



Association européenne pour la Biomasse

European Biomass Association

Report to project Key Issues for Renewable Heat in Europe - K4RES-H

## Statistics on bioheat

Task 4.1. - Deliverable number 2

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# 1. Best available statistics for Biomass for Heat

Note : A first important remark on terminology is essential, to differentiate bioheat and biomass for heat.

- Biomass for heat/cogeneration : biomass as primary energy used to feed a conversion process aiming at producing heat or cogeneration.
- BioHeat : final heat produced by a conversion technology

This distinction is important because the efficiencies of installations might range from a few percents (open fire) up to more than 90% (automatic systems).

## 1.1 Overview and description of available statistics and information sources

### 1.1.1. At EU Level

Statistic bodies are using several types of classification and sub-classification for biomass/bioheat. The following sources of information were found :

- EUROSTAT<sup>1</sup> : these official statistics do include several types of products like biomass and wastes, wood and wood waste and biogas (also municipal solid waste that includes part of biomass, but not specified). The most interesting indicators for heat are final energy consumption for households and services (code 102000), and input to district heating plants (code 101009). The main problems are the following :
  - It is not clear if input to district heating do include cogeneration or heat only applications.
  - The indicator input to conventional and public power stations (code 101001 and 1001021) do not mention any cogeneration and cannot be used.

These data are originating from national statistical bodies that have to answer a questionnaire.

- European Commission<sup>2</sup> : statistics are given for EU25 countries defined as biomass for heat.

However no detailed is given regarding the source of the information, the way it is gathered and the types of biomass covered, etc. We can suppose however that Eurostat was a main source of information.

Biomass for cogeneration is not included as it is part of the biomass for electricity figures. This generates confusion as bioheat will be included in the framework of biomass for electricity statistics.

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<sup>1</sup> EUROSTAT, <http://epp.eurostat.cec.eu.int/portal>

<sup>2</sup> European Commission, 2004, " The share of renewable energy in the EU. Country Profiles. Overview of Renewable Energy Sources in the Enlarged European Union", COMMISSION STAFF WORKING DOCUMENT SEC(2004) 547,{COM(2004)366 final}, 26.5.2004, 111 p

- International Energy Agency <sup>3</sup> : statistics are given for some member states, as gross heat production, for heat only or CHP applications and for each of these with three categories : municipal solid waste renewable, solid biomass, biogas. In the principles used for statistical collection IEA admits that the division into renewable and non renewable municipal waste is often based on estimates and national data are of bad quality in this respect. To the same extend data for non commercial biomass are not complete (see page 30 of the reference). For many countries it was found that IEA statistics for heat are far below the statistics provided by Eurostat. Maybe that the reason comes from the terminology that is not similar as for Eurostat. Gross heat is mentioned but without a clear definition (at least for AEBIOM). Does gross heat means biomass (or fuels) for heat purposes ?
- Euroserv'ER – Wood energy <sup>4</sup>: statistics are given for EU15 and Poland wood energy as primary energy source. The distinction between electricity and heat is only globally mentioned (83,4% for heat and the rest for electricity). This is a main constraint as the various wood routes have a strong impact on the final energy, and particularly heat. Therefore the global figure of wood consumption cannot be used at all to evaluate biomass for heat. In addition, sources of information remain hard to find.
- Euroserv'ER – Biogas<sup>5</sup> : figures are given for crude biogas and final heat production. Final heat figures can be used in the framework of this project, taking into account that this figure cannot be assimilated with the biomass for heat figures according to the note above (see beginning of this report).

The statistics at EU level are giving a broad image of the biomass for heat picture. However aggregated are extremely difficult to comment. Therefore national sources of statistics are needed that are focussed on specific bioenergy areas (biogas, pellets, boilers, district heating, cogeneration, etc.). Such examples of national statistics are given below.

### 1.1.2. Germany

Three main types of sources were used for statistics in Germany.

**a. Institute for Energy and Environment** et al. (2004): Energy consumption of private households and the tertiary sector (trade, commerce and services). Report to the Federal Ministry of Economics and Labour.

The objective of this survey was to obtain reliable, representative and international comparable energy-related data using empirical surveys for the sectors “private households” and “trade, commerce, services” which account for around 45% of final

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<sup>3</sup> Renewables information 2005, IEA statistics, 209 p

<sup>4</sup> Euroserv'ER, 2004, "Wood energy barometer", in Systèmes Solaires n°164, November 2004

<sup>5</sup> Euroserv'ER, 2004, "Biogas barometer", in Systèmes Solaires n°162, August 2004, p 69 - 78

energy consumption in Germany. The aspect of renewable energies was treated more detailed. Within this examination a written survey was conducted in over 27.000 representatively selected private households in December 2002 which resulted in a usable case of 20.235 households. The survey was coupled to a multi-topic survey to reduce costs. Two pages of the questionnaire were dedicated to energy consumption and various influencing variables. The evaluation was weighted for representative household structures.

Exclusive, face-to-face interviews were carried out in the tertiary sector at the beginning of 2003 in a total of 2.121 workplaces by trained interviewers. The company survey was supplemented by 40 in-depth interviews in selected sectors following the main questionnaire.

As a result of these surveys, two possible approaches to assess the bioenergy consumption in households and the tertiary sector were identified: via the total stock of heating systems with the corresponding specific utilisation factors and via the total revenue of biofuels in the corresponding sectors. To determine the heat supply from biomass in this study, existing statistical data were put together, from which conclusions can be drawn about the present utilisation, and these were supplemented by targeted primary data.

So in result the surveys of energy consumption in the private and tertiary sector provides a statistically and scientifically valuable database for both sectors which can be used for quantitative analyses of the energy consumption and its structural and socio-demographical determinants. For households it can be concluded that the analysis results presented are exemplary and pathbreaking for future field surveys due to the fine differentiation by relevant influencing factors, which was possible due to the large sample. This is particularly true for the data collected within the household survey on the use of biomass in particular as well as on car use.

In the tertiary sector the energy consumption structures as well as the equipment with energy-relevant appliances and the economic frame conditions of the companies were able to be examined on very differentiated sectoral levels. With the supplementary surveys on the use of biofuels in both sectors a foundation has been created for further quantitative data to determine the contribution of renewable energies to the energy supply via the analysis of existing systems and their use.

**b. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2005): Renewable Energy Sources in Figures - as at June 2005.**

To handle the problem of insufficient data and market development the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety established a working group on renewable energy statistics, called AGEE-Stat. It started its work on 10 February 2004 and consists of experts of

- › the Federal Ministry for the Environment (BMU),
- › the Federal Ministry of Economics and Technology (BMWI)

- › the Federal Ministry of Nutrition, Agriculture and Consumer Protection (BMELV),
- › the Federal Environmental Agency (UBA)
- › the Federal Statistic Office (Statistisches Bundesamt)
- › the German Institute for Economic Research
- › and the German Renewable Energy Association

AGEE-Stat works as an independent board. The coordination and secretary work is carried out by the Centre for Solar Energy and Hydrogen Research. The AGEE-Stat was founded to evaluate existing data on renewable energy development to elaborate a comprehensive, reliable and coordinated statistic, to deliver the basis for different national, EU-wide and international reports of the government on renewable energies and to inform the public. The working group meets regularly to discuss current developments and publishes its results each year in spring.

**c. German Energy Pellet Association (DEPV), 2005.** Presentation at BBE working group meeting on solid biomass in May 2005 and at the conference "Wood Pellets - Fuel of the Future" November 2005.

The German Energy Pellet Association is the lobby of the wood pellet producers as well as of the manufactures of wood pellet systems. The association is member at BBE and in its function in close contact to the key market players of the wood pellet market. The German Energy Pellet Association elevates the market development on a regularly basis in form of surveys, interviews and working group meetings containing an evaluation of sold units derived from an analysis of the support applications and the data provided by the manufacturers, an estimation of the wood pellet demand (and compared with available data of sold pellets) and a monitoring of the pellet production capacity.

As member of BBE the German Energy Pellet Association participates at the working group meetings on solid biomass of BBE and set its figures in context to the over-all bioenergy heat market. BBE organises its working group meetings on a regularly basis to bring the key market players of the bioheat industry and representatives of related associations together. In these meetings all available data are collected and provided to the branch. Further on actual market developments and appropriate reactions are being elaborated. The data presented by the German Energy Pellet Association reflect the status quo of the bioheat market from November 2005.

### **1.1.3. Italy**

#### **a. Introduction**

The production and use of thermal energy from solid biofuels is widespread in Italy, but a precise assessment of the whole sector is a very hard problem owing to the large scatter of the biomass producing sites, as well as of the users, over the national territory. Millions of households use small scale individual heating systems, while only 40 district heating plants are in operation in the north of Italy. Moreover, a lot of wood processing industries use their own wood residues for satisfying the thermal

need of the wood factory. As a consequence, the official statistics - based on certified trade of biomass (especially firewood) - must be integrated with unofficial ones, based on spot enquiries about the production and use of biomass (especially agro-industrial residues) outside the commercial networks. In the current statistics 5 sources of biomass are considered: firewood, lignocelluloses residues, municipal solid waste (MSW), biogas, biofuels, leaving out for the moment energy crops and short rotation forest (SRF). As a whole the biomass sector provides at present about 5 Mtoe to the national energy balance which represents 3% of the national primary energy supply. Of that amount: 4 Mtoe is converted in thermal energy (9% of global heat consumption), 0.8 Mtoe is converted in electric energy (1.3% of the global electricity consumption), 0.2 Mtoe is used as liquid biofuels (0.5% of fuels for transport). Each source has a different weight and had shown a different trend in the last years.

In the following report only biomass related to the production on thermal energy is considered, that is mainly woody materials.

The verifiable targets for bioheat have been inferred:

- Updating the previous statistics;
- Evaluating the biomass primary energy potential;
- Recollecting the present targets of the national programmes and plans;
- Observing the last 5-years trend.

## **b. The bases of the biomass statistics in Italy**

1. **ISTAT.** The main sources of national statistics concerning every types of data is the National Institute of Statistics (Istat). The Institute “ *has been working since 1926 as the main supplier of official statistical information in Italy. It collects and produces information on Italian economy and society and made it available for study and decision-making purpose. Istat is a public research body acting in full autonomy, governed by a President and a board of directors that plan, direct and evaluate its activities*”. Concerning specifically the RES and biomass sectors, the official data from Istat refer to commercialized firewood; therefore the Istat’s data must be integrated with the ones coming from additional sectorial investigations which take into account new entries, as well as some transactions which occur outside the commercial networks. Typical example of the latter is the consumption of wood fuels and other biomass fuels for household and industrial thermal generation: most of the biomass used for that purpose is self-produced and self-consumed, so that total biomass consumption for heat in Italy is much higher than that displayed by the Istat’s statistics.
2. **ENEA** - the National Agency for New Technologies, Energy and the Environment - has been currently issuing the Annual Report on Energy; since 2003 an additional Report has been publishing on purpose of RES and Biomass. The Reports are financed by the Ministry of Industry (at present called the Ministry for the Economic Development) in the frame of the Energy

Operative Project, (PON-ATAS-FESR, Objective 1, Action 1). The basic information concerning RES and Biomass is got from Istat, as well as from the Administrator of the electricity transmission network (GRNT), and from phone call enquires committed to private agencies such as CIRM (Italian centre for market research). The control and reliability of the data collection and elaboration is guaranteed by the public framework of the action.

3. **ITABIA.** The investigation of Itabia is focused essentially on district heating and power plants fed by different kinds of biomass. The main tool for this investigation are questionnaires sent to plants managers, asking for types, operation and management of the plants. Two examples of the questionnaire are given below. Another source of information is the National Programme on Biofuels (PROBIO) approved by the inter-ministerial Committee for the Economic Planning (CIPE) in February 2000 and managed by the Ministry for Agriculture and Forestry Policy together with Regional Administrations. The programme promotes demonstration projects and dissemination activities at Regional and Interregional level with a strong link with territory in order to stimulate local administrations, as well as industrial and agricultural entrepreneurs, towards biofuel development. Itabia co-operates with regional authorities - especially those located in the south of Italy - to implement such programme, at the same time getting data and information on local situations.
4. **Regional institutions.** Questionnaires, sent in a very large number (several hundred thousands) are also the tool which has been used by local organisations for collecting site-specific data.
5. **Other sources.** Fairs and exhibitions are excellent occasions for gain knowledge on market situation, plant innovation and import/export sector.

Exemple 1 of ITABIA questionnaire : Biomass district heating

| Data of the plant                 |                         |                       |
|-----------------------------------|-------------------------|-----------------------|
| Power                             | 5 MW                    |                       |
| Number of boiler                  | 2                       |                       |
| Power of each boiler              | 2.5 MW                  |                       |
| Type/power of the supplier plant  | 1 gasoil boiler of 3 MW |                       |
| Data of the net of distribution   |                         |                       |
|                                   | 06/2002                 |                       |
| Development of the net            | 4,000 m                 |                       |
| Number of connected consumers     | 115                     |                       |
| Connected power                   | 11,000 kW               |                       |
| Served population                 | n.a.                    |                       |
| Synthetic management data         | 2001/2002               | 2002/2003             |
| Biomass consumption               | 16,120 m <sup>3</sup>   | 20,500 m <sup>3</sup> |
| Invoiced energy                   | 6,500,000 kWh           | 8,500,000 kWh         |
| Saved gas oil and/or fuel oil     | 780,000 kg              | 1,020,000 kg          |
| Avoided CO <sub>2</sub> emissions | 2,100,000 kg            | 2,750,000 kg          |

Exemple 2 of ITABIA questionnaire : Biomass fuelled electric power plants

| <i>plants number</i> | REGION and PROVINCE | SITE            | TOTAL GROSS POWER<br>MWe | TYPE of INCENTIVE | NOTES  | FUEL TYPOLOGY   | CLEAN BIOMASS<br>% | ACTUAL POWER BY CLEAN BIOMASS<br>MWe |
|----------------------|---------------------|-----------------|--------------------------|-------------------|--|---|--------------------|--------------------------------------|
|                      | PIEMONTE            |                 |                          |                   |  |   |                    |                                      |
|                      | TO                  | <i>Airasca</i>  | 14,6                     | CIP 6             | Start up:2003.   | Wood chips, prunings, grape-stones, wood dust.        | 100                | 14,6                                 |
|                      | VC                  | <i>Vercelli</i> | 6,8                      | CIP 6             | Start up :2002. Two parallel power stations designed by Tecnogroup.. | Rice husk and wood chips.                             | 100                | 6,8                                  |
|                      | VC                  | <i>Crova</i>    | 6,7                      | CIP 6             | Start up :2001.  | Rice husk and wood chips.                             | 100                | 6,7                                  |
|                      | CN                  | <i>Verzuolo</i> | 5,2                      | Green C.          | Start up :2002.  | Wooden residua by agro-forest and paper mills pulper. | 60                 | 3,1                                  |
| 4                    | TOT. REGION         |                 | 33,3                     |                   |  |   |                    | 31,2                                 |

**c. Small size plants for domestic use of solid biomass (5-500 kW<sub>th</sub>)**

The data concerning the global household consumption of biomass - especially in the mountain communities - are obtained by intersecting and comparing four estimations:

ENEA's figures:

- ENEA estimates that from 20% to 30% of the family use woody materials and that the overall consumption of biomass (commercialised and non-commercialised) in the household sector is equal to 3.6 Mtoe<sup>6</sup>. ENEA provides also the trend of commercialised biomass in the last 5 years.

CTI's enquiries:

<sup>6</sup> ENEA, *Annual Reports on Energy and Environment*:2003, page. 15; 2004 page. 24,25; 2005, page. 25,27,33.

- The Italian Thermo-technical Committee (CTI) explored the firewood consumption in some mountain communities in the central Apennines and found it equal to 1.5 t/y (fresh weight) per-capita<sup>7</sup>.

#### UNCCEM's data base:

- The National Union of Mountain Municipalities (UNCCEM) provides reports on the state of the Italian mountains, in particular on the people living in mountains which amount to 10,845,442 units<sup>8</sup>.

#### Lombardy Region's investigation

A specific survey has been performed in Lombardy sending about 100,000 questionnaires to different users. The following data are obtained: 25% of the families of the sample use wood, with an average consumption of 4.0 t/y per family<sup>9</sup>.

Combining the figures from 3.2 and 3.3, taking into account that 1 t of fresh firewood is equal to approx. 0.2 toe, we get 3.25 Mtoe/y, which is very close to the ENEA's figure.

Expanding the figures of Lombardy Region to the whole national territory, where over 17 million families are dwelling, we get 3.4 Mtoe.

So we can assert that in the domestic sector the overall primary fossil energy replaced by biomass is very close to 3 - 4 Mtoe/y.

Pellets are going to be widely used together the traditional firewood and gross agriculture residues. Italy is the most important Mediterranean pellet market, with over 90 production sites. Nevertheless, national production, of approximately 160,000 t/year, cannot satisfy the growing demand, which is nearly 300,000 t/y<sup>7</sup>, making it necessary to import large quantities of the product from abroad. The price of pellets varies from 150 to 200 €/t; nevertheless its convenience is high in respect to traditional fuels, and the companies producing the pellet make up an ever-expanding sector.

In Italy, almost all pellets are burned in over 125,000 domestic heaters, while less than 2% are used for larger heating boilers (approximately 500 units installed).

In the domestic sector, heaters, fireplaces, boilers and wood-burning stoves from several dozen to several hundred kW of power are currently sold. At this time, the low-powered appliance market (10-50 kW) for domestic heat is approximately several dozens of thousands of units per year.

The existing appliances in Italy are nevertheless mostly obsolete and poorly efficient. There is thus ample room for more efficient conversion technologies, including inverted flame combustion boilers coupled with an accumulator. This would lead to

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<sup>7</sup> CTI/Giovanni Riva, *Note sull'applicazione energetica delle biomasse*, Milano 2006

<sup>8</sup> UNCCEM *La montagna italiana all'1/1/2006*

<sup>9</sup> VV. AA: *An extensive survey on wood use for domestic heating in Lombardy: implication for PM emission inventory*, [www.QualEnergia.it](http://www.QualEnergia.it), 2005.

a significant increase in the net energy supply, also keeping the global consumption of wood fuel unaltered.

#### **d. Medium size plants for district heating with solid biomass (1-20 MW<sub>th</sub>) <sup>7</sup>**

Biomass district heating has spread widely in Italy in the last decade, especially in the Autonomous Province of Bolzano and then throughout Piedmont, Lombardy, Val d'Aosta and the Trento Province. The overall installed thermal power is about 210 MW. The biomass used is mainly wood chips coming from wood industries. About 0.2 Mt/y of biomass is consumed at 40% of water content. The combustion technology is based on mobile grid boilers coupled with different systems for gas cleaning.

Many of these plants are situated in remote municipalities of the Alpine valley, where, due to the climate, the request for thermal energy is drawn out over long periods of the year and where, furthermore, one can rely on large quantities of mainly local wood materials.

In these valleys, the replacement of individual heating plants with a single centralized, efficient plant (the central district heating station) has produced a series of positive effects (whether from a technical-operational, economic, or environmental point of view) such as, for example:

- Less pollution: instead of operating hundreds of individual plants, there is only one central plant, which can best regulate combustion (greater energetic efficiency) and utilize advanced systems of emission control.
- Lower costs (excluding initial installation costs and predisposition to the network).
- Greater safety and comfort inside the living space: there exists no possibility of gas leaks, explosions or fires.
- The elimination of maintenance responsibilities on the part of the consumers.
- The recovery for energy use of residual biomass that would otherwise be destined for dumps at onerous disposal costs.

#### **e. Biomass primary energy potential**

Summing up the contributions of the various sources - firewood, lignocelluloses residues, MSW, biogas, biofuels, (leaving out energy crops and SRF) - the production of raw material of biological origin in Italy should be around 23 - 25 Mtoe/year<sup>1011</sup>. The actual availability for harvesting and supplying is, of course, lower. Certain biomass has already found other uses, yet for many other types, the harvesting, packaging, and transport are difficult and taxing. The percentage of actual availability varies from 30% to 70%, according to the type of biomass. Nevertheless, in terms of the order of magnitude, it is confirmed that at least 50% of the total

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<sup>10</sup> ITABIA, *Biomass for Energy and the Environment*, Report 2003 for the Ministry of the Environment: Cap 5

<sup>11</sup> ITABIA, *Disponibilità, caratteristiche e mercato delle biomasse in Italia* prepared on behalf of Enitecnologie, Settembre 2005

estimate can be utilized for energetic use. The global potential is certainly increased and, with auspicious investments, could continue to grow, ensuring a stable supply for energy conversion plants. More careful programming, however, necessitates launching specific studies and analyses of the land, emphasizing, on a case-by-case basis, the specific local conditions that influence effective potentiality. This furthermore implies a strong need for greater interaction between public administration and the corporate world, with the necessary support from the research sector.

#### f. Target for Italy

The Italian National Program on Renewable Energy from Biomass (PNERB), issued in 1998, set the goal to reach the production of 8-10 Mtoe of energy from agro-forest and zoo technical biomass by 2012, more than doubling the current contribution. This target has been confirmed by the subsequent plans and by the trend over the last 5 years.

The trend experienced in the last years show different figures according to the type of biomass considered (lignocelluloses materials, biodegradable fractions of MSW, biogas, liquid biofuels). On the average, an overall increase of 14% - 15% annually is registered <sup>6</sup>. From 70% to 80% of the biomass energy content is converted into thermal energy. Following this trend it is possible to argue that, by 2010, about 14 Mtoe of energy could be provided by different types of biomass, and about 10 Mtoe will be available as heat.

On the basis of the available data, we can say that the contribution of biomass to the global heat sector now reaches about 10%. The overall contribution of biomass and waste to the national energy balance is approximately 2-3%.

#### Overview of the target for Italy

|   |   |   |
|---|---|---|
| Potential primary energy of biomass available annually including: firewood, ligno-cellulosic residues, biogas, liquid biofuels, MSW, but not energy crops | 20-22 Mtoe  |   |
| Biomass primary energy used in 2000   | 3 -5 Mtoe *<br>of which: 90% as heat, 9% as electric energy, and 1% as biofuels | * The second figure takes into account non-official statistics pointed out by ENEA among self-producers and self-consumers of residual biomass outside the commercial networks. |
| Biomass primary energy used in 2004   | 5 - 7 Mtoe*   |   |
| Gross annual increase from year 2000  | 10-16%  |   |
| Goal at 2010 if this trend is confirmed   | 8-9.8 Mtoe<br>of which: 58% as heat, 37% as                                     |   |

|                                       | electricity and 5 % as biofuels |   |
|---------------------------------------|---------------------------------|---|
| Target from National Programmes, 2010 | 10 Mtoe                         | It should be remarked that many old appliances and plants – especially for household heating – are going to be substituted by more efficient ones. As a consequence the biomass consumed in successive years could result less or equal to that consumed in the previous ones in spite of the increase of useful energy produced. |
| Realistic target for 2020             | 20 Mtoe                         | More amount of biomass should be provided by SRF and energy crops.  |

#### 1.1.4. Slovenia

Three main national sources of statistics have been used for Slovenia.

##### a. own enquiries SLOBIOM

Reliability : 1

Regarding the biogas sector SLOBIOM contacted all producers by phone to enquire about their capacity.

##### b. AURE

Reliability : 1

The Department for Energy Efficiency and Renewable Energy (AURE) is a unit within the Ministry of the Environment and Spatial Planning. The department prepares national programmes and drafts energy legislation. Beside that it runs programmes promoting energy. A state of bioheat was provided on SLOBIOM request.

##### c. ApE

Reliability : 1

ApE Energy Restructuring Agency (ApE) is one of the leading Slovenian independent consulting companies in the field of energy efficiency and renewable energy sources. Our range of services include energy demand analyses, execution of energy concepts, feasibility studies. Their involvement in district heating projects are made them aware about bioenergy fuelled plants for district heating.

#### 1.1.5. Sweden

Four main types of sources are used for biomass statistics in Sweden.

#### **a. Own inquiries by SVEBIO (Swedish Bioenergy Association)**

Data reliability: 1

SVEBIO is the Swedish Bioenergy Association with more than 25 years of experience from bioenergy, with about 300 member companies involved in bioenergy production and use. Among the members are forest companies, equipment manufacturers, district heating and CHP companies, consultants, fuel traders etc.

In 2004 and 2005 SVEBIO conducted questionnaire surveys to all biopower producers in the forestry industry and CHP sectors. The reason for the survey was to study the development in combined heat and power production with biofuels in Sweden, which is positively affected by the introduction of electricity certificates in 2003.

Detailed questions about e.g. past, present and future (years 2002–2010) production and fuel mixes were asked in both telephone interviews and by questionnaires. Every company has estimated their own future production, according to existing and anticipated conditions. The response frequency was well above 95% and the results of the survey have been widely spread through media and several conferences. The results are publicised in three different reports of which one is produced in cooperation with the Swedish District Heating Association. The results are shown in aggregated form where all respondents are anonymous.

#### **b. Swedish District Heating Association**

Data reliability: 1

Svensk Fjärrvarme (the Swedish District Heating Association) has 135 of the Swedish district heating companies, which together produce and deliver 98% of the district heating in Sweden, as their members. The organisation also has about 60 other companies (e.g. equipment manufacturers, consultants etc.) as members. The organisation was founded in 1949, under the name Svenska Varmeverksforeningen.

The Swedish District Heating Association annually gather statistics through inquiries from their member companies regarding customers, deliveries, fuels etc, which is published in printed version and on the internet.

#### **C1&c2) Swedish Pellet Producers Association & Swedish Heating Boilers and Burners Association**

Data reliability: 1

PiR (the Swedish Pellet Producers Association) has the 14 major Swedish pellets producing companies as their members. They account for about 85% of the total Swedish pellet production.

SBBA (the Swedish Heating Boilers and Burners Association) has 13 of the major Swedish producers/distributors of burning appliances for biofuels as their members.

These both organisations continuously gather production and sales statistics in their respective field. Both organisations have mutual interests in sharing the statistics with each other.

Sales statistics for burning appliances is gathered each year. It is divided into small scale (family house) appliances and medium scale (e.g. schools, block centrals etc.) appliances. Small scale appliances are also divided into boiler/burners (for use as primary energy source) and stoves (for use as secondary energy source).

## **D1&d2) Swedish National Energy Agency & Statistics Sweden**

Data reliability: 1

The Swedish National Energy Agency annually gather and publish extensive statistics about energy production and use in Sweden and internationally in the report "Energy in Sweden", since 1998. Before that the publication was produced by the Energy Agency's forerunners NUTEK (the National Board of Industrial and Technical Development) during 1991-1997, and prior to that the National Energy Authority.

The data used in "Energy in Sweden" consists primarily of the results of the Agency's processing of basic data from Statistics Sweden. The publication is available in Swedish and English languages at [www.stem.se](http://www.stem.se) in pdf and excel file formats.

### **1.2 Compilation of best available statistics for EU 25 (approx. 1-2 page)**

As explained above the collection of data on biomass for heat is not easy. The tables in annex are giving the available data for each country. An attempt of summary is given below. Here we take the best available figures out of the tables for each country, we mention the reference year and the source. A column with data from the Commission is given as reference.

Note also that CHP figures are not given here as CHP is not included in the Commission's figures.

#### **Summary of available statistics for biomass for heat for small and medium to large scale.**

|                | Small scale individual heating systems | Medium and Large scale boiler | Total | EC, data 2001* | reference year     | Main source   |
|----------------|--|-------------------------------|-------|----------------|--------------------|---|
| Austria        | 2.075                                  | 890                           | 2.965 | 2373           | 2.000              | Austrian Energy Agency and Austrian biomass association |
| Belgium        | 190                                    | 191                           | 381   | 384            | 2001, 2002 for CHP | ValBiom   |
| Cyprus         | nf                                     | nf                            |       | 2,5            |                    |   |
| Czech Republic | 466                                    | nf                            |       | 432            | 2003               | EUROSTAT  |

|                |        |        |       |        |   |                               |
|----------------|--------|--------|-------|--------|---|-------------------------------|
| Denmark        | 488    | nf     |       | 891    | 2003  | EUROSTAT                      |
| Estonia        | 344    | nf     |       | 398    | 2003  | EUROSTAT                      |
| Finland        | 1.120  | 4540** |       | 4818   | 2002  | Finnish Bioenergy Association |
| France         | 7.369  | 1288   | 8.657 | 9567   | 2004 for small scale, 2003 for medium scale | ITEBE                         |
| Germany        | 4.453  | 883    | 5.335 | 5480   | 2002  |                               |
| Greece         | 702    | nf     |       | 962    | 2003  | EUROSTAT                      |
| Hungary        | 604    | nf     |       | 302    | 2003  | EUROSTAT                      |
| Ireland        | 43     | nf     |       | 145    | 2003  | EUROSTAT                      |
| Italy          | 3.300  | 1.116  | 4.416 | 5613   | 2003  | ITABIA                        |
| Latvia         | 704    | nf     |       | 592    | 2003  | EUROSTAT                      |
| Lithuania      | 447    | nf     |       | 574    | 2003  | EUROSTAT                      |
| Luxembourg     | 15     | nf     |       | 24,6   | 2003  | EUROSTAT                      |
| Malta          | nf     | nf     |       | 0      |   |                               |
| Netherlands    | 223    | nf     |       | 324    | 2003  | EUROSTAT                      |
| Poland         | 2.462  | nf     |       | 2539   | 2003  | EUROSTAT                      |
| Portugal       | 1.150  | nf     |       | 1885   | 2003  | EUROSTAT                      |
| Slovakia       | nf     | nf     |       | 103    |   |                               |
| Slovenia       | 324    | nf     |       | 383    | 2003  | EUROSTAT                      |
| Spain          | 1.995  | nf     |       | 3383   | 2003  | EUROSTAT                      |
| Sweden         | 982    | 5.910  | 6.893 | 4995   | 2003  | SVEBIO                        |
| United Kingdom | 204    | nf     |       | 700    |   | EUROSTAT                      |
|                |        |        |       |        |   |                               |
| EU25           | 29.660 |        |       | 46.870 |   |                               |

\* European Commission, 2004, " The share of renewable energy in the EU. Country Profiles. Overview of Renewable Energy Sources in the Enlarged European Union", COMMISSION STAFF WORKING DOCUMENT SEC(2004) 547,{COM(2004)366 final}, 26.5.2004, 111 p - 2001 data

\*\* this figure includes CHP

For Austria and Sweden the AEBIOM figures are higher than the reference from the Commission while for Italy and France the biomass for heat figures are lower. As long as we have no detail about the aggregated figures by the Commission it is difficult to explain these differences.

Eurostat statistics for small scale are lower than the Commission's figures for the whole heat sector, except for CZ, HU and LV. However the reference year is different.

### 1.3 Recommendations to improve quality of statistics

AEBIOM faced a lot of difficulties to treat and compare the various sources of statistics. The main reasons are :

- these are generally not complete for all sectors and sub-sectors (global figures for all biomass for heat are vague, probably reached through broad assumptions, and could not be considered as reliable).
- do not refer to the same type of biomass (waste included or not)

- are not classified the same way (sometimes the primary criteria is the type of biofuel – forest wood chips, industrial wood waste, etc.- sometimes it is the type of use - households, collective, industries, etc.).
- terms are not defined clearly (what gross heat production means in IEA statistics ?)

It is therefore suggested in the future statistics to define as much as possible the source of the information and how it has been collected, the type of biomass considered and sub-sectors.

A special notice have to be made for cogeneration. This sector is classified by the Commission within biomass for electricity (in the Biomass Action Plan for example), what should be avoided in the future. In addition it makes no sense to add biomass for heat and biomass for cogeneration, so it has to be treated separately. This was not the case for example for the Euroserv'ER data that, as a consequence, cannot be used for reliable statistics in terms of biomass for heat.

This brings the reflection to the final heat. The most important objective for bioenergy is to replace as much fossil fuels as possible to increase our energy independence. The goal is not to use as much biomass as possible for heat, cogeneration and electricity. Final energy must be considered. Therefore it is recommended to use a clear terminology :

Biomass for heat → bioheat

Biomass for cogeneration → bioheat and bioelectricity

Biomass for electricity → bioelectricity

A better classification of the sectors and sub-sectors is of primary importance for being able to calculate the final bioheat. For small scale households systems particularly collective figures should be avoided because of the large variety of biomass use (log wood stoves have nothing to do with pellet boilers). The classification used by the Institute for Energy and Environment in Germany is quite detailed for small scale with the following categories :

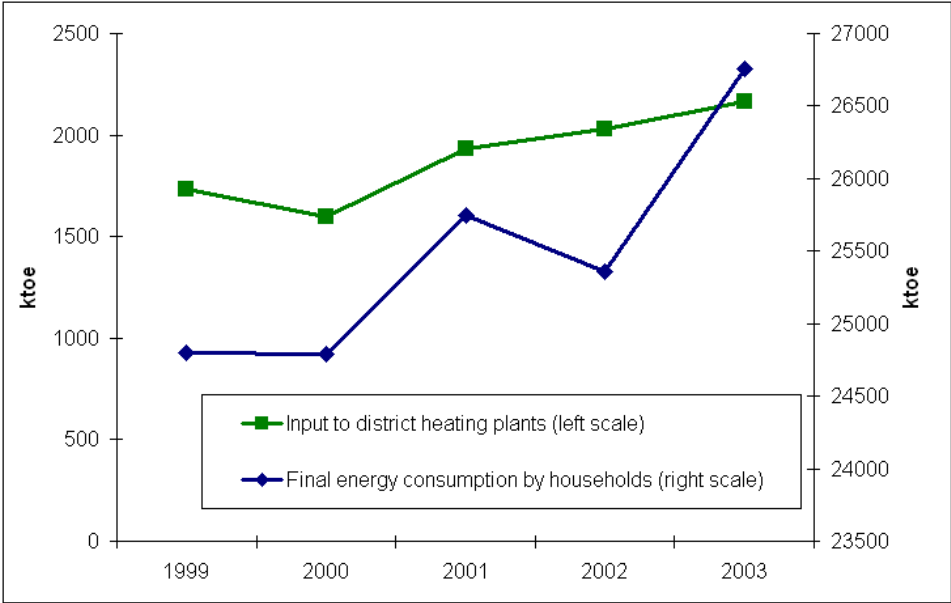
1. Wood logs
  - 1.1. stove heating (as main heating system)
  - 1.2. wood/coal burning stove
  - 1.3. tiled stove
  - 1.4. open fire
  - 1.5. additional stove
2. Wood central heating system
3. Chips boiler
4. Pellets stoves/boilers

Finally AEBIOM would like to draw the attention to the sector of private households that is particularly of particular interest for biomass for heat. The evolution of the quantity of biomass used for heat and the number of installations evolves positively for a number of years (Figure 1). It should be noted that this trend is strongly related

to the price of fossil energy that makes bioheat more or less competitive (see report on WP 4.4. of this project on competitiveness of bioheat and financial incentives). The recent sharp increase of oil price, not reflected in the statistics presented in this report, has a strong impact on the bioheat market.

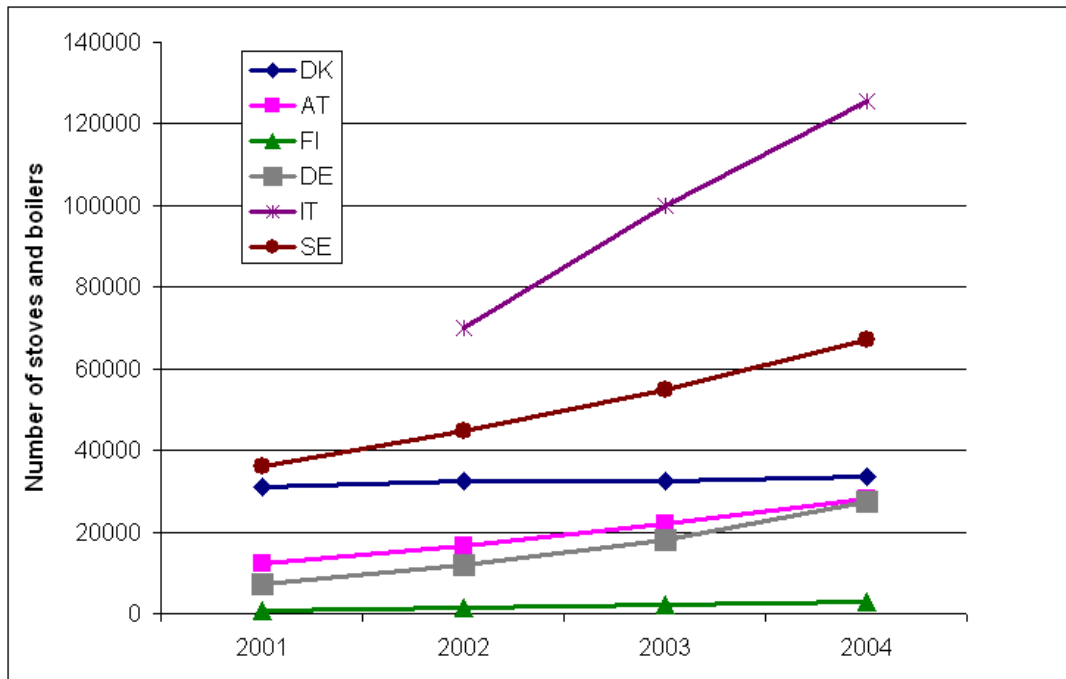
As example of a booming biomass sector, pellets are offering a new large scale option for bioheat with a standardised fuel that is used in automatic installations, making it competitive and almost as convenient as fossil alternatives. This trend will strongly influence as well the future statistics.

**Figure 1 : Evolution of the wood and wood waste used in district heating plants and by households according to Eurostat<sup>1</sup>**



**Evolution of the number of pellets stoves and boilers in selected countries<sup>12</sup>**

<sup>12</sup> [www.pelletcentre.info/CMS/site.asp?p=953](http://www.pelletcentre.info/CMS/site.asp?p=953)



## 2. Guidelines to define targets

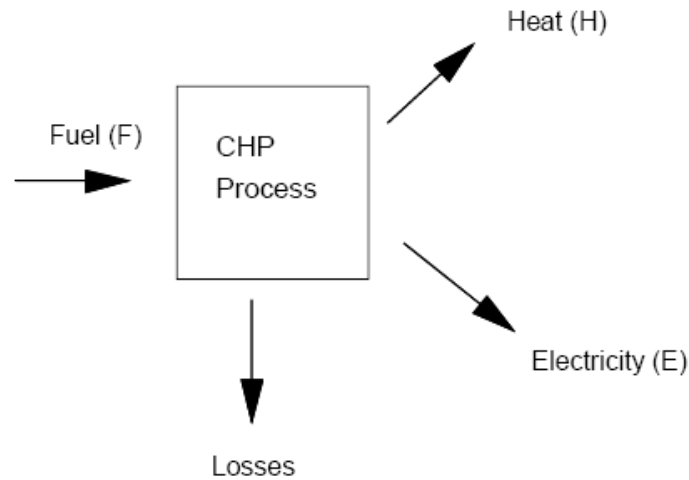
Several methods can be used to define targets for biomass for heat/bioheat.

As mentioned above the efficiency of the use of biomass should be taken into account. However statistics are always referring to the fuels for heating (amount of light fuel oil, electricity or gas used by households). Therefore targets in terms of biomass for heat should be used, in parallel with targets of biomass for bioelectricity and biomass for cogeneration, but one should be able to calculate the final energy.

The EUROSTAT methodology also foresees to share the fuel for cogeneration applications according to the proportion of heat and electricity according to a simple principle (see Figure 2) using the formula : Fuel for heat =  $F * (H / (H + E))$

**Figure 2 : Methodology for apportioning fuel input in a CHP plant<sup>13</sup>**

<sup>13</sup> EUROSTAT, definition of renewable and waste for the annual questionnaire 2001 and 2002, <http://europa.eu.int/estatref/info/sdds/fr/sirene/reneng.pdf>



The target should be based on existing biomass for heat or bioheat, with statistics that are as much as possible reliable and clearly evaluated, what is not obvious as written above.

Targets should also take the potential of biomass into account, taking care of the other kinds of use of the wood (paper and pulp, board manufacture).

Targets might take into account the national programmes and support schemes. National targets are sometimes already defined (AT - Austrian Energy Agency, BE - Plan pour Maîtrise de l'Energie for the Walloon Region, FI - NAPRES).

Objectives for the heat sector should be evaluated in the light of other policies to develop bioelectricity and second generation biofuels. Priorities will have to be given in the future with balanced incentives using coherent criteria like maximum efficiency of maximal CO<sub>2</sub> emission reduction (see also report on WP 4.4. of this project on competitiveness of bioheat and financial incentives).

The target should be expressed in energy terms (toe or kWh), while the number of units and investment required might be appropriate to give a more precise idea on the possible ways to reach these targets.

### 3. Conclusion

Establishing reliable statistics for biomass for heat is definitely not an easy task. Figures from different sources are often hardly comparable because of different categories of biomass and classification systems. For some countries however (AT, DE, FI, SE) statistics from several agencies or associations are sufficient to reach a reliable estimation.

For the future it is especially recommended:

- to separate biomass for heat, biomass for cogeneration and biomass for electricity.
- to include for each item a classification that is detailed enough especially regarding the type of biomass and type of conversion process (because of efficiency

- differences are involved). Such classification avoid general aggregated figures that cannot be considered as reliable without detailed explanations.
- to include specific statistics for pellets, an outstanding biofuels for the future heat market.
  - to adapt the questionnaire of Eurostat according to the above principles.

## 4. Annex

Tables of statistics for each EU25 countries are given in annex. The table below give a summary of the main source of information.

|                | international statistics |                             |                           |                         |                     | national statistics         |                             |
|----------------|--------------------------|-----------------------------|---------------------------|-------------------------|---------------------|-----------------------------|-----------------------------|
|                | Eurostat                 | International Energy Agency | EU Observer 2004 - biogas | EU Observer 2004 - wood | European Commission | national statistical office | national associations       |
| Austria        | y                        | y                           | y                         | y                       | y                   | AEA                         | ABA                         |
| Belgium        | y                        | y                           | y                         | y                       | y                   |                             | ValBiom, ICEDD              |
| Cyprus         | y                        | y                           |                           |                         | y                   |                             |                             |
| Czech Republic | y                        | y                           |                           |                         | y                   |                             |                             |
| Denmark        | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Estonia        | y                        | y                           |                           |                         | y                   |                             |                             |
| Finland        | y                        | y                           | y                         | y                       | y                   |                             | FINBIO                      |
| France         | y                        | y                           | y                         | y                       | y                   |                             | ITEBE, DGEMP                |
| Germany        | y                        | y                           | y                         | y                       | y                   | IEE                         | BBE, DEPV                   |
| Greece         | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Hungary        | y                        | y                           |                           |                         | y                   |                             |                             |
| Ireland        | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Italy          | y                        | y                           |                           | y                       | y                   | ENEA                        | ITABIA, DHA, CTI, IBA       |
| Latvia         | y                        | y                           |                           |                         | y                   |                             |                             |
| Lithuania      | y                        | y                           |                           |                         | y                   |                             |                             |
| Luxembourg     | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Malta          | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Netherlands    | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Poland         | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Portugal       | y                        | y                           | y                         | y                       | y                   |                             |                             |
| Slovakia       | y                        | y                           |                           |                         | y                   |                             |                             |
| Slovenia       | y                        | y                           |                           |                         | y                   |                             | SLOBIOM, AURE, ApE          |
| Spain          | y                        | y                           |                           | y                       | y                   |                             |                             |
| Sweden         | y                        | y                           | y                         | y                       | y                   | STEM                        | SVEBIO, DHA, PPP, SBBA, SBA |
| United Kingdom | y                        | y                           | y                         | y                       | y                   |                             |                             |

