <li>• choose to purchase electricity from companies that produce electricity from renewable sources enables every household to cut back on 520 kg of CO<sub>2</sub> emissions a year (green energy group purchasing)</li> </ul>

Moreover, in order to achieve the goal of reducing CO<sub>2</sub> emissions, other special technical measures must be adopted at the local level in the various sectors of activity. Such measures, proposed by SEAP, are listed below

- run washing machines with full loads - 45 kg of CO<sub>2</sub>emissions avoided each year;
- let clothes dry naturally, limiting the use of tumble dryers to eliminate 280 kg of CO<sub>2</sub> emissions each year;
- always ensuring there is adequate pressure in car tires can prevent about 140 kg of CO<sub>2</sub> emissions per vehicle per year;
- using low viscosity oil in car engines can prevent the emission of about 45 kg of CO<sub>2</sub> per vehicle per year;
- plan routes when using the car by selecting roads that will permit a smooth ride (speed as constant as possible, few accelerations and breaks) and driving at low rpm can prevent the emission of about 200 kg of CO<sub>2</sub> per vehicle per year;
- use a bicycle instead of car for short journeys around town, avoiding about 240 kg CO<sub>2</sub> emissions each year;
- make use of double-sided printing - up to 50% savings on end-use consumption;

### **At this point the question is: With what resources?**

Normally at this point the issue that arises is the availability of financial resources, based on which it can easily be decided that it is not possible to proceed.

We believe that there would be money available - but only if there are concrete plans, the implementation of which would provide long-lasting benefits for everyone concerned in the Trasimeno - Medio Tevere area: inhabitants - businesses - Public Authorities - the economy - the environment.

The money is available. Indeed, it is useful to draw attention to the following European sources of funding which, though not free, certainly have the advantage of allowing expected results in the territory's development of **energy sustainability** to be achieved - at a fair cost:

<b>Sources</b>	<b>Tools</b>	<b>Beneficiaries</b>	<b>Brief description</b>
<b>EIB European Investment Bank</b>	<b>Programme ELENA</b>	Large or medium-sized individual municipalities or provincial administrations intending to act on their assets, and group the needs of the municipal administration, however small, of their territory	Cooperation between the EC and the EIB to support local and regional authorities to achieve the 20-20-20 objectives <b>Management: EIB</b> Contribution of 90% for the costs of preparing an investment programme for feasible sites in the amount of at least €50 million and equal to at least 25 times the contribution of ELENA. <b>Max. contribution €2 million (min. 50 x 25 times)</b>
<b>EIB European Investment Bank</b>	<b>Programme Mini-ELENA</b>	Large or medium-sized individual municipalities or provincial administrations intending to act on their assets, and group the needs of the municipal administration, however small, of their territory	Cooperation between the EC and the EIB to support local and regional authorities to achieve the 20-20-20 objectives <b>Management: EIB</b> <ul style="list-style-type: none"> <li>• Funds: European Commission (CIP/IEE programme).</li> <li>• Applicable sectors: energy savings, renewable sources, urban transport.</li> <li>• Investment leverage factor 1:20</li> <li>• 90% financial non-recoverable subsidy (10% cash)</li> </ul>

To be added to the European sources of funding are those made available by the Umbria Region (e.g. POR Competitività), the State ESCOs (Energy Service Company), as well as funding from the banks.

**So now, more than ever before, sustainable development of the territory is truly in our hands, which means it is time to decide:**

- **if we really want it;**
- **and how to proceed**

**to gradually improve the territory's energy sustainability, making it more competitive.**

What is going to happen is the municipalities will develop a pool of projects that they will progressively carry out. The choice of which projects to implement will be made on a decisional basis according to the classification of projects into 3 classes defining their viability level (feasibility), and the criteria by which each project passes from one class to another, based on its greater feasibility/likelihood of being implemented.

- 1<sup>st</sup> class: Executive and feasible projects  
Projects that have passed all feasibility analysis stages and are pending activation of the financial source;
- 2<sup>nd</sup> class: Potential projects:  
Projects that have only passed some - not all - of the feasibility analysis;
- 3<sup>rd</sup> class: Project ideas  
These projects are still in the idea stage even if they express goals shared by the municipalities and the Local Agenda 21 Forum: they represent solutions to problems that have been identified but are not included in the first two categories.

The transition from one class to the next, must take into account:

- agreement between players;
- development sustainability;
- regulatory compatibility;
- coherence with other territorial tools:
- business feasibility;
- ability to be financed.

*Therefore, projects will be selected and funded also refining the tools for the evaluation of expected results and any subsequent, long-term improvement action, with the strategic objective of implementing the territory's sustainable development model.*

*Specifically this would mean setting up a 'Project Pool - a scholarship for opportunity' for each Municipality and therefore the whole territory, to the benefit of sustainable development and, hence, territorial competitiveness.*

*The municipalities will be assisted by the Comunità Montana – Associazione dei Comuni in such ways and under such terms as will be shared, in accordance with the principles of the Trasimeno Local Agenda 21 process.*

*Consistent with the economic and managerial resources that will be available under the constraints and obligations established by national and regional laws on local public financing and on energy plans, the next steps are as follows:*

- *proceed to the activation of the EMAS II regulation, already being activated by the Municipalities;*
- *integrate it with the ISO 16000/ISO50001 (energy management system) criteria, to optimise the implementation and facilitate its management, reducing time and costs;*
- *according to the principle of subsidiarity, the Comunità Montana provides technical and operational support in updating the LEAP for the whole Trasimeno area, thus*

*facilitating the creation and management by each municipality of its own LEAP and thereby more easily obtaining their adherence to the 'Covenant of Mayors'.*

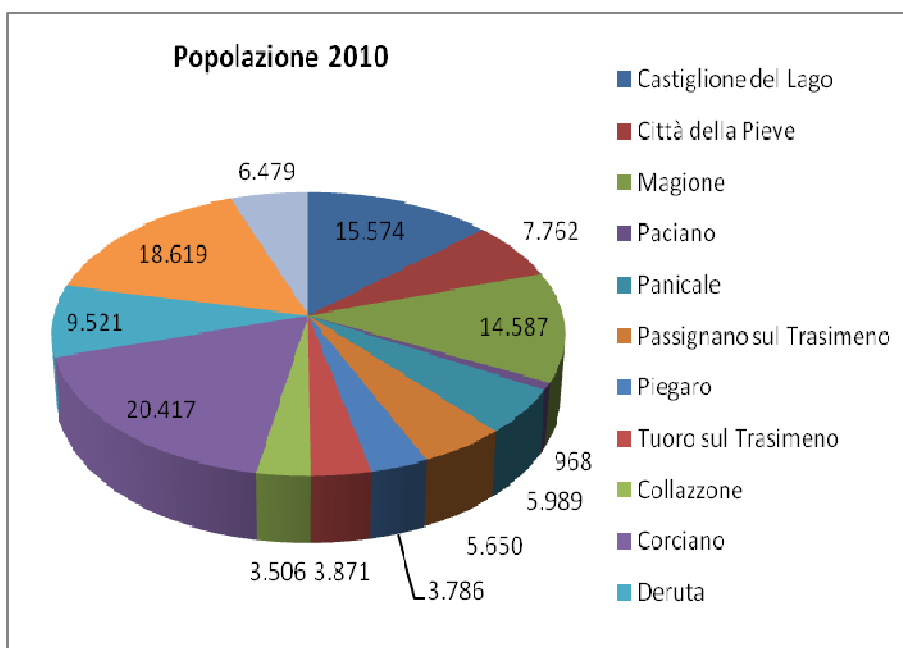
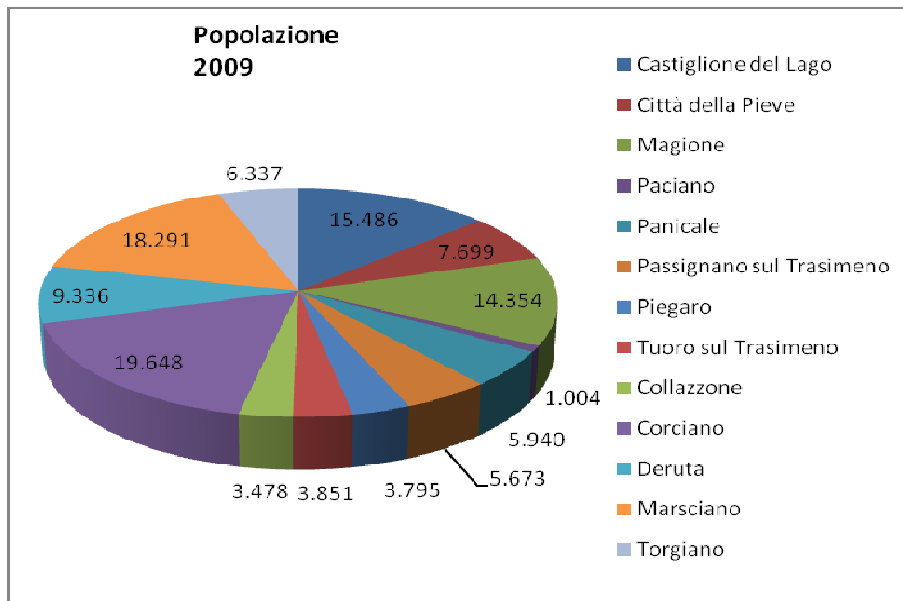
All this will concretely contribute to achieving specific strategic goals to be defined by each Municipality, to achieve the strategic '20-20-20' objective for each municipality and the entire Lake Trasimeno area, contributing to:

- the creation of a local network for promoting energy efficiency improvement and support the use of renewable energy sources with a view to creating a municipal **and territorial** energy supply chain;
- the growth of local entrepreneurship founded on the principles of sustainability, tied to energy saving, the use of renewable resources, innovation and focused on increasing cooperation with various local players that are involved.

## Attachment: detailed summary extracted from the 'LEAP'

### Resident population in the Comunità Montana – Associazione dei Comuni "Trasimeno - Medio Tevere"

Based on demographic data collected from ISTAT (Italian National Statistics Institute), compared to 2009, some municipalities registered a decline in population whereas others an increase. Nevertheless, the final balance for 2010 is positive with about 2,000 more people as can be seen from the attached table.



## Building Heritage

**Table 1: Buildings by period of construction (source: ISTAT 2001 census)**

The assessment of the properties in the various municipalities (to then be re-assessed later for energy performances), was carried out on the basis of information taken from the 2001 census, which is updated every ten years. One of the first elements deemed important was assessing the period when the housing units were constructed, divided into age groups as can be seen from Table 1. This table is also represented graphically.

Municipality	prior to 1919	1919-1945	1946-1961	1962-1971	1972-1981	1982-1991	after 1991	TOT
Castiglione del Lago	1336	899	1075	999	1387	654	573	6923
Città della Pieve	973	158	275	643	579	534	319	3481
Collazzone	241	134	146	154	235	245	139	1294
Corciano	570	211	262	1079	1948	837	1060	5967
Deruta	396	187	356	777	752	360	283	3111
Magione	870	527	608	1023	957	801	571	5357
Marsciano	1178	524	977	1114	1221	925	572	6511
Paciano	247	22	45	71	131	46	65	627
Panicale	658	257	281	399	424	297	232	2548
Passignano sul Trasimeno	355	168	252	411	479	339	339	2343
Piegaro	744	176	153	211	239	193	166	1882
Forgiano	182	386	273	460	341	188	221	2051
Tuoro sul Trasimeno	383	258	171	374	399	239	150	1974
<b>Comunità Montana</b>	<b>8133</b>	<b>3907</b>	<b>4874</b>	<b>7715</b>	<b>9092</b>	<b>5658</b>	<b>4690</b>	<b>44069</b>



Chart 1: Buildings by period of construction (source: ISTAT 2001 census)

Table and Chart 2, also taken from the ISTAT 2001 census, show the real estate properties by building type divided into town housing, inhabited area and scattered houses.

Local Energy Action Plan Comunità Montana Associazione dei Comuni "Trasimeno-Medio Tevere  
Forum Energia Progetto "Sustainable Now"

Numicipality	Town housing	Inhabited area	Scattered houses	TOT
Castiglione del Lago	4886	819	1220	6925
Città della Pieve	2613	367	504	3484
Collazzone	767	71	456	1294
Corciano	4690	892	385	5967
Deruta	2602	226	283	3111
Magione	4163	155	1040	5358
Marsciano	4872	220	1419	6511
Paciano	333	108	187	628
Panicale	1811	285	452	2548
Passignano sul Trasimeno	2059	7	279	2345
Piegaro	904	334	646	1884
Torgiano	1531	167	353	2051
Tuoro sul Trasimeno	1429	179	366	1974
<b>Comunità Montana</b>	<b>32660</b>	<b>3830</b>	<b>7590</b>	<b>44080</b>

Table 2: Buildings by housing type (ISTAT Census 2001)

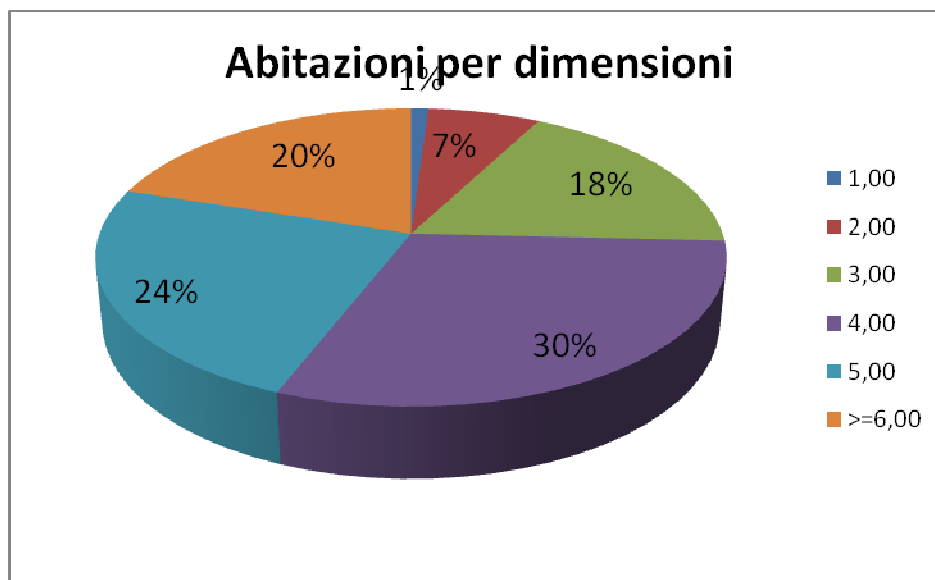


Chart 2: Buildings by housing type (ISTAT Census 2001)

Another important aspect for a proper assessment of the real estate property characteristics, according to the ISTAT 2001 census, is the subdivision of houses by size based on the number of rooms as can be seen from Table 3 and Figure 3 below.

**Table 3: House size by number of rooms (ISTAT 2001 census)**

Municipality	1,00	2,00	3,00	4,00	5,00	>=6,00	total rooms	TOT
Castiglione del Lago	57	386	1063	1945	1202	1043	26152	5696
Città della Pieve	32	240	573	958	617	468	12892	2888
Collazzone	23	83	210	311	242	226	5081	1095
Corciano	66	351	886	1550	1486	1081	25704	5420
Deruta	28	181	475	836	678	668	13893	2866
Magione	37	297	854	1266	1084	932	21133	4470
Marciano	58	346	929	1558	1468	1297	27485	5656
Paciano	10	25	53	133	95	71	1794	387
Panicale	11	104	355	639	486	377	9286	1972
Passignano sul Trasimeno	16	152	400	547	497	350	8993	1962
Piegara	14	84	259	389	284	282	6191	1312
Forgiano	14	136	362	530	388	415	8752	1845
Tuoro sul Trasimeno	14	100	261	531	360	219	6673	1485
<b>Comunità Montana</b>	<b>380</b>	<b>2485</b>	<b>6680</b>	<b>11193</b>	<b>8887</b>	<b>7429</b>	<b>174029</b>	<b>37054</b>



**Chart 4: House size by number of rooms (ISTAT 2001 census)**

For a summary of the properties, see the following table which has been prepared based on previously collected information regarding the relationship between the coefficients rooms/houses, average area occupied, rooms/inhabitant and square meters/inhabitants.

Municipality	Houses inhabited by residents	Houses inhabited only by non-residents	Empty houses	TOT	occupied m <sup>2</sup>	occupied rooms	rooms/houses	average area occupied	rooms/inhabitant	m <sup>2</sup> /inhabitant
<b>Castiglione del Lago</b>	5696	62	1167	6925	586011	26152	4,59	102,88	1,83	40,95
<b>Città della Pieve</b>	2888	47	549	3484	292271	12892	4,46	101,20	1,81	41,12
<b>Collazzone</b>	1095	2	197	1294	117040	5081	4,64	106,89	1,74	40,05
<b>Corciano</b>	5420	52	495	5967	612318	25704	4,74	112,97	1,68	40,10
<b>Deruta</b>	2866	19	226	3111	335358	13893	4,85	117,01	1,72	41,49
<b>Magione</b>	4470	58	830	5358	492779	21133	4,73	110,24	1,72	40,01
<b>Marsciano</b>	5656	73	782	6511	637728	27485	4,86	112,75	1,68	38,96
<b>Paciano</b>	387	138	103	628	39297	1794	4,64	101,54	1,88	41,15
<b>Panicale</b>	1972	45	531	2548	216446	9286	4,71	109,76	1,74	40,65
<b>Passignano sul Trasimeno</b>	1962	70	313	2345	203712	8993	4,58	103,83	1,77	40,16
<b>Piegaro</b>	1312	16	556	1884	146646	6191	4,72	111,77	1,70	40,21
<b>Torgiano</b>	1845	22	184	2051	221064	8752	4,74	119,82	1,62	40,85
<b>Tuoro sul Trasimeno</b>	1485	26	463	1974	142973	6673	4,49	96,28	1,86	39,81
<b>Comunità Montana</b>	<b>37054</b>	<b>630</b>	<b>6396</b>	<b>44080</b>	<b>4043643</b>	<b>174029</b>	<b>4,70</b>	<b>109,13</b>	<b>1,73</b>	<b>40,28</b>

**Table 5: Availability of houses per capita (source: ISTAT Census 2001)**

### ACE data

From an analysis of a sample of energy certifications collected by the Umbria Region for the Comunità Montana area, an average PE (primary energy for heating and hot water for domestic use) value equal to 205 kWh/m<sup>2</sup> p.a. was extrapolated, which, in relation to the occupied properties of the area in square meters, has led to the calculation of the potential consumptions of the buildings in the area in thermal kWh.

Municipality	Average PE value kwh/m <sup>2</sup> *yr 205 occupied		toe (1=11628 kWh)	co2 (tonnes)	kgCo2/ab
	m2	KWh dispersion			
<b>Castiglione del Lago</b>	586011	120192714	10336,49	31009,4721 3	2166,67636 4
<b>Città della Pieve</b>	292271	59945708,7	5155,29	15465,8691 2	2176,14592 9
<b>Collazzone</b>	117040	24005275,06	2064,44	6193,31141 9	2119,54531 8
<b>Corciano</b>	612318	125588363,1	10800,51	32401,5384 6	2121,76926 6
<b>Deruta</b>	335358	68782989,01	5915,29	17745,8692	2195,72744 3
<b>Magione</b>	492779	101070535,2	8692,00	26075,9894 7	2117,24500 4
<b>Marsciano</b>	637728	130800034,6	11248,71	33746,1389 7	2061,84022 5
<b>Paciano</b>	39297	8059939,286	693,15	2079,4477	2177,43214 7
<b>Panicale</b>	216446	44393760,81	3817,83	11453,4986 6	2150,89176 7
<b>Passignano sul Trasimeno</b>	203712	41781977,04	3593,22	10779,6638 4	2124,90909 5
<b>Piegaro</b>	146646	30077559,52	2586,65	7759,94827 7	2127,76207 2
<b>Torgiano</b>	221064	45340927,25	3899,29	11697,8656 5	2161,86761 2
<b>Tuoro sul Trasimeno</b>	142973	29324215,58	2521,86	7565,58709 4	2106,81901 8
<b>Comunità Montana</b>	<b>4043643</b>	<b>829363999</b>	<b>71324,73</b>	<b>213974,2</b>	<b>2131,663</b>

Table 6:

<b>consumption in kWh of the buildings by period of construction</b>	
<b>prior to 1919</b>	<b>112056474</b>
<b>1919-1945</b>	<b>53830646</b>
<b>1946-1961</b>	<b>67153972</b>
<b>1962-1971</b>	<b>106297270</b>
<b>1972-1981</b>	<b>133350477</b>
<b>1982-1991</b>	<b>77955924</b>
<b>after 1991</b>	<b>64618820</b>

Table : property consumptions for the area  
(source ACE Umbria Region and ISTAT data)



Chart: property consumptions for the area (source ACE Umbria Region and ISTAT data)

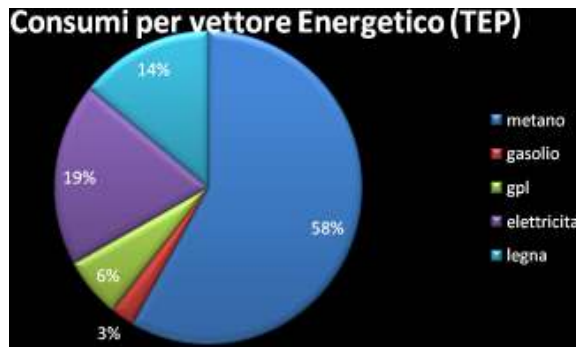
average annual consumption in kWh of the buildings by period of construction							
(kWh) per house before 1919	(kWh) per house 1919-1945	(kWh) per house 1946-1961	(kWh) per house 1962-1971	(kWh) per house 1972-1981	(kWh) per house 1982-1991	(kWh) per house AFTER 1991	
13778	42363	30130,8468	36455,485	14666,7925	18044,744	9501	

Table 7: Average consumption per house (source Umbria Region and ISTAT data)

Valore Medio EP kwh/mq*anno <b>205</b>					
	mq occupati	Dispersioni KWh	tep (1=11628 kWh)	co2 (ton)	kgCo2/ab
Comunità montana	4043643	829363999	71324,73	213974,2	2131,663

**Table 8: consumption for energy carriers reported in TOE and CO<sub>2</sub> emissions per capita (source: 2007 Ministry of Economic Development for LPG diesel fuel; source ISTAT data for wood consumption; 2007 ISTAT data based on the provincial capital reported for the local context for the consumption of methane and electricity)**

Municipalities	TOE Methane	TOE Diesel fuel	LPG TOE	TOE Wood	TOE Electricity	TOT TOE	Tonne CO <sub>2</sub>	kgCO <sub>2</sub> /inhabitant
Castiglione del Lago	4794,38	203,80	513,61	1143,02	1565,79	8220,60	24661,79	1619,61
Città della Pieve	2389,16	101,56	255,94	569,68	780,27	4096,61	12289,83	1619,64
Collazzone	1075,56	45,72	115,22	257,26	351,27	1845,03	5535,10	1620,35
Corciano	5988,33	254,55	641,51	1498,46	1955,72	10338,58	31015,73	1630,78
Deruta	2873,41	122,14	307,82	698,77	938,43	4940,58	14821,73	1624,12
Magione	4441,73	188,81	475,83	1070,58	1450,62	7627,58	22882,73	1622,08
Marsciano	5689,84	241,86	609,54	1366,50	1858,24	9765,98	29297,94	1621,27
Paciano	311,08	13,22	33,33	71,05	101,60	530,27	1590,81	1610,14
Panicale	1827,76	77,69	195,80	439,55	596,93	3137,74	9413,22	1621,57
Passignano sul Trasimeno	1754,72	74,59	187,98	414,67	573,07	3005,02	9015,07	1617,63
Piegaro	1176,95	50,03	126,08	277,87	384,38	2015,30	6045,91	1617,42
Torgiano	1960,63	83,34	210,04	475,51	640,32	3369,85	10109,55	1623,50
Tuoro sul Trasimeno	1207,17	51,31	129,32	284,11	394,25	2066,16	6198,49	1616,72
<b>Comunità Montana</b>	<b>35490,73</b>	<b>1508,65</b>	<b>3802,02</b>	<b>8567,03</b>	<b>11590,88</b>	<b>60959,30</b>	<b>182877,91</b>	<b>1622,42</b>



**Kg CO2 inhabitants: 1,622.42**  
derived from fossil fuels actually used

**Chart 3: consumption for energy carriers (source: 2007 Ministry of Economic Development for LPG fuel; source ISTAT data for wood consumption; 2007 ISTAT data based on the provincial capital reported for the local context for the consumption of methane and electricity)**

**Analysis of energy consumption in different sectors**

Estimate of energy consumption at a local level, for different sectors of activity according to the following sources:

- Electricity
- Petroleum products
- Natural gas
- Solid fuels
- Renewable sources

The data considered was obtained from official sources that will be available later, along with those for energy.

Some data specifically relates to the municipal area, while for others the territorial bases of reference are provincial or regional.

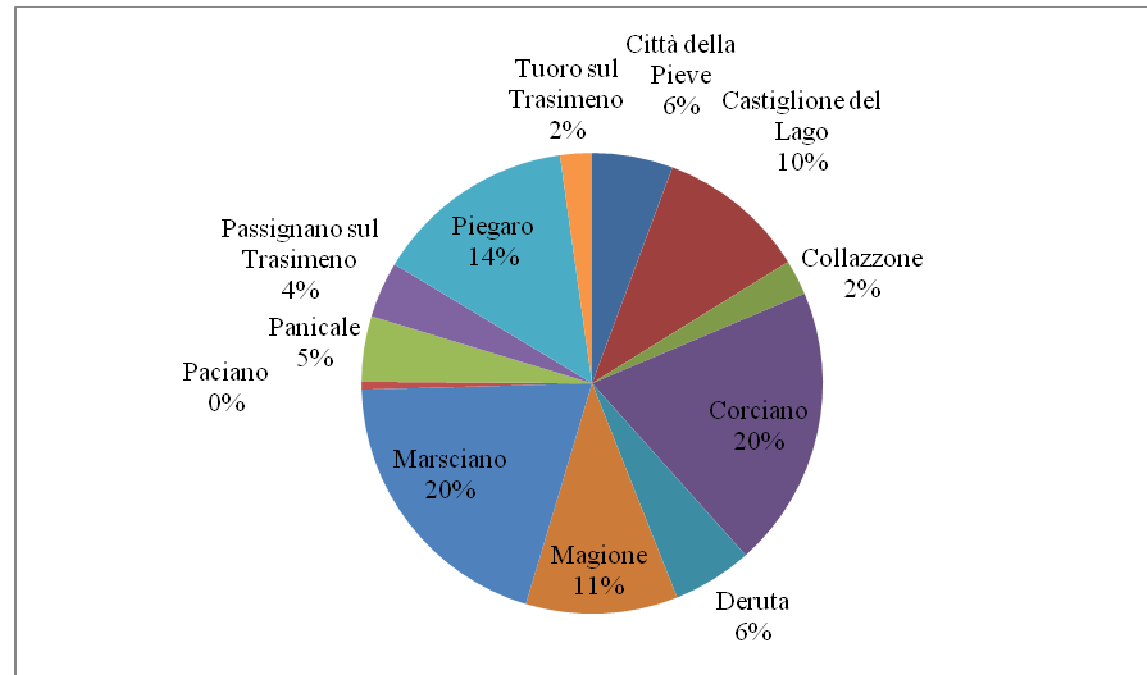
**Total consumption of electricity GWh on a regional basis, broken down by sector of activity.**

Sector	2006	2007	2008	2009
<b>Agriculture</b>	103,5	104,7	99,8	101,3
<b>Industry</b>	3.557,3	3.930,3	3.548,2	2.994,4
<b>Services</b>	1.198,3	1.212,9	1.260,7	1.291,7
<b>Domestic</b>	942,7	956,9	957,0	977,6
<b>Total GWh</b>	5.801,9	6.204,8	5.865,9	5.364,9

End energy consumption (MWh)							
Category	Electricity	Methane	LPG	Diesel fuel	Petrol	Wood	Total
Agriculture	18.422			64.760			83.183
Industry	133.104	14.218					147.322
Residential buildings - domestic use	113.606	35.491	44.217	17.546		13.291	185.894
Services	113.745	30.714					144.459
Public lighting	13.157						13.157
Mobility			40.512	410.159	280.614		731.284
<b>Total</b>	<b>392.035</b>	<b>80.422</b>	<b>84.729</b>	<b>492.465</b>	<b>280.614</b>	<b>13.291</b>	<b>1.305.300</b>

Emissions of CO2 in equivalent tonnes							
Category	Electricity	Methane	LPG	Diesel fuel	Petrol	Wood	Total
Agriculture	8.843			17.291			26.134
Industry	63.890	2.872					66.762
Residential buildings - domestic use	54.531	7169	11.010	4.685			67.869
Services	54.597	6.204					60.802
Public lighting	6.316						6.316
Mobility			10.087	109.512	69.873		189.473
<b>Total</b>	<b>188.177</b>	<b>16.245</b>	<b>21.098</b>	<b>131.488</b>	<b>69.873</b>		<b>417.335</b>

### ENERGY CONSUMPTION BREAKDOWN IN 2006-2007-2008 BY THE MUNICIPALITIES OF THE C.M. TERRITORY 'TRASIMENO-MEDIO TEVERE'



From the chart, which summarises the situation of the area, the municipalities that stand out for their greater energy consumption (20% of the total) are Corciano and Marsciano, followed by Piegaro and Magione with 14% and 11% respectively. Paciano, on the other hand, is the municipality which performs best, as can be seen from the chart above.

## RENEWABLE SOURCES

The only renewable source in the territory for which reliable data is available is that of the photovoltaic systems. The data relating to the systems are provided by the GSE (Electrical Services Manager), and shows the distribution of all systems which are in operation and installation projects admitted to the Italian incentive programme. On the GSE website, through the ATLASOLE application, the list of aggregated PV systems on a municipal, provincial and regional level can be consulted. The installations are grouped by power class and by number. The following table shows both the number of installations in the area of each municipality, and the total production of energy from photovoltaic systems, with its associated ISTAT reference code.

Municipality	No. installations	Total power (Kw)	ISTAT Code
Castiglione del Lago	75	1.279	010054009
Città della Pieve	17	287	010054012
Collazzone	14	458	010054014
Corciano	70	707	010054015
Deruta	28	188	010054017
Magione	48	1.562	010054026
Marsciano	85	3.035	010054027
Paciano	9	188	010054036
Panicale	30	222	010054037
Passignano sul T.	16	97	010054038
Piegario	14	55	010054040
Torgiano	12	117	010054053
Tuoro sul T.	13	82	010054055
<b>Total</b>	<b>431</b>	<b>8.277</b>	

Table 5. 1. Photovoltaic systems in the municipalities

Based on the peak power supplied and on annual solar radiation, an estimate for the various plants can be made of the theoretical electricity production in kWh with the following formula:

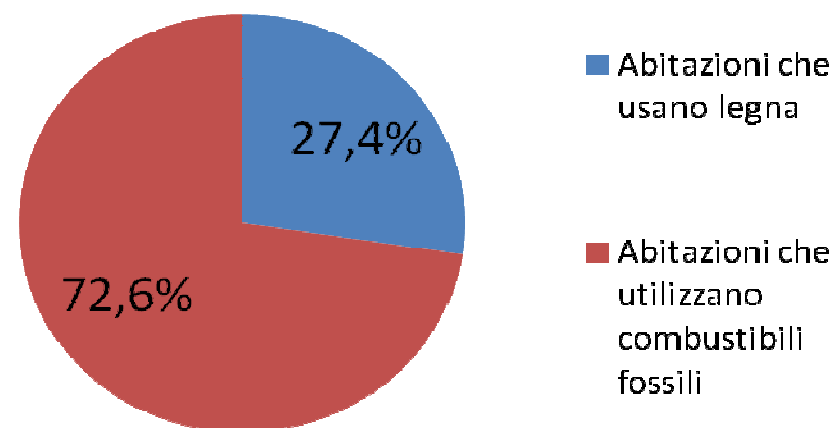
$$E = P_{nom} \cdot h_{eq} \quad \text{where:}$$

- E: the theoretical annual electricity production;
- P<sub>nom</sub>: represents the peak power of the photovoltaic generator;
- h<sub>eq</sub>: number of hours of operation at its peak power, on an annual basis.

## Solid wood fuel consumption

Comuni	popolazione	Famiglie	Abitazioni che usano legna	Consumi legna (t)
Castiglione del Lago	15.571	4.450	1.219	4.572,08
Città della Pieve	7.762	2.218	608	2.278,70
Macione	14.587	4.168	1.142	4.282,33
Paciano	968	277	76	284,18
Panicale	5.989	1.711	469	1.758,20
Passignano sul Trasimeno	5.650	1.614	442	1.658,68
Piegara	2.786	1.082	296	1.111,46
Tuoro sul Trasimeno	3.871	1.106	303	1.136,42
<b>Totale popolazione Lago</b>	<b>58.187</b>	<b>16.625</b>	<b>4.555,21</b>	<b>17.082,04</b>
Collazzone	3.506	1.002	274	1.029,26
Corciano	20.417	5.833	1.598	5.993,85
Deruta	9.521	2.720	745	2.795,09
Marsciano	18.619	5.320	1.458	5.466,01
Torciano	6.479	1.851	507	1.902,05
<b>Totale popolazione non Trasimeno</b>	<b>58.542</b>	<b>16.726</b>	<b>4.583</b>	<b>17.186,26</b>
<b>Totale Generale</b>	<b>116.729</b>	<b>33.351</b>	<b>9.138</b>	<b>34.268,30</b>

## Utilizzo legna per riscaldamento



Local Energy Action Plan Comunità Montana Associazione dei Comuni "Trasimeno-Medio Tevere  
Forum Energia Progetto "Sustainable Now"

From the ENEA website, by means of the ENEA-SOLARTERM calculation model, it was possible to derive the annual global solar radiation on horizontal surfaces devoid of obstacles in kWh/m<sup>2</sup>, which, for a given location, corresponds to the number of hours equivalent to maximum sun exposure.

Municipality	Total power (Kw)	KWh/m <sup>2</sup> or h <sub>eq</sub>	Max. product.
Castiglione del Lago	1.279	1.465	1.873.735
Città della Pieve	287	1.474	423.038
Collazzone	458	1.471	673.718
Corciano	707	1.460	1.032.220
Deruta	188	1.468	275.984
Magione	1.562	1.461	2.282.082
Marsciano	3.035	1.473	4.470.555
Paciano	188	1.471	276.548
Panicale	222	1.471	326.562
Passignano sul T.	97	1.459	141.523
Piegaro	55	1.473	81.015
Torgiano	117	1.464	171.288
Tuoro sul T.	82	1.458	119.556
Total	8.277	1.467 (average)	12.147.824

Table 5.2. Theoretical photovoltaic electricity production

- PV production: **12,140,449kWh = 10%** domestic consumption
- Installed PV power = **71 W/ inhab.** = 0.55 m<sup>2</sup> panels/inhab.
- Kg CO<sub>2</sub> avoided: **6,070,224 - 50 kg CO<sub>2</sub> avoided per inhab.**

## Vehicles

In order to analyse the impact of transport and human activities on energy issues, the vehicles in circulation were looked at first. From ACI data it was possible to gather the total number of vehicles in the area which numbered 100,146 units. Of these, 49,015 vehicles belong to the municipalities of the Trasimeno area (Castiglione del Lago, Città della Pieve, Magione, Paciano, Panicale, Passignano sul Trasimeno, Piegaro and Tuoro sul Trasimeno) and the remaining 51,131 are located in the other municipalities of the Comunità Montana (Collazzone, Corciano, Deruta, Marsciano, Torgiano).

Below is a table showing the number of vehicles for each municipality

No.	Trasimeno municipalities	Vehicles 2005	Vehicles 2008
1	Castiglione del Lago	12.241	13.239
2	Città della Pieve	6.018	6.625
3	Magione	11.474	12.442
4	Paciano	823	867
5	Panicale	4.814	5.058
6	Passignano sul Trasimeno	4.127	4.447
7	Piegaro	3.007	3.211
8	Tuoro sul Trasimeno	2.994	3.126
	<b>Total vehicles Trasimeno</b>	<b>45.498</b>	<b>49.015</b>
	<b>Other Municipalities Comunità Montana</b>		
1	Collazzone	2.703	2.955
2	Corciano	16.753	18.954
3	Deruta	7.131	7.773
4	Marsciano	13.797	15.068
5	Torgiano	5.294	6.381
	<b>Total vehicles other municipalities</b>	<b>45.678</b>	<b>51.131</b>
	<b>General Total</b>	<b>91.176</b>	<b>100.146</b>

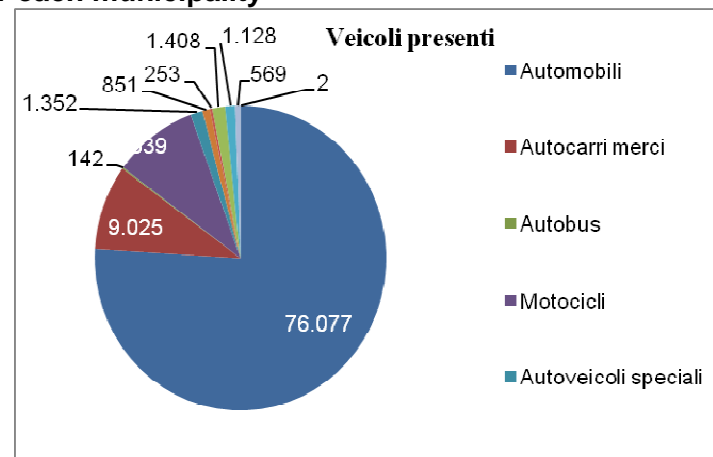


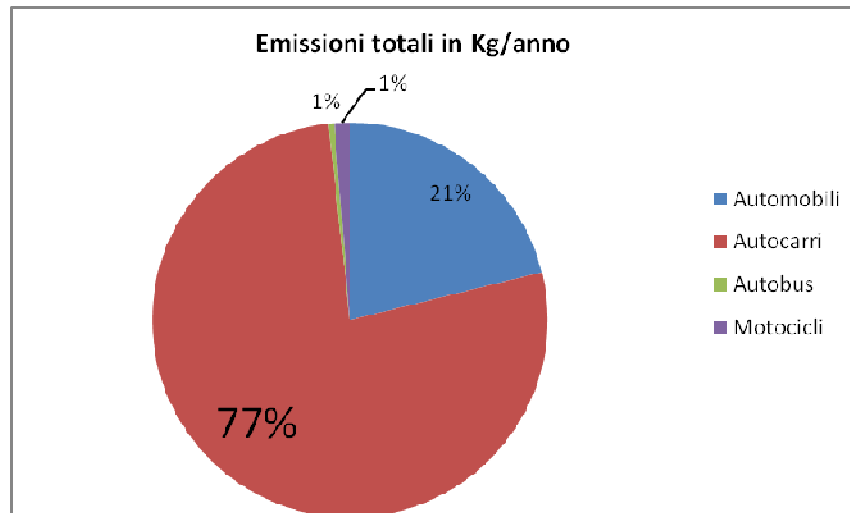
Chart 1.1: Municipalities vehicles

The fleet is characterised by a heavy number of lorries:  
1 for every 10 inhabitants

## Emissions calculation TRANSPORT

Total vehicle emissions	Kg Co2
Cars	136.329.984
Goods vehicles	498.180.000
Busses	2.939.400
Motorcvcles	8.218.320
<b>Total</b>	<b>645667704</b>

**Kg Co2/inhab:**  
**5,620.00**



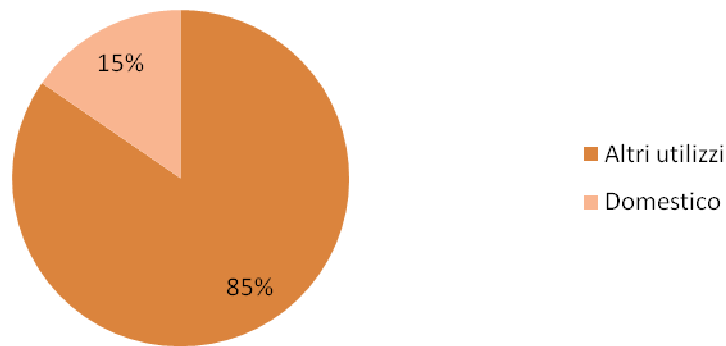
### Comments

- Very strong incidence of emissions from goods transport.
- Methodological assumption
- The kilometres assigned to each vehicle are considered to have been travelled within the territory
- Emission factors per km travelled taken from specialised sites and not from Regional Agencies data

### Electricity consumption

Popolazione	n.	Consumo elettrico (kWh)			CO2 (kg)		
		Altri utilizzi	Domestico	Totale Consumi	Altri utilizzi	Domestico	Totale Emissioni
Singolo abitante	1	5.978	1.089	7.067	2.989	545	3.534
<b>Totale Comunità Montana</b>	<b>116.729</b>	<b>697.806</b>	<b>127.118</b>	<b>824.924</b>	<b>348.903</b>	<b>63.559</b>	<b>412.462</b>

### Produzione CO2 da consumi elettrici Comunità Montana (kg)



**Kg CO<sub>2</sub> inhab:**  
**3,354.00**