

# IEE – Innovative Thinking – Overall Energy Status Report

## 1. Introduction

In this Overall Energy Status Report the reports of all participating communities in the IEE Innovative Thinking project are summarised and discussed. The objective of each energy status report is to record and display the energy status of each community by presenting the actual energy consumption for the baseline year of 2005. The energy consumption will be broken down into consumption by different fuel types (electricity, natural gas, non transport petroleum products, transport fuels, coal and other fuels) as well as by residential and non-residential end users. Other factors that will be assessed in the report are the CO<sub>2</sub> emissions (in tonnes) in each of the communities and the present contribution (expressed as a percentage) from renewable energy and energy from waste.

The present energy status is a starting point for (policy) actions in the field of sustainable energy and energy saving and will form the basis for the direction of the Community Energy Action Plan that is to be compiled under Work Package 3. The energy status report will show the activities and sectors that are consuming the most energy and which are responsible for the highest carbon dioxide emissions. This research will help to direct the actions in the action plan and target the areas which need most urgent attention. The status report is designed to be a 'one stop shop' where the wider community energy usage and CO<sub>2</sub> emissions are recorded and presented in an accessible format.

The status report can also be used a 'baseline' position against which energy consumption, CO<sub>2</sub> emissions and renewable energy generation data for future years can be compared. The status reports have been compiled with reference to the 'Energy Barometer' developed by the Dutch partner 'SRE Milieudienst'.

## 2. Community Energy Status Reports

### 2.1 Madona (Latvia)

Madona town (the centre of Madona region) is located in the middle of eastern part of Latvia (see Figure1). Regarding the data obtained from Central Statistical Bureau (CSB) of Latvia the population of Madona town is 9125 (data on beginning of 2007) and the total area is 10.45 km<sup>2</sup>. Madona's main economical activity is related to commerce, public and industrial sectors.



Fig. 1 Madona Region with Madona and Lubana in Latvia

To prepare the report on the present energy status different data sources were used:

- From CSB – data on total living area (m<sup>2</sup>) in Madona town;
- From Latvian Environmental, geological and meteorological agency – data on fuel consumption and CO<sub>2</sub> emission factors;
- From Company “Latvenergo” – data on electricity consumption;
- From Ministry of Environment of Latvia – CO<sub>2</sub> emission factors for electricity.

The main used energy source in Madona is wood fuel (see Figure 2) that comprises 75-90% from Madona’s total energy sources. However, similar to other towns in Latvia Madona has significant potential for energy efficiency measures related to fuel combustion. Other significant energy source is electricity, followed by some fossil fuels – light and heavy fuel oil. During the last three years fossil fuel consumption has significantly decreased. This is due to different reasons, including increase of oil prices, refurbishment of Madona district heating system and changes in climate conditions.

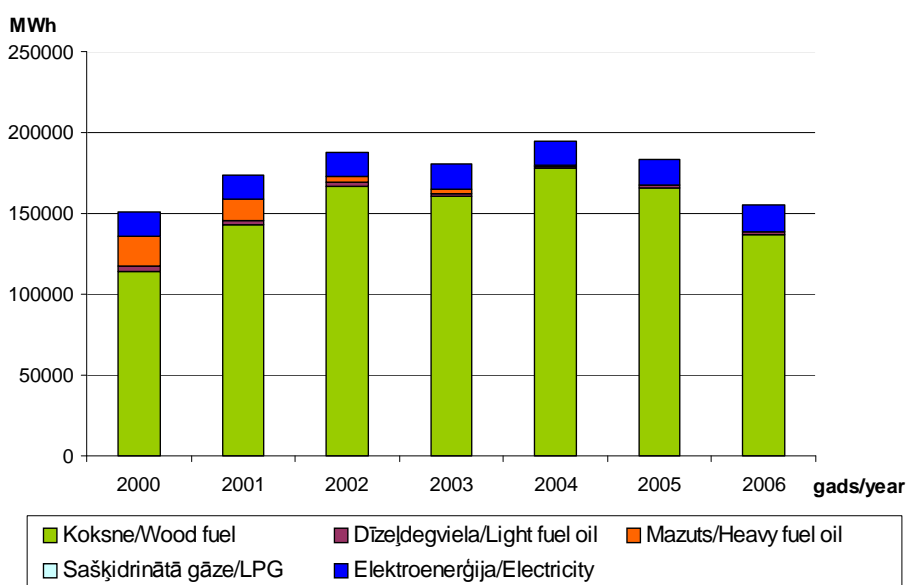


Fig. 2. Total energy consumption divided by fuel/energy sources, MWh/year

Analysis of energy consumption by different consumer sectors (see Figure 3) clearly shows that the biggest energy consumer in Madona is household sector comprising more than a half of final energy consumption. The second important consumer is public sector, e.g., schools, kindergartens, hospitals and other municipal institutions. Approximately the same share of final energy consumption is for consumers representing commerce and industrial sectors. Considering the above given division the main attention should be paid to households and public sector in order to reach significant decrease of total energy consumption.

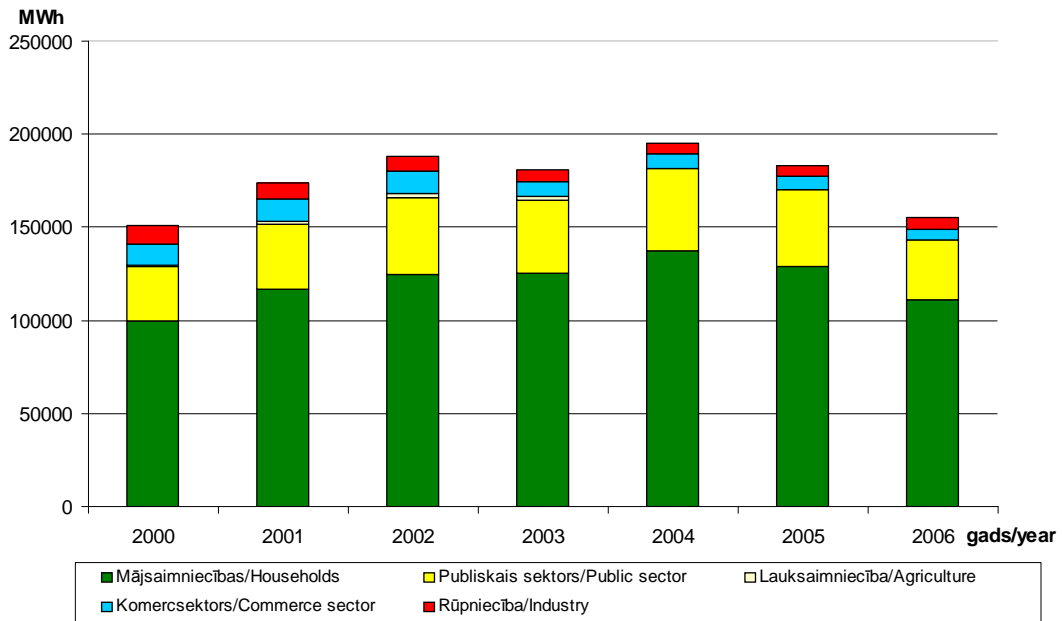


Fig. 3. Total energy consumption divided by consumer sectors, MWh/year

Total energy consumption has decreased during the last three years. The main reason mentioned during the interviews with Madona local stakeholders is energy efficiency measures implemented in buildings and district heating system during the last few years.

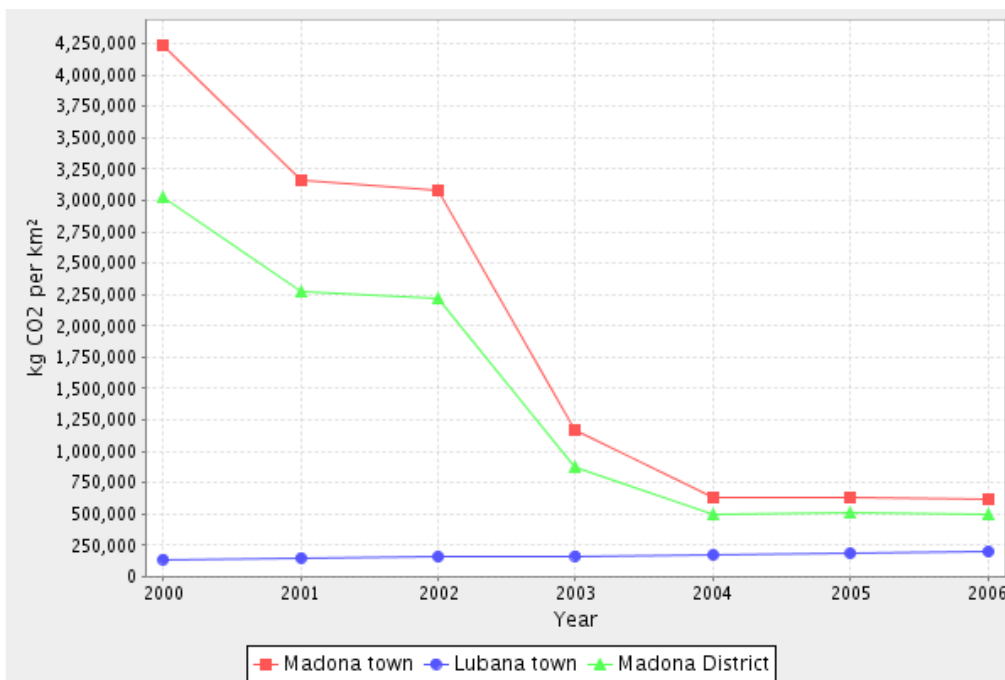


Fig. 4. Madona's total CO<sub>2</sub> emissions per km<sup>2</sup>

Madona's annual CO<sub>2</sub> emissions were calculated in order to evaluate the environmental impact of energy use. The results of calculation show that amount of CO<sub>2</sub> emissions has rapidly decreased starting from year 2000 up to 2004 (see Figures 4 and 5). Those changes are related to elimination of fossil fuel use. However, due to the increase of electricity consumption during the last years, in the future more emphases will have to be put on energy efficiency measures limiting the use of electricity.

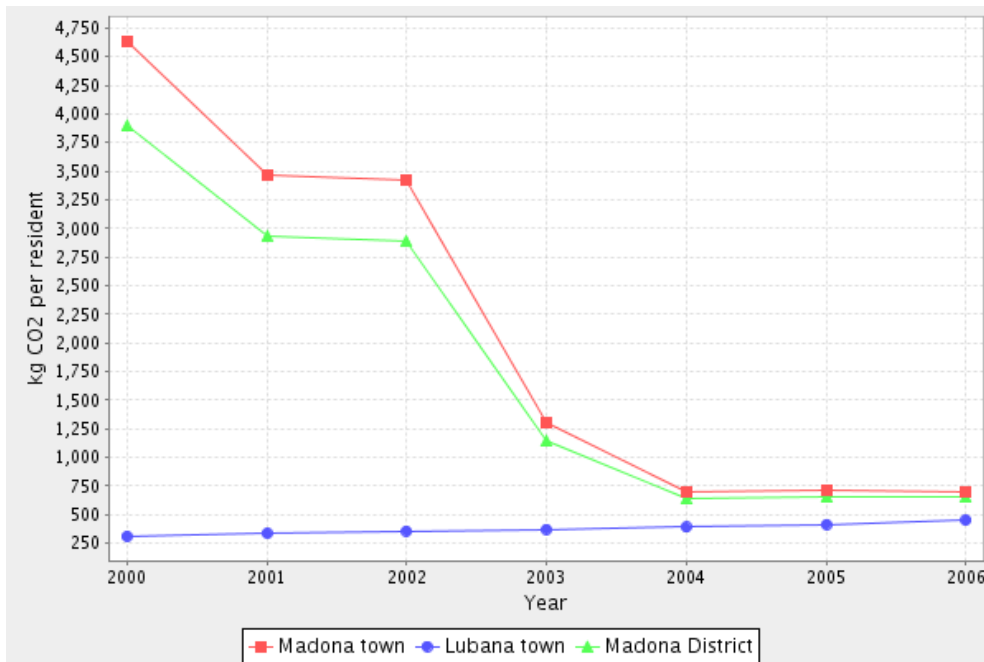


Fig. 5. Madona's total CO2 emissions per resident

Comparing Madona's amounts of CO<sub>2</sub> emissions with Lubāna town and Madona District specific CO<sub>2</sub> emission, it is possible to see that Madona has significantly higher CO<sub>2</sub> emissions per surface area and per resident (see Figures 4 and 5). This is because Madona as the regional centre has higher population density and economical and industrial activity compared to district's average or smaller towns like Lubāna. On the other hand Madona also has comparatively higher potential for CO<sub>2</sub> emission reduction.

One of the crucial points in preparing this report was a lack of necessary energy consumption data. The current situation in Latvia is that there are no data on energy consumption in regional and municipal level available. Consequently, it is not possible to analyze and make conclusions about feasible measures ensuring sustainable energy use in future without using reliable data. Therefore collection of energy consumption data should be a free will of every municipality responsible for community's sustainable development.

## 2.2 Lubāna (Latvia)

Lubāna town is located in the eastern part of Latvia and Madona region (see Figure1). According to the data obtained from Central Statistical Bureau (CSB) of Latvia the population of Lubāna town is 1934 (data on beginning of 2007) and the total area is 4.39 km<sup>2</sup>. Lubana's main economical activity is related to commerce and public sectors.

To prepare the report on the present energy status different data sources were used:

- From CSB – data on total living area (m<sup>2</sup>) in Lubāna town;
- From Latvian Environmental, geological and meteorological agency – data on fuel consumption and CO<sub>2</sub> emission factors;
- From Company "Latvenergo" – data on electricity consumption;
- From Ministry of Environment of Latvia – CO<sub>2</sub> emission factors for electricity.

The main used energy source in Lubāna is wood fuel (see Figure 6) that comprises 92-94% from Lubana's total energy sources. However, similar to other towns in Latvia Lubāna has significant potential for energy efficiency measures related to wood fuel combustion. Other significant energy source is electricity. During the last four years electricity consumption has significantly increased.

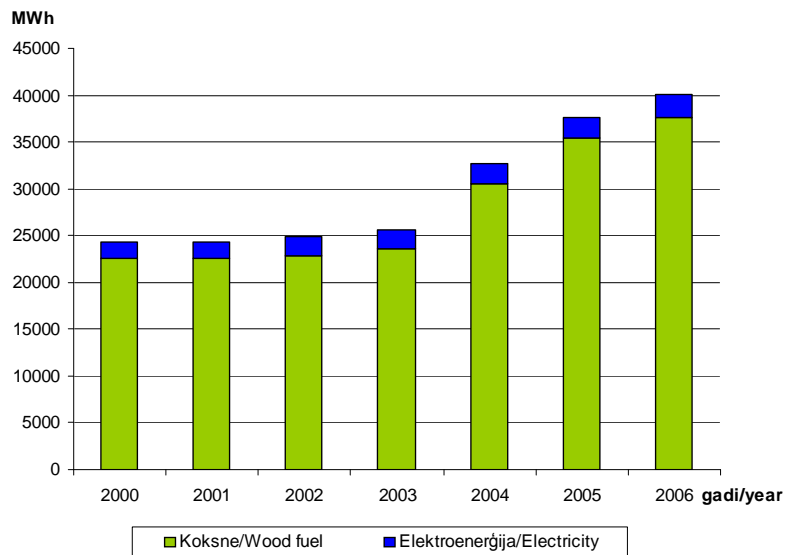


Fig. 6. Total energy consumption divided by consumer sectors, MWh/year

Analysis of energy consumption by different consumer sectors (see Figure 7) clearly shows that the biggest energy consumer in Lubāna is household sector comprising more than a half of final energy consumption. The second important consumer is public sector, e.g., schools, kindergartens, hospitals and other municipal institutions; followed by commerce sector. However, commerce sector energy consumption during last few years has decreased. Considering the above given division the main attention should be paid to households and public sector in order to reach significant decrease of total energy consumption.

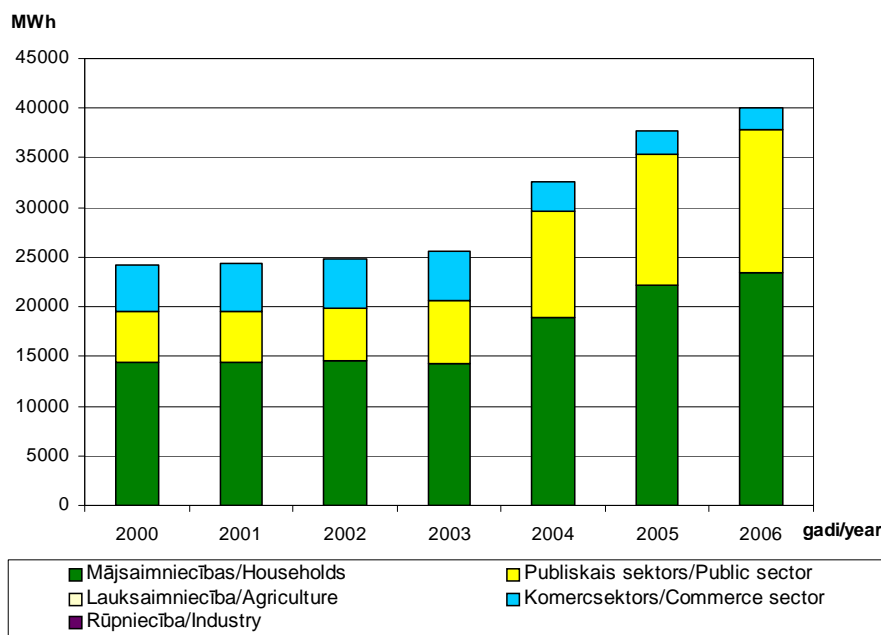


Fig. 7. Total energy consumption divided by consumer sectors, MWh/year

Total energy consumption has significantly increased during the last four years. To decrease the energy consumption it is very important to implement energy efficiency measures in energy production, distribution and end use sides.

Lubana's annual CO<sub>2</sub> emissions were calculated in order to evaluate the environmental impact of energy use. The results of calculation show that amount of CO<sub>2</sub> emissions is constantly increasing (see Figures 4, 5 and 6). Since there is no significant fossil fuel use for energy production, the growth in CO<sub>2</sub> emissions is related only to increased electricity consumption in Lubāna. Therefore in future

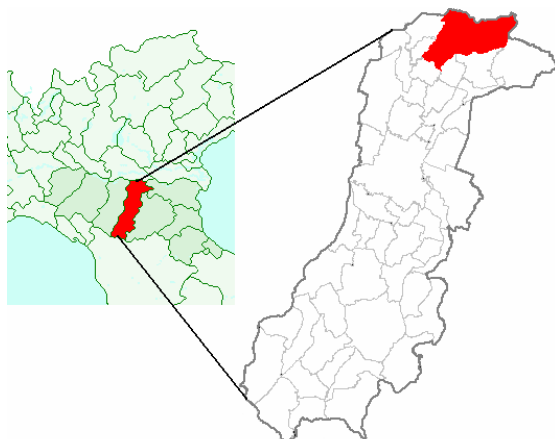
more emphases have to be put on energy efficiency measures limiting the use of electricity in households and public sector.

Comparing Lubāna's amounts of CO<sub>2</sub> emissions with Madona town and Madona District specific CO<sub>2</sub> emissions, it is possible to see that Lubāna has less CO<sub>2</sub> emissions per surface area and per resident (see Figures 4 and 5). This is because of extensive wood fuel use in Lubāna and compared to Madona town it has lower population density and economical activity. On the other hand Lubāna's small size and population gives some advantages on implementation of awareness campaigns to reduce the electricity consumption and promote energy efficiency in wood fuel use.

One of the crucial points in preparing this report was a lack of necessary energy consumption data. The current situation in Latvia is that there are no data on energy consumption in regional and municipal level available. Consequently, it is not possible to analyze and make conclusions about feasible measures ensuring sustainable energy use in future without using reliable data. Therefore collection of energy consumption data should be a free will of every municipality responsible for community's sustainable development.

### **2.3 Municipality of Mirandola (Italy)**

The Municipality of Mirandola is located in the north of the Modena Province.



Mirandola is characterised by 23.281 inhabitants, with a density of 170 inhabitants per km<sup>2</sup> and a territory of 137.13 km<sup>2</sup>.

Mirandola is a centre of international level industries and it is considered one of the most important research and production sites for Biomedical Equipment. Other important economic sectors are agriculture, high precision mechanics and clothing

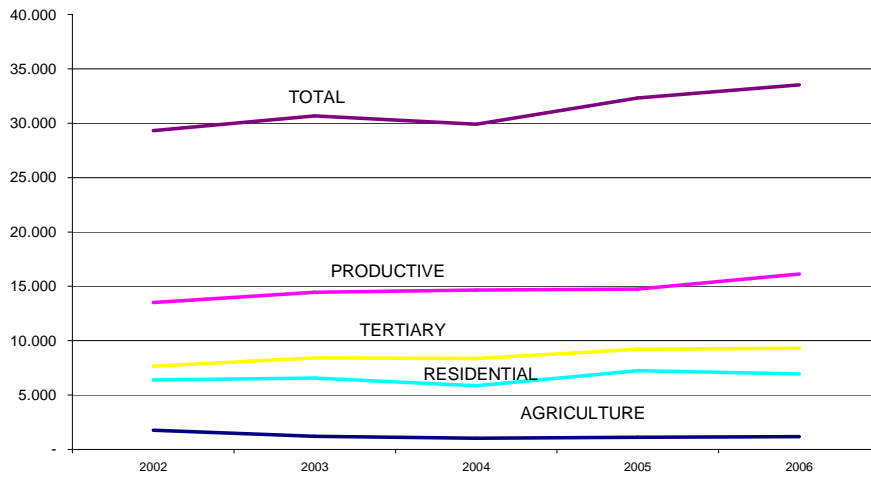
For the energy status report AESS collected data related to:

- Electricity consumption (2001-2005) divided by residential, tertiary, industrial, agricultural, public lighting
- Natural gas consumption 2001-2005 divided by residential, tertiary, industrial, agricultural
- Fuels consumption 2001-2005 divided by petrol, gas oil, LPG, methane
- Waste management: total tons produced, tons in dumps, tons in incinerator
- Livestock (number of animals): bovine and swine
- Urban area (existing and planned): hectares of residential areas, hectares of industrial areas, typology of industrial area
- Demographic data and scenarios

The energy demand in the Municipality of Mirandola is mainly connected to the electricity and natural gas use.

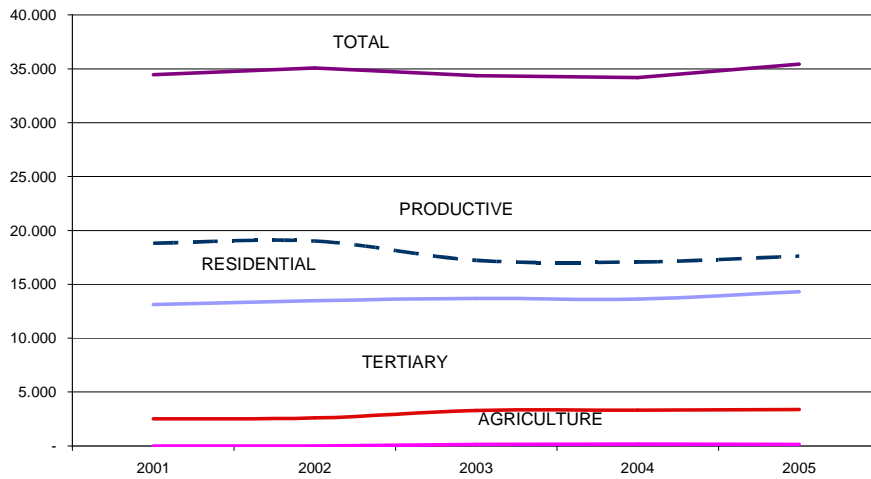
Electricity consumption in particularly represents the 39% of the total energy consumption and in 2006 the annual demand was of about 33.500 Toe. In the period 2002-2006 the electricity demand increased by the 14.5%, depending principally to the productive sector, which represent the 48% of the total electricity consumption.

**Electricity consumption (Toe)**

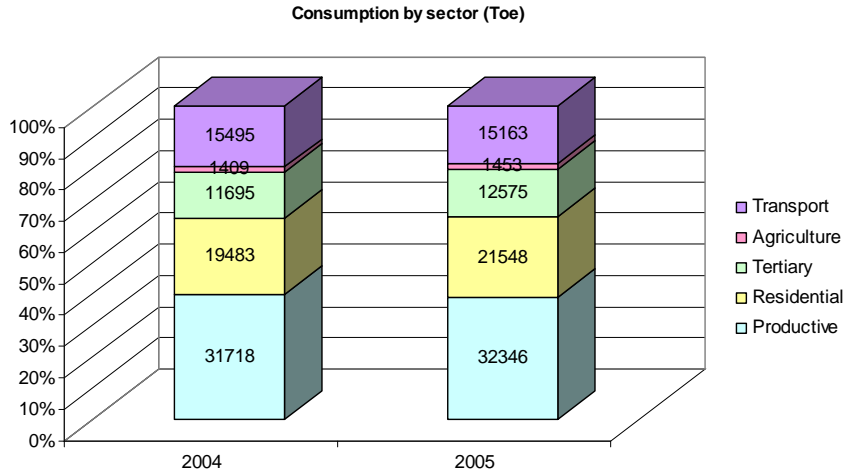


The natural gas represents the 42% of the total energy consumption and in 2005 the annual demand was of about 35.500 Toe. In the period 2001-2005 the natural gas demand increased by the 3%. The scarce growth in the gas demand depends principally in the reduction of the demand from the industrial sector due to some food industries closedown.

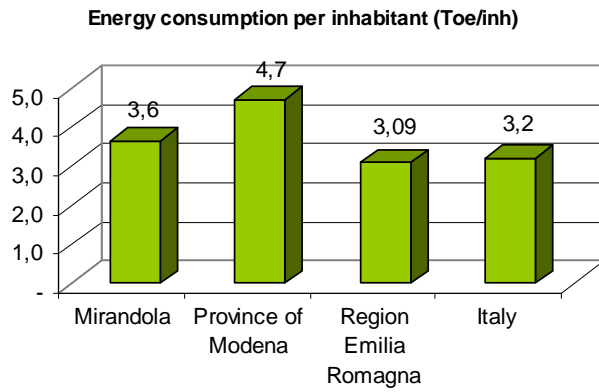
**Natural gas consumption (Toe)**



The other source of energy are gasoline, diesel oil and LPG used in the transport sector. The total energy used is about 83.500 Toe. In the following figure are represented the total consumption divided by sector in 2002 and 2005

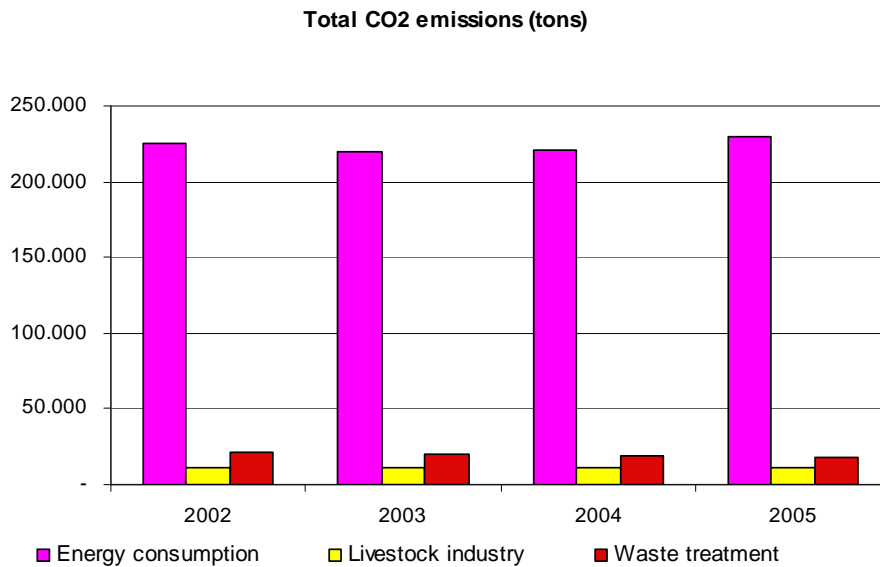


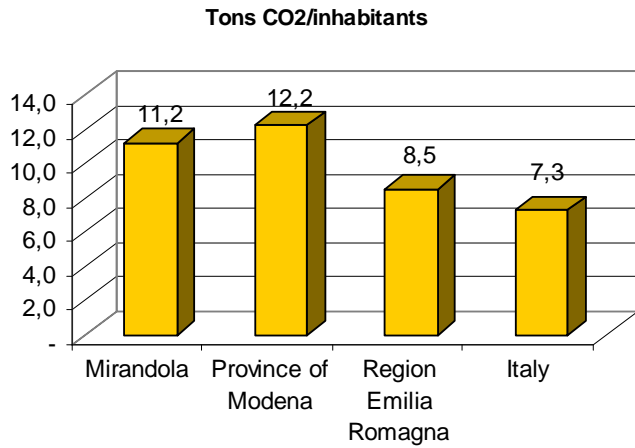
In the following figure is possible compare the index of total energy consumption per inhabitants in the Municipality of Mirandola with the index at provincial, regional and national.



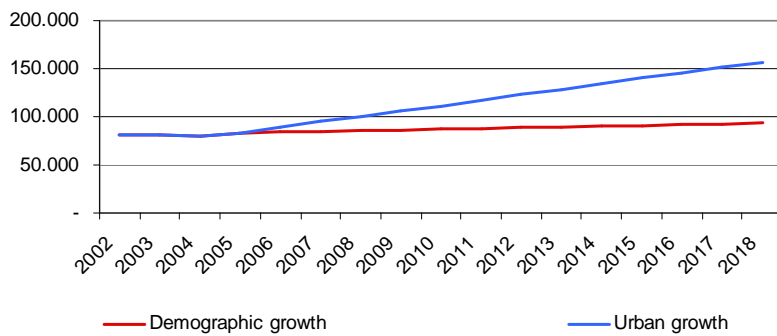
CO<sub>2</sub> emissions are connected principally to the energy consumption, but also to the waste management and treatment and to the livestock industry.

In the following figures are reported the CO<sub>2</sub> emission trend by source and the tons of co2 emission by inhabitant.

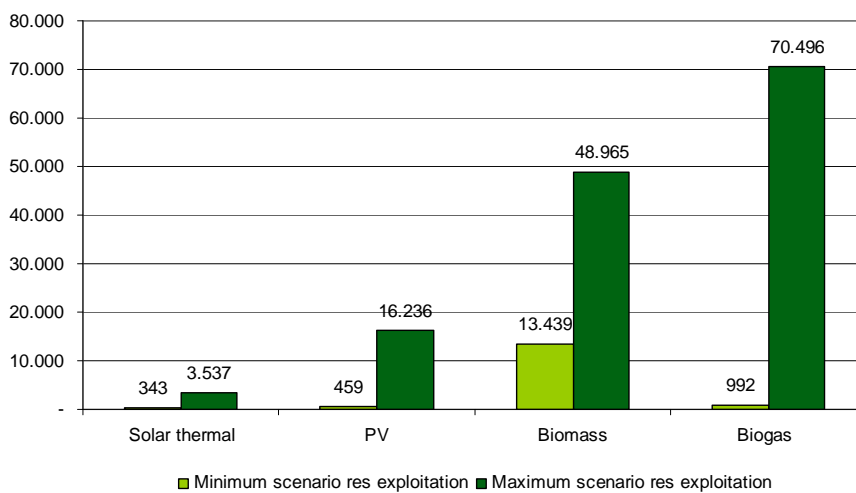




The energy status contains also scenarios on the expected energy demand by 2018 base both on demographic and urban growth.

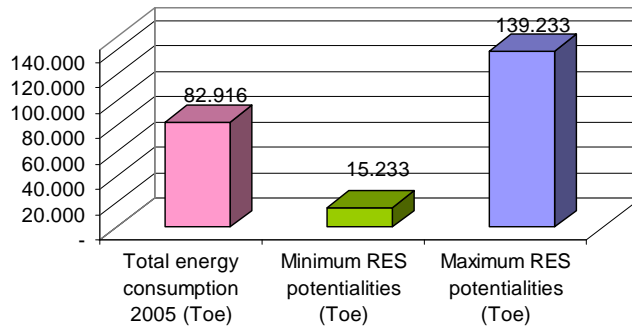


The study evaluates also the renewable energy sources potentialities, in particularly have been identified 2 scenarios of minimum and maximum exploitation of renewable energy sources available in the territory (Toe).



In the following figure the energy demand is compare with the potential production of energy from renewable energy source.

**Energy demand and RES potential production (Toe)**



## 2.4 The Province of Ávila (Spain)

Ávila is a province of the region of Castilla y León, located in the centre of Spain with a population of 167.818 inhabitants, agriculture and tourism being the main economic sectors.

The aim of the project “Innovative Thinking” for the community of Ávila is the development of the RES and the efficiency energy as well as the saving of energy in order to achieve a sustainable community. These goals will be achieved by means of an Action Plan focused on training and dissemination activities.

The first step of the project has been the compilation of final energy for the electricity, butane/propane, gas natural and oil for heating for the following sectors: Residential, Non Residential (Industry, Services and Other) and Agriculture from 2000-2006.

Several sources have been consulted for the energy compilation: Statistical yearbooks of Castilla y León (2001-2006), Industry, Tourism and Trade Ministry, Regional Gas Provider, Spanish Association of Oil Products, General Sub direction of Energy Planning (belonging to Industry Ministry), General Subdirection of Hidrocarbures (belonging to Industry Ministry), National Statistic Institute and Energy Data of the Autonomous Community of Valencia, 2005.

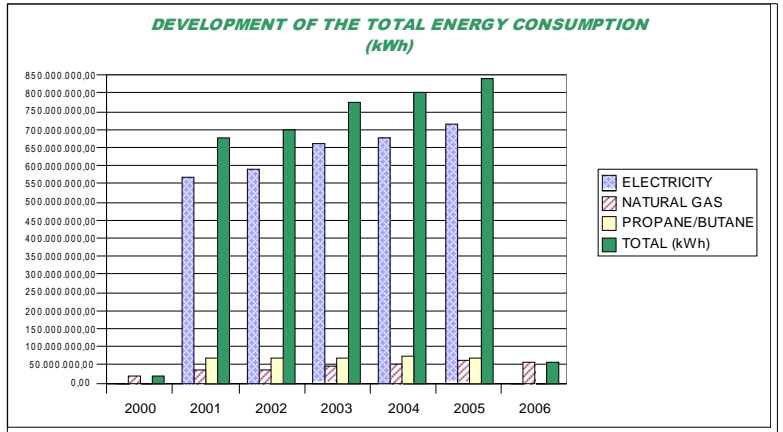
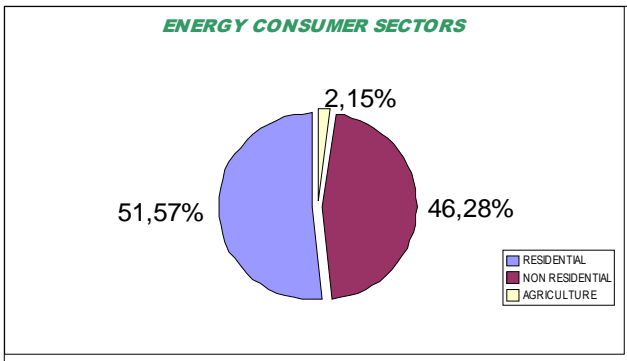
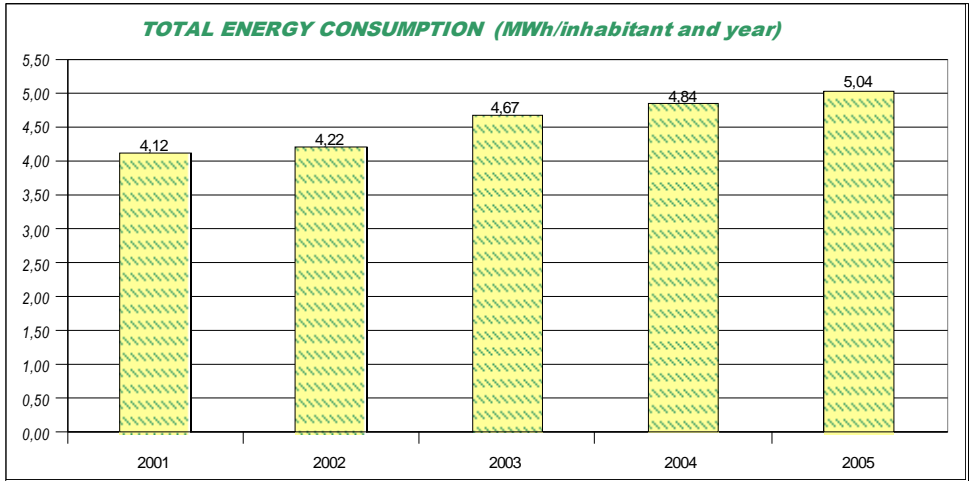
The results of the energy analysis of the community is the quantification of the CO<sub>2</sub> emitted to the atmosphere. The next table shows the CO<sub>2</sub> emitted by each type of energy considered in the study.

Type of Energy	t CO <sub>2</sub> /ktep
Coal	4032 t CO <sub>2</sub> /ktep
Butane/Propane	2614 t CO <sub>2</sub> /ktep
Oil Type C	3070 t CO <sub>2</sub> /ktep
Natural Gas	2337 t CO <sub>2</sub> /ktep
Renewable Energies (Hidraulic, Eolic, Biomass and Solar)	Neutral

The energy consumption per sectors and per inhabitants and the development of the energy consumption in the last years are shown in the next figures.

A data to be considered is the increase of energy in a 24,59% from 2001 to 2005, being the electrical consumption the main cause. In the case of the energy per inhabitant, the increase has been of a 22% for the same period.

Residential sector, with an average of 51,57% of energy consumption, is the main energy consumer in the community of Ávila, so that an important number of formation and dissemination activities will be directed to this sector during the project.



## 2.5 Tanum (Sweden)

Tanum is a rural community on the West-coast of Sweden with islands, forests, lakes and farming areas. It has 12 250 inhabitants the year-round (about 5 times more during summer). The area consists of 945 km<sup>2</sup>.

About 50% of the private houses are only used in the summertime/during weekends, mostly warmed up with electric-heat. Other heat sources are Heat Pumps, Wood/Pellets and Oil. There is no District Heating for private houses. Within the community the main workplaces are in the Tourism business, Smaller Industry, Fisheries, Farming and the Municipality of Tanum itself.

### *Energy consumption*

During 2005 the total energy consumption was 549 GWh (including 311 GWh sold amount of petrol/diesel)/

The following tendencies are noticed:

- The use of electricity increases;
- Residential use of oil decreases;
- 70% of the consumption took place in the Municipality buildings of Tanum (between 2003 and 2006);
- Transport sector increases.

The total energy consumption for Tanum compared to the whole of Sweden:

	<b>total energy consumption</b>	<b>total emissions (CO<sub>2</sub>, 2003)</b>
Tanum	44.807 kWh/capita	6.279 kg/capita
Sweden	52.143 kWh/capita	5.895 kg/capita

### *Renewable energy*

During 2004, renewable energy sources (solar, wind power; bio fuel) produced 99 GWh, equivalent to about 20% of the total energy use. Wind power produced around 20% of the total electricity use.

In Tanumshede there is one district heating plant with a production of 7 700 MWh based on 90% bio fuel and 10% on oil (2006).

## 2.6 Dals-Ed (Sweden)

Dals-Ed is a rural community with forests, lakes and farming areas. It has 4900 inhabitants. Many private houses are whole or partly warmed up with bio fuel (wood and/or pellets). There is no District Heating for private houses. Within the community the main workplaces are Sawmills, Plastic Industry, Call enter and the Municipal of Dals-Ed itself.

### *Energy consumption*

During 2005 the total energy consumption was 189 GWh (including sold amount of petrol/diesel).

The following tendencies are noticed:

- The use of electricity increases;
- Residential use of oil decreases;
- Transport sector increases.

The total energy consumption for Dals-Ed compared to the whole of Sweden:

	<b>total energy consumption</b>	<b>total emissions (CO<sub>2</sub>, 2003)</b>
Dals-Ed	39.000 kWh/capita	4.238 kg/capita
Sweden	45.000 kWh/capita	5.084kg/capita

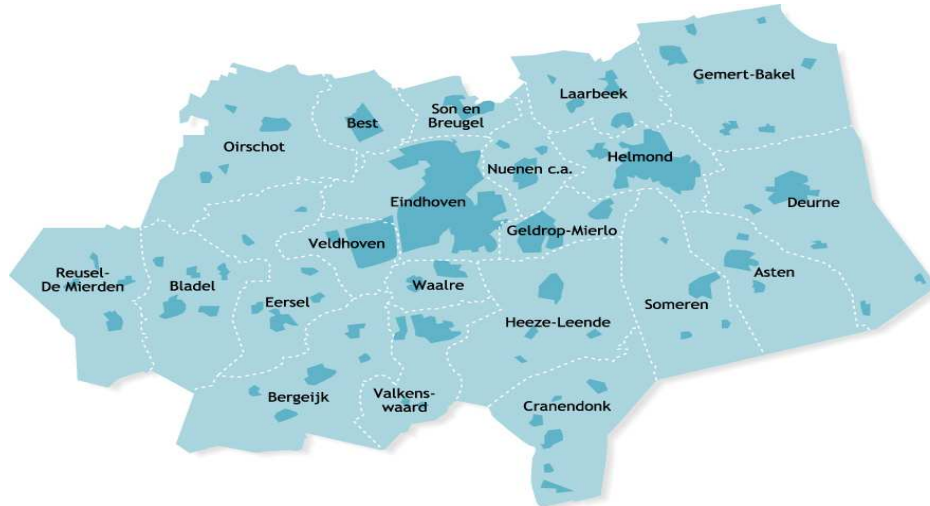
With regard to the energy consumption it is of interest to see that two private companies (Sawmill and Plastic Industry) together with the Municipality use 26% of the total consumption.

### *Renewable energy*

During 2005, renewable energy sources (solar, wind power; bio fuel) produced 60 GWh, equivalent to about 30% of the total energy use. In Dals-Ed there is one district heating plant with a production of 7000 MWh based on 97% bio fuel and 3% oil.

## 2.7 The Eindhoven Region (The Netherlands)

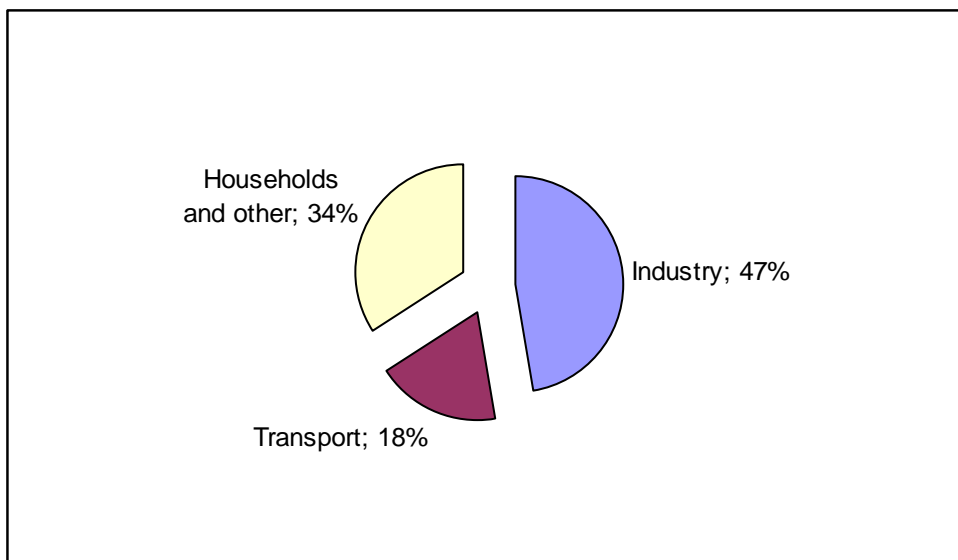
The Eindhoven Region, located in the south-east of The Netherlands with about 725,000 inhabitants, is known as an Industrial Main port. The 21 municipalities of the region are united in the Samenwerkingsverband Regio Eindhoven (SRE), which looks after the common interests. The SRE undertakes activities in the fields of spatial planning, traffic and transport, housing, the environment, recreation and tourism, education, health, culture and socio-economic affairs. The purpose is to bring about a balanced development of a region in which there are urban as well as rural districts.



The Energy Agency is part of the SRE and contributes to the region's aims regarding energy saving and sustainable energy. The transition to an energy saving and a sustainable energy supply society are crucial factors in the development of the south-eastern region of Brabant. Along with the Dutch national climate goals, it is the region's mission to achieve 30 % of renewable energy in 2020 and maximum energy saving.

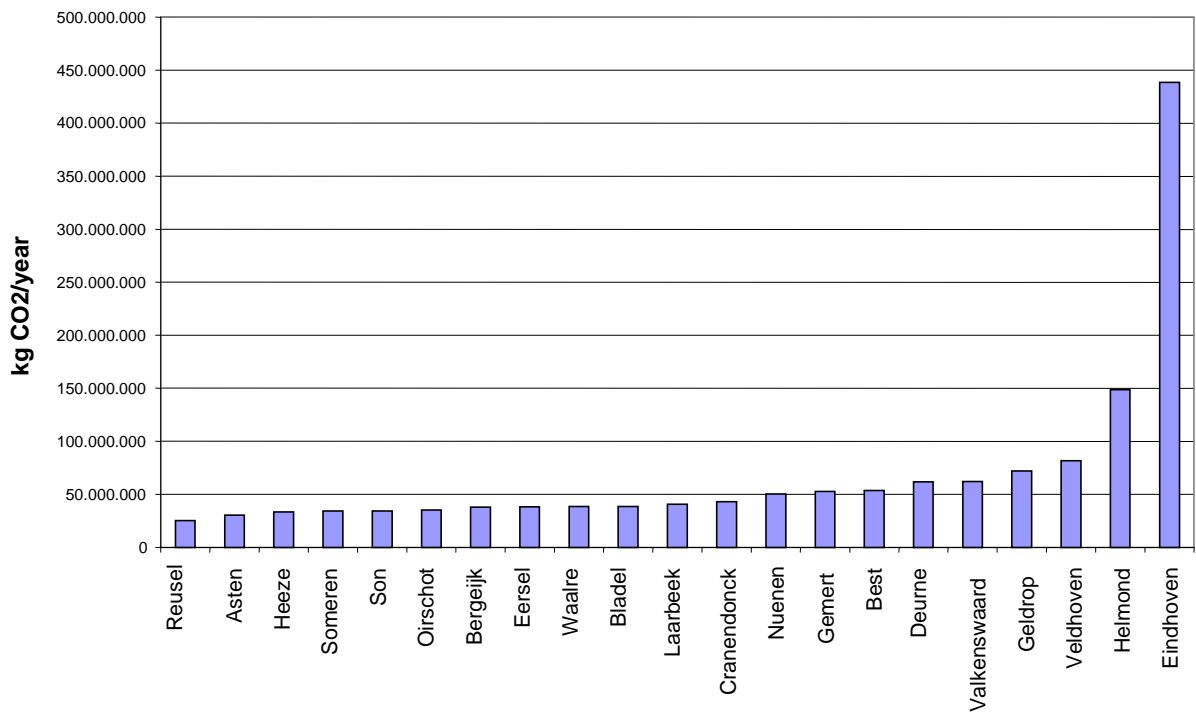
### *Energy consumption*

The current energy status has been assessed with 2004 data derived from the national statistics agency (CBS). Unfortunately, no local nor regional data were available on the energy consumption of all sectors. In the near future this will change since the administration is obliged and CBS will process the energy data structurally. We assume that the division of the energy consumption is similar to the rest of the Netherlands, as is portrayed in the pie diagram below.

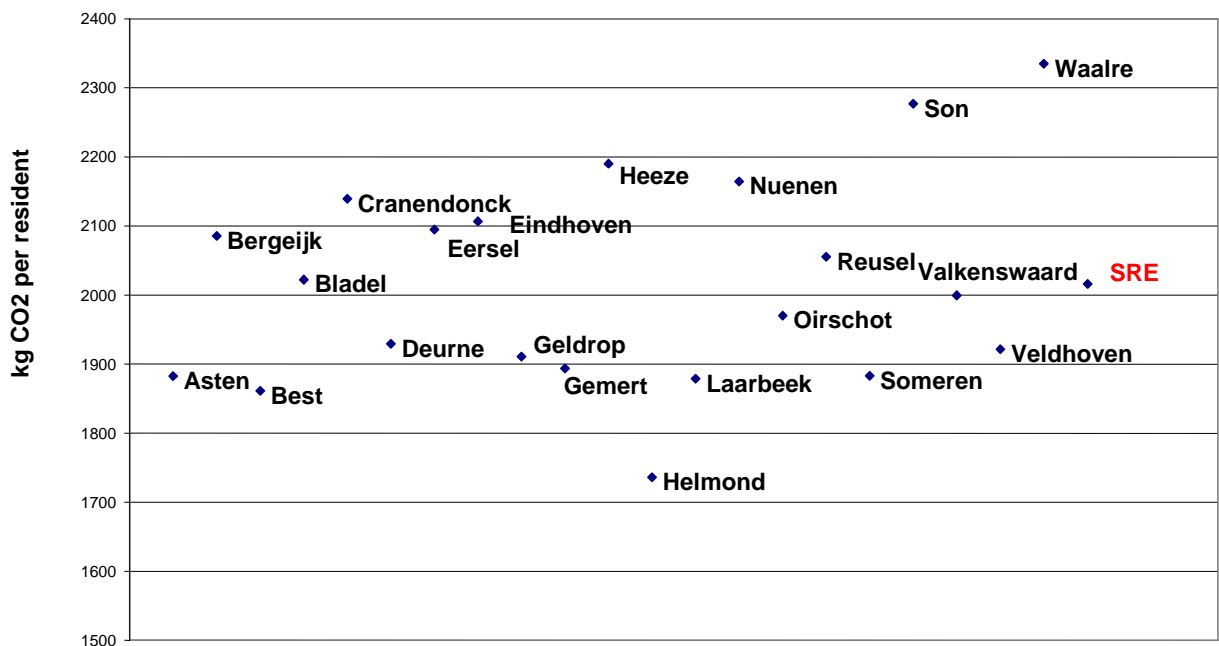


*Relative energy consumption in the Netherlands in 2007 (CBS 2008)*

The available local data on energy consumption were the use of natural gas and electricity by households. By using the Energy Barometer ([www.energystatus.eu](http://www.energystatus.eu)) these figures were converted to the corresponding CO<sub>2</sub> – emissions and totalled per municipality. This is shown in the figure below. It is not surprisingly to see that Eindhoven has by far the highest emission. Most of the other municipalities are rather small and do not contribute much. In the second figure, the municipalities are plotted by the amount of CO<sub>2</sub> – emissions per resident (in kg). Overall, the differences are not so big and lie close to the region’s average (SRE). It’s striking that the households in the second largest town (Helmond) are the most efficient in the use of gas and electricity.



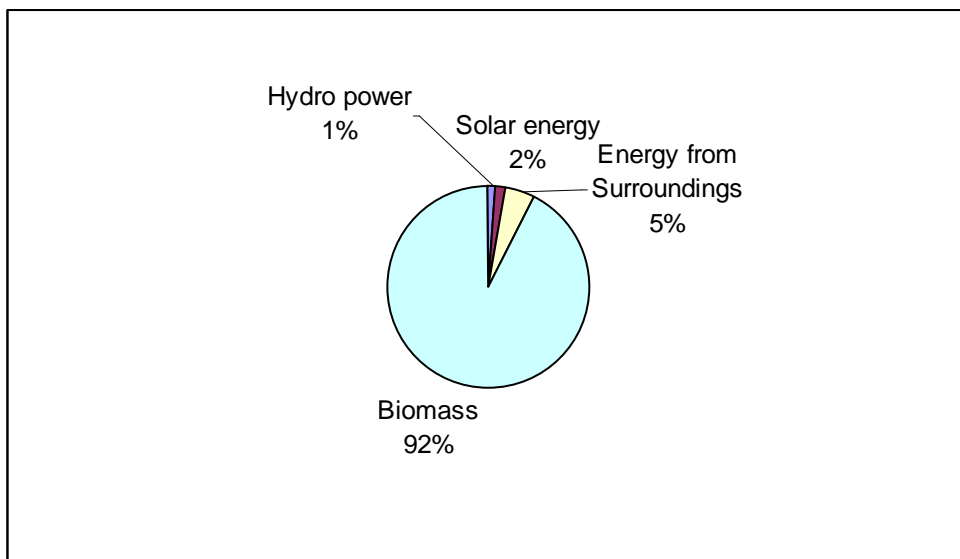
CO<sub>2</sub> exhaust of total household energy use



Household CO2 emissions per person (2004)

### Renewable Energy

In the Region of Eindhoven, biomass, solar energy and the use of heat and cold in the surroundings, are the main Renewable Energy Sources. Contrary to the other Dutch regions there's no wind energy generated. But there are plans for some wind turbines in three municipalities. There are some traditional watermills that produce a little power for local use. There are no local statistics on renewable energy production, but it will be similar to the rest of the Netherlands, apart from wind energy. In the diagram below (CBS 2008), the relative importance of renewable sources for the whole of the Eindhoven Region in 2006 is displayed, derived from national data. The importance of renewable energy from the surroundings like groundwater is quickly growing due to the increasing rate of diffusion of heat pump-technology systems in building projects.



Indicative renewable energy production in the Eindhoven Region in 2007 (CBS 2008)

In total the renewable sources accounted for about 2,8 % of the total energy demand and replaced about 3,5 % of fossil CO<sub>2</sub> – emissions. This clearly shows there's a lot to do to reach the energy objectives in the Eindhoven region. The main opportunities are in bio-energy production from various

waste streams (wood, organic household waste, dung) and renewable energy generation in the built environment.

## 2.8 Stroud District and Swindon (United Kingdom)

The UK communities partnering on the Innovative Thinking project are Stroud District and Swindon Borough. The local councils representing these communities, Stroud District Council and Swindon Borough Council, are working in partnership with a local not-for-profit energy agency, Severn Wye Energy Agency, to deliver the program.

The communities of Stroud and Swindon are located on the border between the Counties of Gloucestershire and Wiltshire. Whilst Stroud District (in Gloucestershire) is a predominantly rural area, Swindon (in Wiltshire) is a mainly urban area. The town of Swindon itself is growing rapidly with several large new residential and industrial developments planned in the area. Both municipalities have recently begun work towards developing climate change or carbon management strategies and aim to develop methods to engage the wider community with this process.

This summary document is designed to provide an energy 'snap shot' for the two communities using data available from national sources.

### 2.8.1 Stroud District

Key Statistics Stroud District (2005)	
Population	110,000
Total CO <sub>2</sub> Emissions from the District	817,000 tonnes
Per Capita CO <sub>2</sub> Emissions (for NI 186) for Stroud District	7.4 tonnes

Figure 1 shows the total CO<sub>2</sub> emissions from Stroud District Council for 2005 and a Figure 2 gives a detailed breakdown of the sources of those emissions.

The figures do not include emissions from organisations involved with the EU Emissions Trading Scheme, and emissions from diesel railways or motorway transport have also been removed.

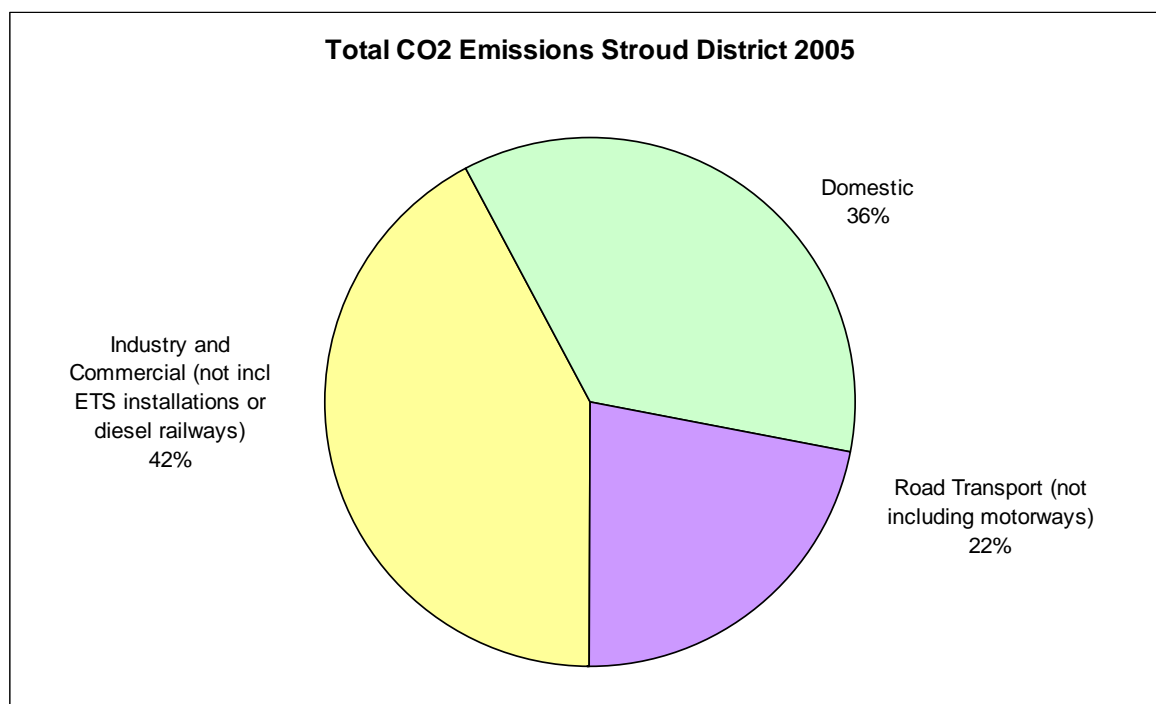


Figure 1: Total CO<sub>2</sub> Emissions by Sector from Stroud District 2005

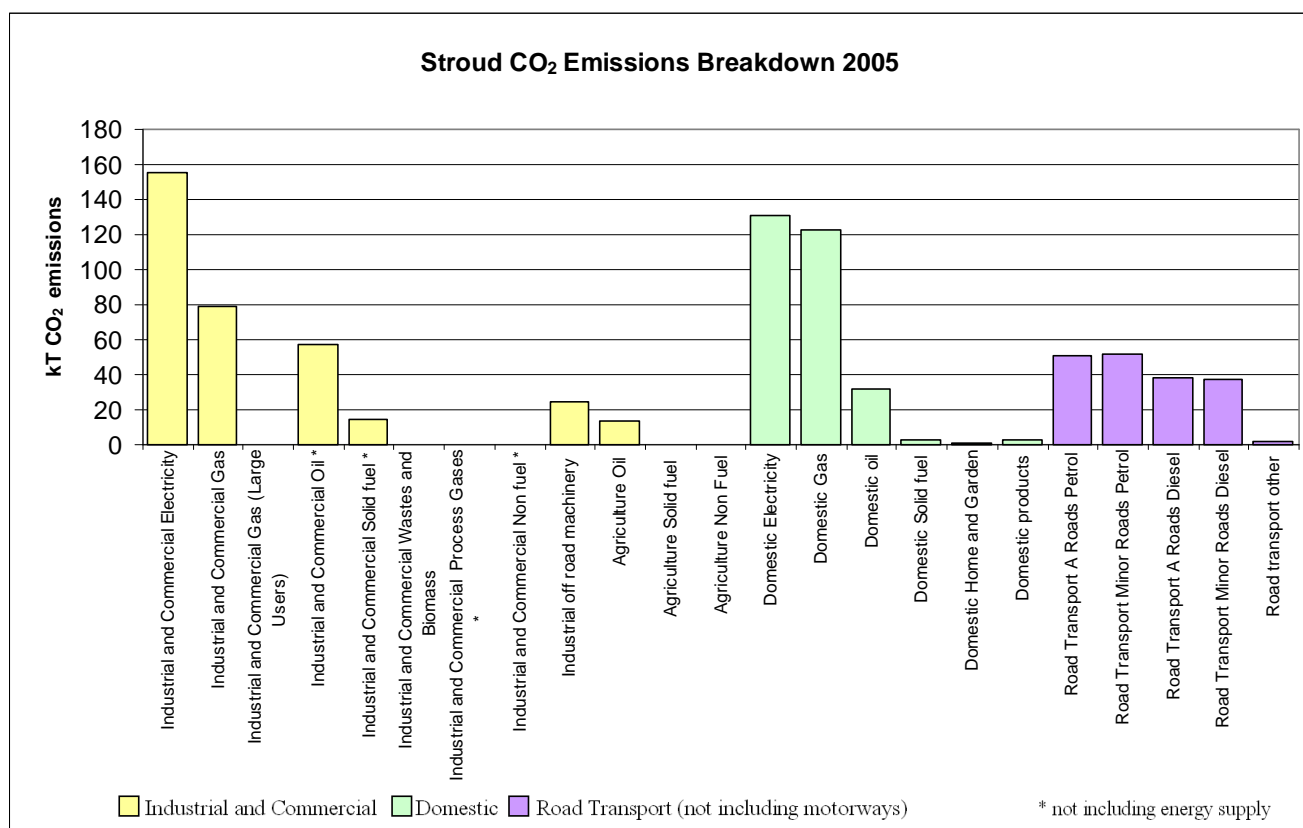


Figure 2: Breakdown of Emissions Stroud District 2005

<b>Breakdown of Renewable Energy Contribution Stroud District</b>	
Grid connected non domestic renewable electricity projects	10
Installed Capacity	2.61MW
Renewable Heat Projects	2
Installed Capacity	0.01MW
Total Installed Capacity	2.62MW
Percentage Contribution of Renewables and Waste	0.16%

#### *Stroud District Council Activities*

Stroud District Council has recently begun to assess its own carbon footprint. An initial estimate for the period 2006-07 is as follows:

Fleet and other business mileage	180.8 tonnes
Gas and oil consumption for heating for all sites managed directly by the council	360.9 tonnes
<b>Total Emissions (CO<sub>2</sub>)</b>	<b>541.7 tonnes</b>

#### **2.8.1 Swindon Borough**

Swindon Borough has a wonderful blend of urban and rural landscapes including the North Wessex Downs area of outstanding natural beauty, 88 country wildlife sites and 2 nature reserves. The protection, conservation and improvement of these is vital to maintaining and improving our local biodiversity and the quality of life for all who live and work in the borough and beyond. Population of Swindon Borough is 184,000 with a good mix of people from different cultures and countries.

There is a high projected population increase, estimated at 61,000 new residents by 2011.

Swindon is a major centre of employment, shopping, leisure and community facilities thanks largely to its excellent transport links and as such the town is the UK base for the corporate headquarters of several major companies such as Honda, BMW, RWE Innogy, Nationwide Building Society and Arrival

PHH. Four of the government's Research Councils and the National Monument Record Office are based in Swindon and the town enjoys lower than the national average unemployment rates.

<b>Key Statistics Swindon Borough (2005)</b>	
Population	184,000
Total CO2 Emissions from the Borough	1,401,000 tonnes
Per Capita CO2 Emissions for Swindon Borough	7.6 tonnes

<b>Breakdown of Renewable Energy Contribution Swindon Borough</b>	
Grid connected non domestic renewable electricity projects	6
Installed Capacity	3.55MW
Renewable Heat Projects	2
Installed Capacity	0.1 MW
Total Installed Capacity	3.65MW
Percentage Contribution of Renewables and Waste	0.11%

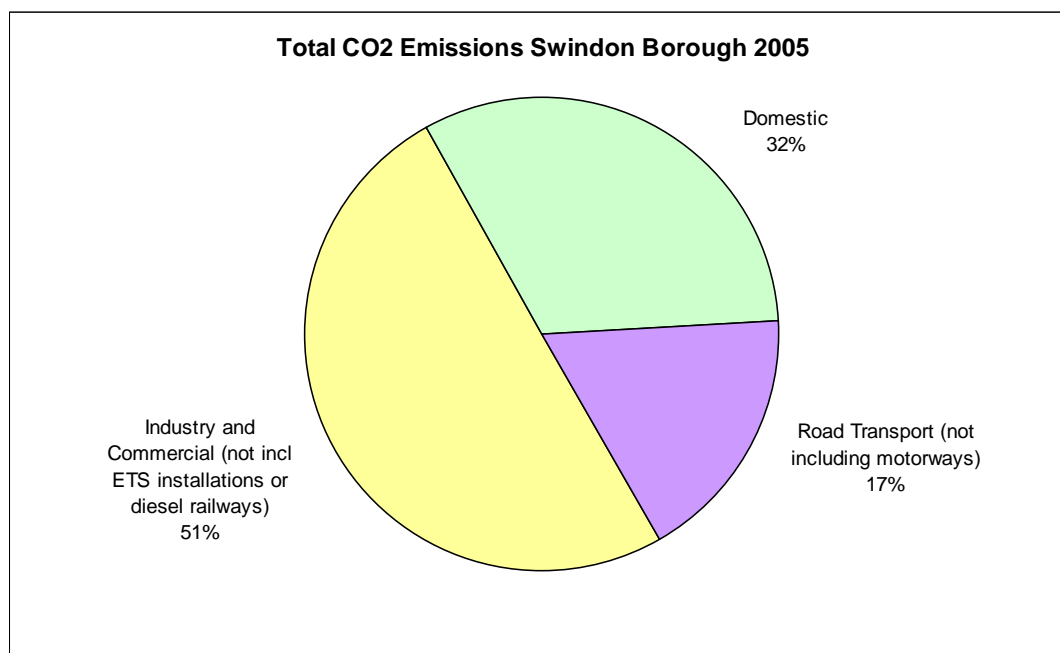


Figure 3: Total CO2 Emissions from Swindon Borough by Sector 2005

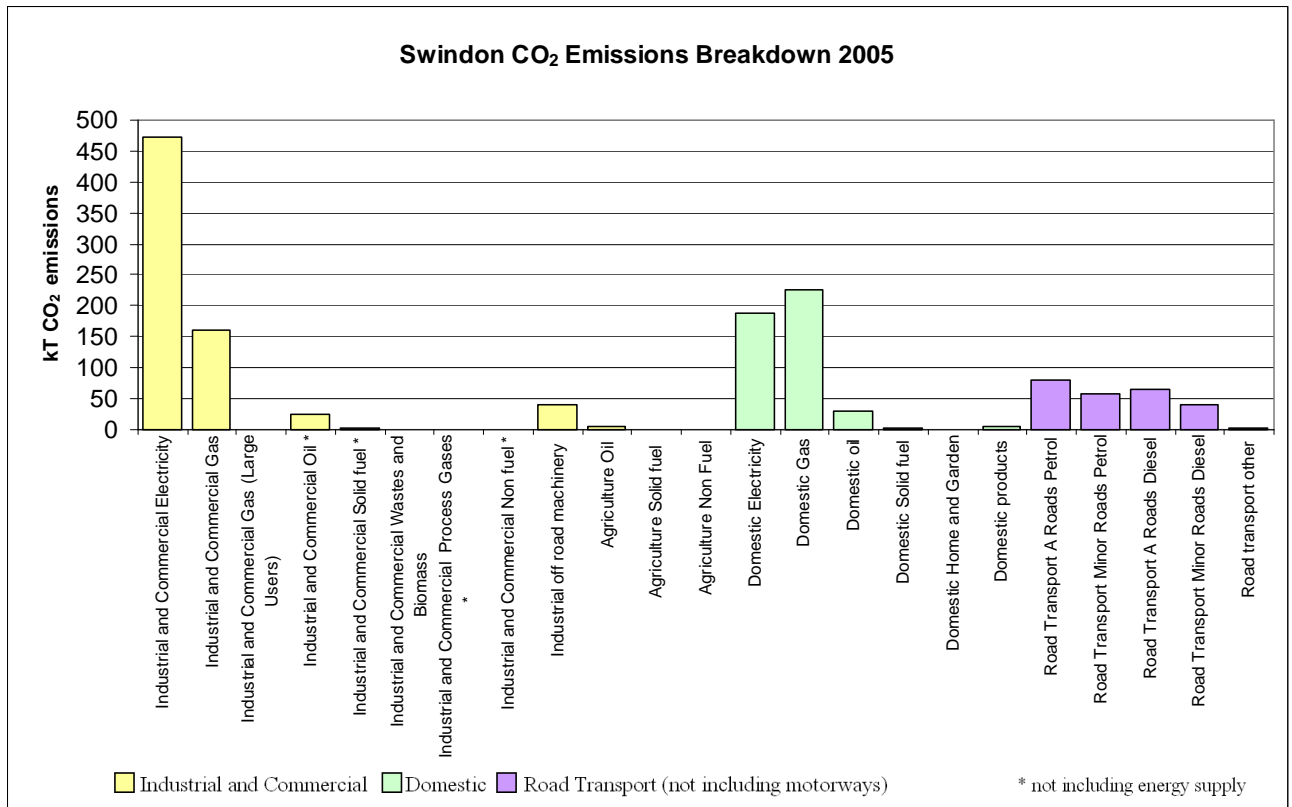


Figure 4: Breakdown of CO<sub>2</sub> Emissions Swindon 2005

### Conclusions

The per capita emissions from the two communities are quite similar – 7.4 tonnes per person in Stroud and 7.6 per person in Swindon. For both communities the figures are lower than the average for the South West region of 7.7 tonnes per person and lower than the UK average of 7.9 tonnes per person. Industrial and commercial energy use and emissions are high in both communities and concerted action to tackle this sector is crucial. In Swindon Borough in particular the emissions from electricity consumption in the non domestic sector are significant – action on improving efficiency in the commercial sector should be a priority.

The use of natural gas for heating and electricity in domestic properties makes up a significant proportion of the emissions in both communities and action to improve energy efficiency, particularly in older housing stock, is vital. Transport emissions make up the smallest share of emissions from in both communities (22% in Stroud and 17% in Swindon) but these figures do not include emissions from motorways and diesel railways that pass through the areas. Use of renewable energy, both electricity and heat needs to be significantly increased in both communities, current contribution to overall energy use stands at 0.16% in Stroud District and 0.11% in Swindon Borough. These figures need to increase urgently for the communities to be contributing to both national and regional targets on renewable energy.

### Data Sources

The main data source used for the energy status report is the Regional Energy Statistics produced by the Department of Business, Enterprise and Regulatory Reform (DBERR). The data is compiled annually and gives total final energy consumption for each Local Authority area in the UK. The dataset combines natural gas consumption, electricity consumption, use of other fuels (solid fuels, renewables, industrial petroleum and coal) and use of transport fuels for each area. The data currently takes around 3 years to become available hence the latest figures used in this report are for 2005. According to DBERR ‘the data is produced to emphasise the importance of local and regional decision-making for energy policy in delivering a number of national energy policy objectives’ The statistics are available at <http://www.berr.gov.uk/energy/statistics/regional/index.html>

The report will also use the experimental statistics of carbon dioxide emissions for local authority areas produced by AEA Technology on behalf of DEFRA for years 2003, 2004 and 2005 (see <http://www.defra.gov.uk/environment/statistics/globalatmos/globalghg.htm>). The CO<sub>2</sub> emissions data used in this report is for 2005 only and will serve as a baseline position for future years.

The renewable energy data for the report has been sourced from the REGENSW Renewable Energy Projects in the South West April 2007 document available at <http://www.surveys.energysw.com/>

### **3 Overall conclusions**

First of all it is very difficult to draw unambiguous conclusions due to the diverse nature of data used by the different countries. For instance the consumer groups are not identically defined amongst the countries. Where the United Kingdom and the Netherlands divide the consumer groups into three categories: households, industry and transport, other partners divide the consumer groups into more categories, for example Italy: productive, residential, agriculture and tertiary. We do not state one categorisation is right or wrong, we just want to emphasise the differences, which make it difficult to draw overall unambiguous conclusions. However we realise it is hard – if not impossible – to collect equally defined data in the various countries. Therefore we will try to define certain trends despite the variations in data definitions.

#### **Total energy consumption**

The total energy consumption in the various regions has increased over the past couple of years. Within the light of developing a sustainable environment, it therefore becomes more and more important to take policy actions to stimulate the use of sustainable energy and energy savings in all the regions considered in this study.

Remarkable is the decrease in energy consumption in the region Madona (Latvia). The reduction in energy consumption was mainly realised by energy efficiency measures implemented in buildings and district heating systems during the years.

Note that for the Dutch region Eindhoven and the English regions Stroud District and Swindon no data on the amount of energy consumption over the years was given.

#### **Energy consumption by consumer group**

Amongst the different regions the two consumer groups 1) households/ residents and 2) industry/productive/non-residential have the main share in the overall energy consumption in each region/town. Therefore policy actions to stimulate the use of sustainable energy and energy savings should be focused on these consumer groups.

Note that not for all regions it's clear whether or not the public/tertiary sector or commerce sector is included in the industrial/ productive/ non-residential sector. In the regions of Latvia and Italy the public/ tertiary sector and the commerce sector is presented separately from the industrial sector. For this comparison these sectors (public/ tertiary and commerce) were included in the category industry.

#### **Energy consumption by source**

- The main energy sources used to meet the energy demand are electricity and gas (Spain, UK)
- Latvia is the only region where wood fuel is by far the main source to meet the energy demand, followed by a small share for electricity.
- For the regions in Italy, Sweden and Eindhoven the sources used to meet the energy demand are not specified
- The Swedish regions Tanum and Dals-Ed have the largest amount of renewable energy sources contributing to meet the total energy demand, respectively generating 20% and 30% of the total energy use.
- In the Dutch and English regions the amount of renewable energy sources used to meet the energy demand is still quite small. In the Dutch region (the Eindhoven region) the renewable energy sources only account for about 2,8% of the total energy demand. In the English regions Stroud District and Swindon Borough the renewable energy sources (including waste) account for less than 1% (respectively 0.16% and 0.11%) of the total energy demand.
- For the Latvian, Italian and Spanish regions no data are given on the share of renewable energy source to meet the total energy demand.

#### **CO<sub>2</sub> emissions**

- The Latvian regions Madona and Lubāna have the lowest amount of CO<sub>2</sub>-emissions per resident, respectively 0,25 and 0,5 ton CO<sub>2</sub>-emissions/resident.
- The Latvian regions are followed by the Dutch region Eindhoven which has a CO<sub>2</sub>-emission, varying from 1,7 – 2,4 ton CO<sub>2</sub>-emissions/resident. However it should be noted that only the energy consumption of households is considered in this data.
- Next are the Swedish regions Tanum and Dals-Ed, with respectively 6,3 and 4,2 ton CO<sub>2</sub>-emissions/resident and the English regions Stroud and Swindon Borough with respectively 7,4 and 7,6 ton CO<sub>2</sub>-emissions/resident
- The highest amount of CO<sub>2</sub>-emissions per resident is found in the region Mirandola (Italy); i.e. 11,2 ton CO<sub>2</sub>-emissions/ resident

Note that no data on the CO<sub>2</sub>-emissions per resident were given for the Spanish region Ávila.

Remarkable is the lowest amount of CO<sub>2</sub>-emissions per resident in Latvia where according to the data no renewable energy sources are used to meet the energy demand. In addition it is remarkable that the Swedish regions with the highest amount of renewable energy sources used to meet the energy demand does not come up with the lowest CO<sub>2</sub>-emissions per resident. An explanation could be found in the industrial activity of these regions. It could be that the industrial activity in the Latvian regions is quite low compared to the other regions and that the industrial activity in the Swedish regions is quite high compared to the other regions. As shown from the energy consumption figures one can see that in the Latvian regions the industrial sector has a small share in the total energy consumption. However for Sweden no data on the share of the industrial sector in the total energy consumption is given. So more data/ research would be needed to confirm this presumed explanation.