

**ENERGIAS LIMPIAS
EN AMÉRICA LATINA**



*European Union Experience in
Biomass for Energy Production*

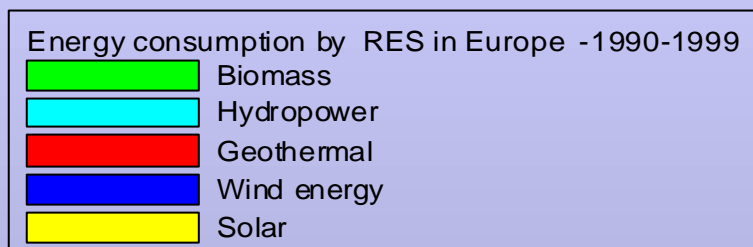
Buenos Aires, Argentina, 21 February 2005

*Daniele Fraternali,
FAST, Milan, Italy*

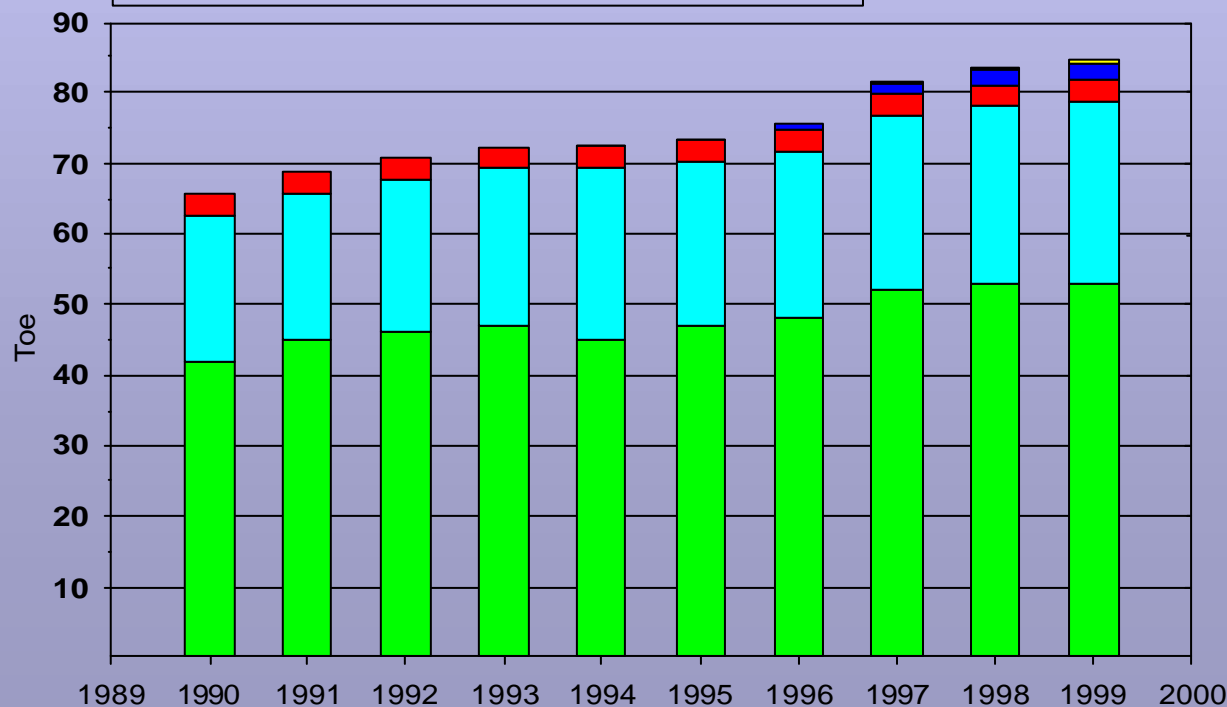


The role of Biomass in the Primary Energy Production in Europe

In 1999, the contribution of RES represented **11.2%** of total EU primary energy production and **6%** of gross inland consumption (EC, 2002).



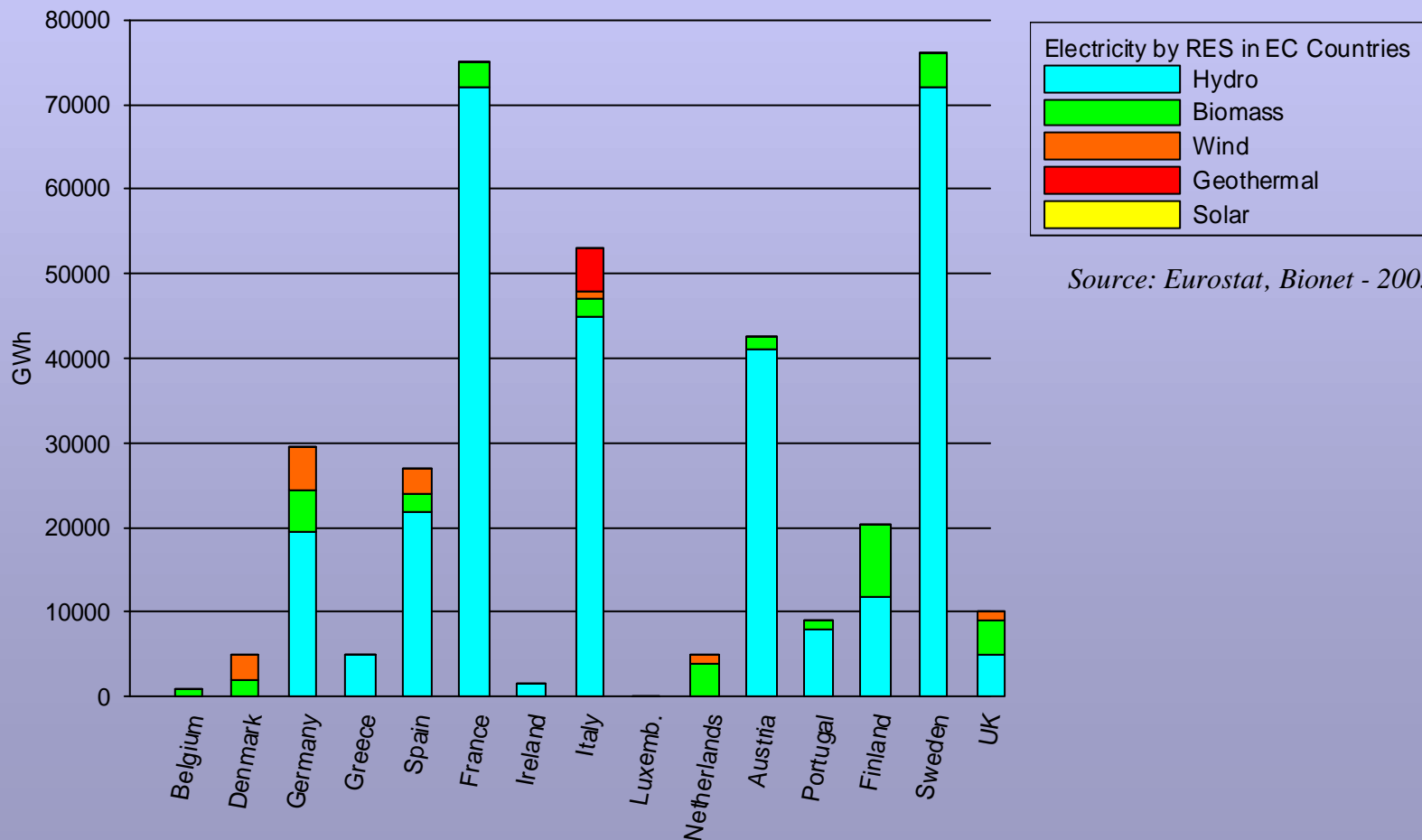
Source: Eubionet / Eurostat



In Europe, Biomass is the main component of primary RES, representing 7.3% (year 1999) of the total primary energy production.

The role of Biomass for the Electricity Generation in Europe

In the field of electricity production, the role played by biomass is minor if compared to hydroelectricity





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Solid Biofuels:

- *Wood*
- *Municipal and Industrial Waste*
- *Biogas from Solid Waste Landfill*

Current use of **Solid Biomass** in EU Countries and future (2010) targets

Actual (1999) overall use of biomass is **53 Mtoe**.

In 2010 the “EU White Paper” expects **135 Mtoe**.

This increased production is expected by:

- 45 Mtoe from crops (of which 27 solid and 18 converted to liquid bio-fuels)
- 15 Mtoe from biogas exploitation (agro-industry effluents, sewage treatments and landfill)

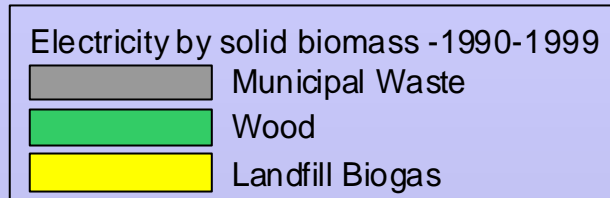
Overall solid biomass is expected 57 Mtoe in 2010 (of which 27 from crops and 30 wood residues).



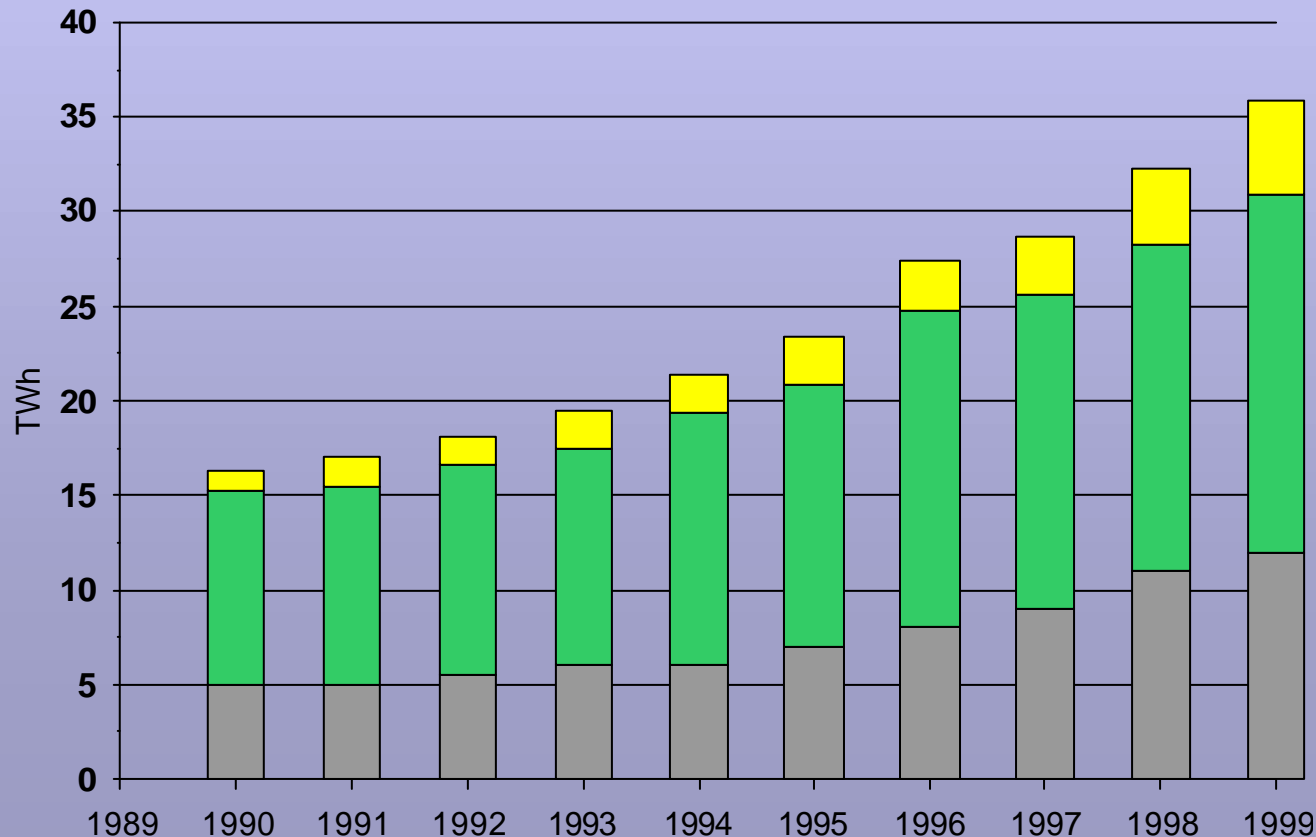
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Electricity Generation from Solid Biomass Fuels in Europe



Overall electricity production by Biomass in Europe increased since 1990 to the actual (1999) level of 35.8 TWh. Wood and wood industry residuals play a main role (18.8 TWh).



Source: Eurostat, Bionet - 2003

The specific contribution of wood

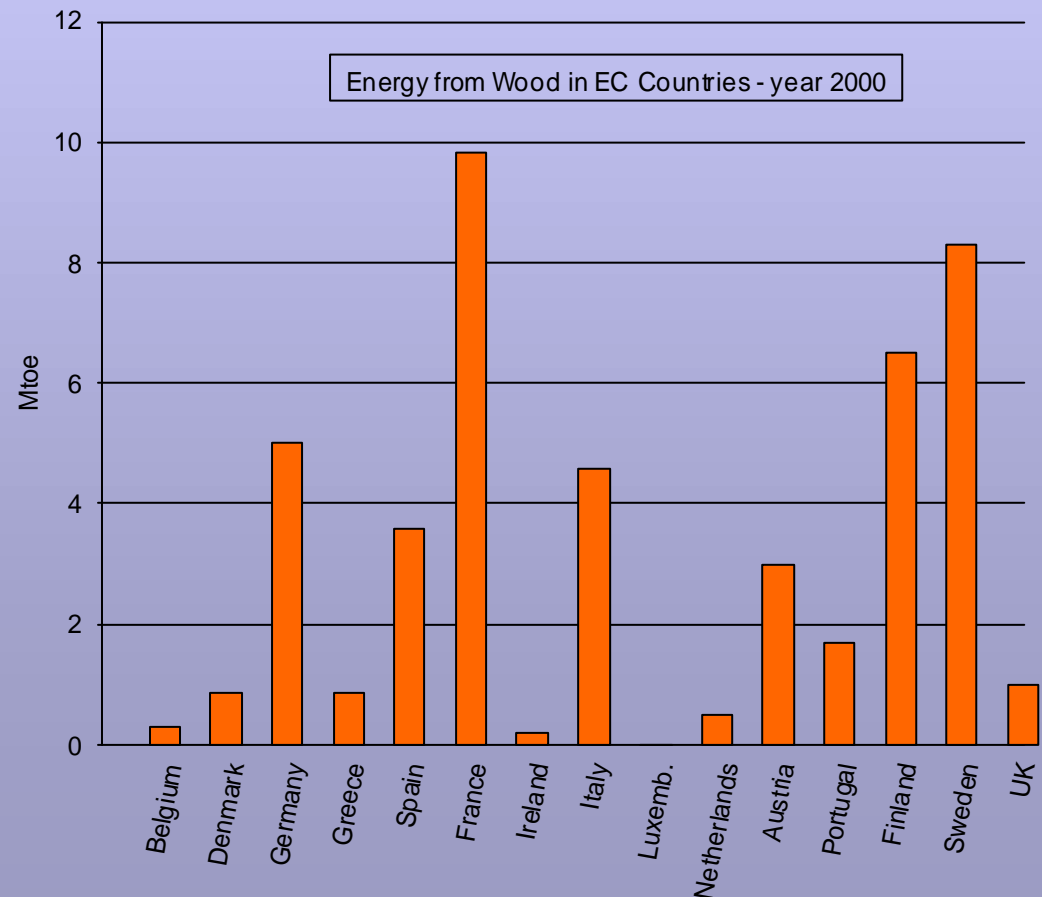
In EU, it is estimated that 58% of primary RES energy comes from wood. The wood energy sector is based on traditional exploitation of the potential of the European forests (> 100 million ha).

France uses wood mainly in domestic firewoods

In Finland and Sweden wood is used both in electricity production and District Heating

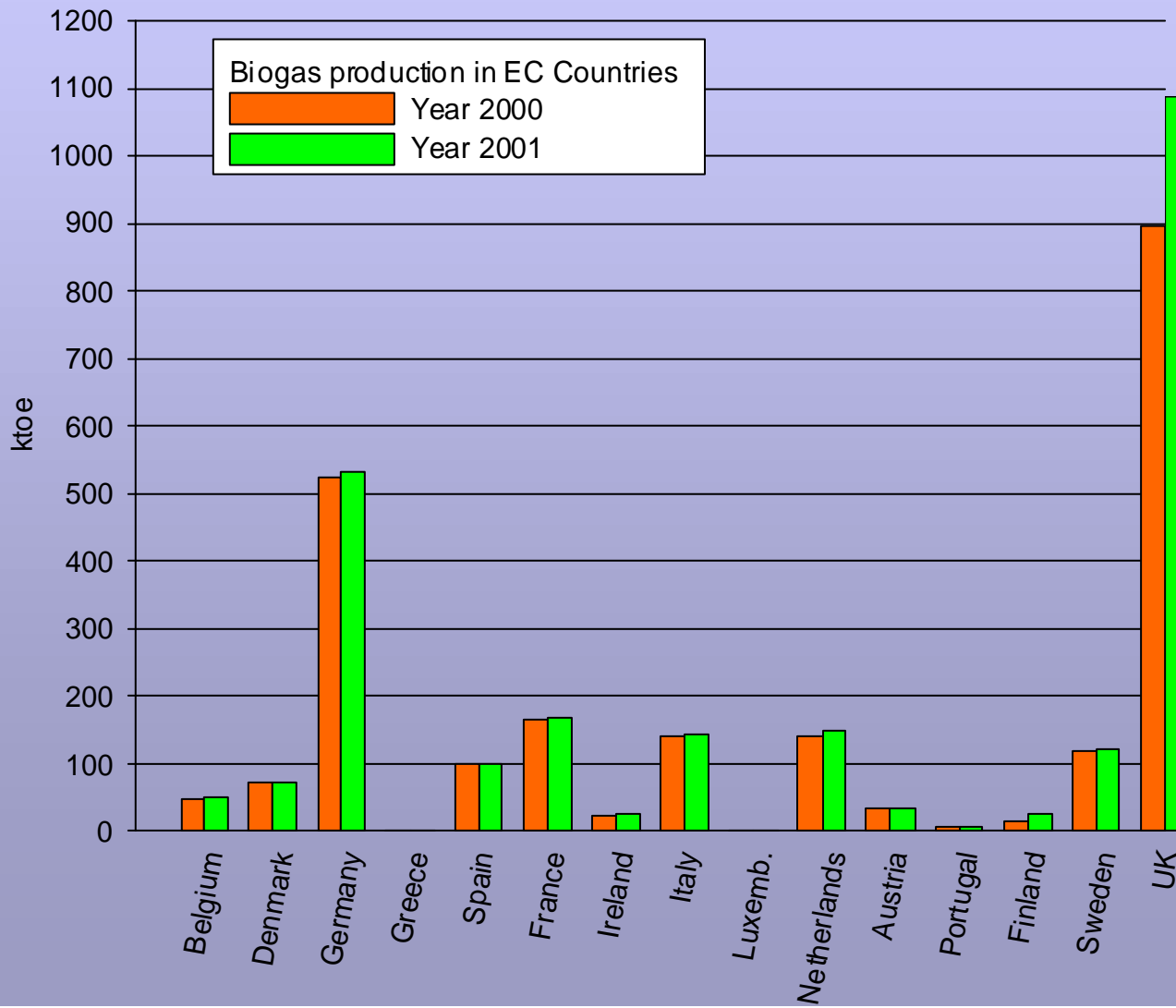
Finland is also the leading European Country in producing power from wood

In Austria, Finland, France, Germany, Italy, Portugal, Spain and Sweden, main provider of wood is the forest industry



Biogas

European production of crude biogas in 2001 was 2'500 ktoe.



Source: EurObserv'ER, Bionet

Biogas

Due to lack of infrastructures and many other problems, only half of this amount is used in energy production.

UK and Germany are leader countries in this sector.

The most numerous installations are urban sewage treatment plants (> than 1'500 units).

Biogas installations on farms are also common (1500-1660 units) but with smaller dimension.

The potential of all EU countries is estimated at 18 Mtoe of biogas (7 times the actual production).

Liquid Biofuels

The EU is presently working on the implementation of two Directives related to biofuels.

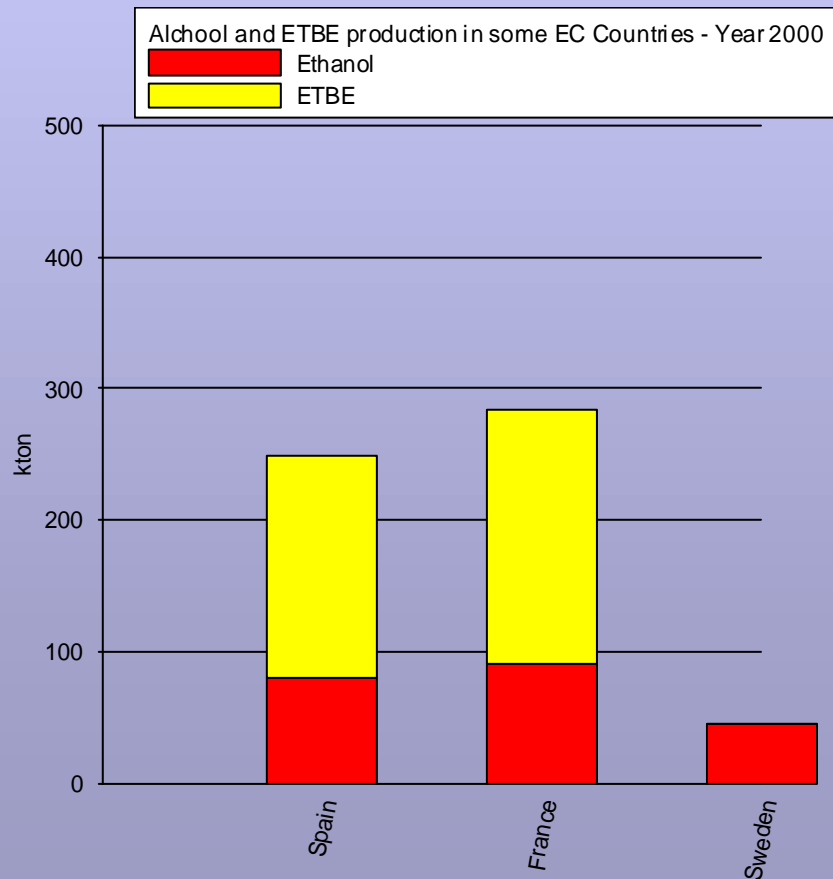
Development is concentrated on two products:

- Alcohol (Ethanol, ETBE)
- Biodiesel

Actual production in EU is sufficient to reach the target of 2% share of for liquid biofuels.

The target for 2010 is 5.75% but this will require the increase of cultivable land dedicate to energy production (extra 10 Million ha will be necessary).

Liquid Biofuels - Ethanol and ETBE



In 2000 ethanol production reached 216 ktons to be added to 363 kton of ETBE.

France is the leading country (about 91 kton of ethanol + 193 kton of MTBE).

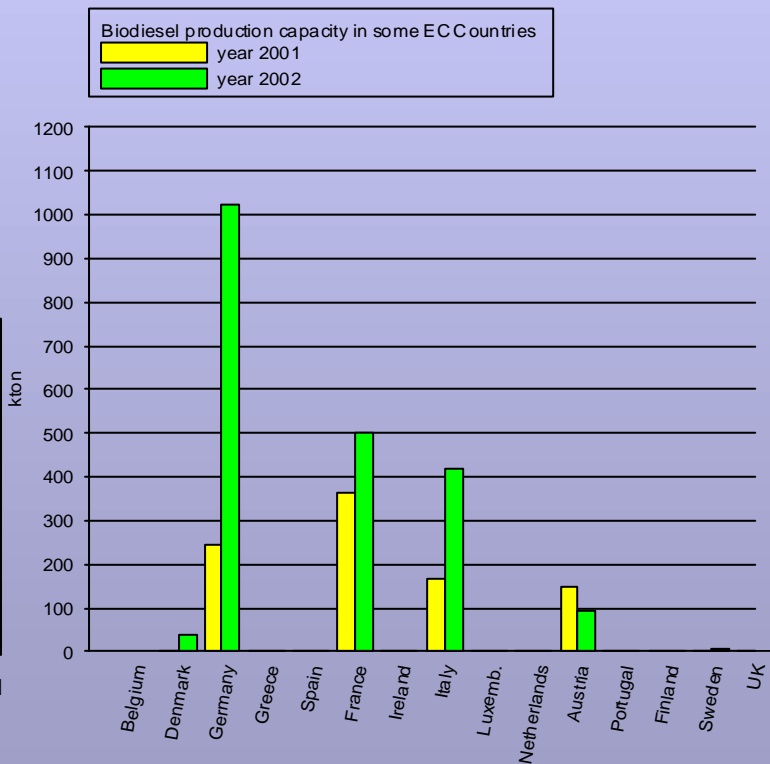
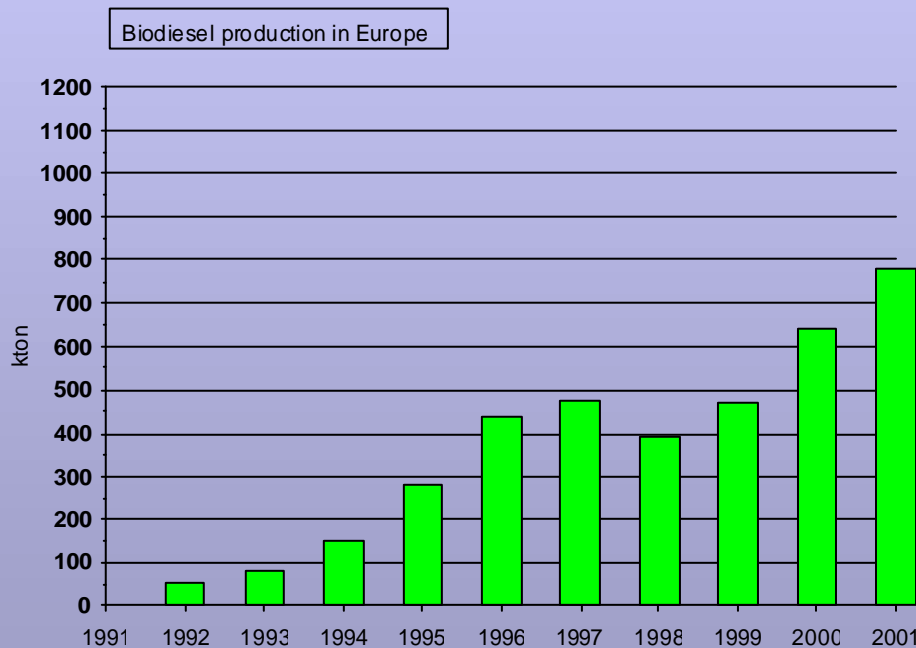
Source: EurObserv'ER, Bionet



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Liquid Biofuels - Biodiesel

- In the year 2001, overall biodiesel production reached 780'000 tons
- France is the leading country (about 374 ktons).
- Installed production capacity is quickly increasing (mainly in Germany, France, Italy).





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Biomass for Energy Production

Some examples of European Best Practices

Riso Scotti Energia (Italy)

Electricity from agricultural residues (rice husks)



Main Figures:

- fuel used: 20'000 tons/year of rice husks
- electric power: 6 MWe (from 25 ton/h rice husks)
- 465°C max temperature of steam from bioler.

District Heating systems fuelled by woodchips. Many installations in the European Alpine Region (Austria, Italy, Switzerland, Germany)

Some examples:

Few application of small scale cogeneration (1-2 MWe + 3-6 MWth)
mainly located in the alpine region

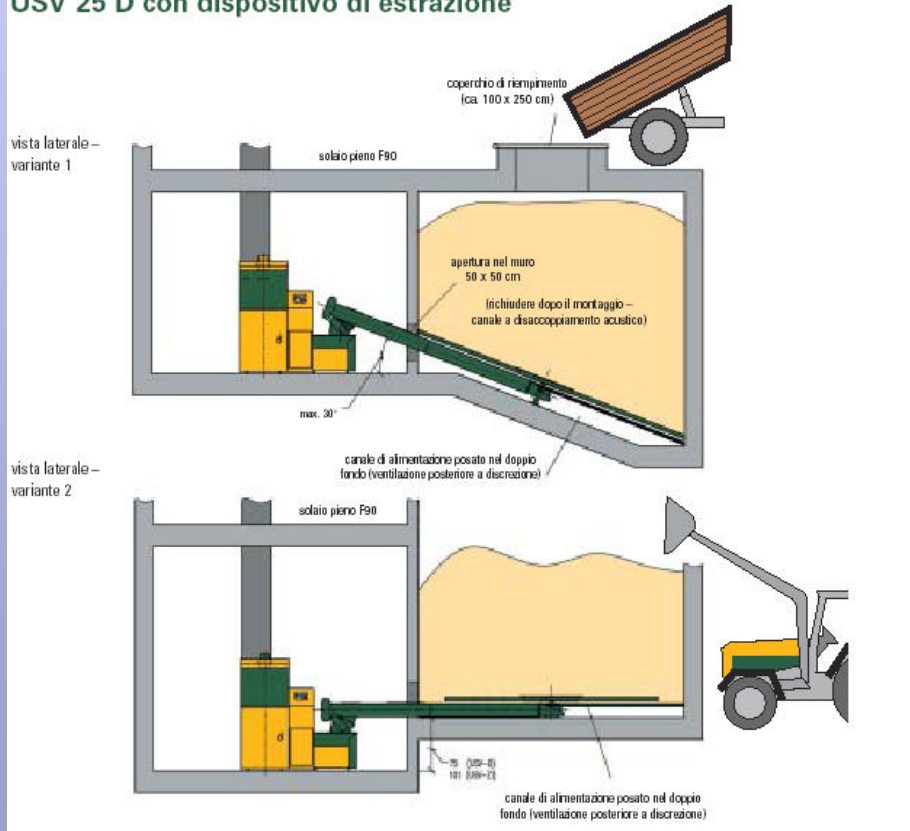
Several examples of thermal-only boilers for alpine villages district heating
(up to 10 MWth)

These “small dimension projects” are related to the opportunity of using
biomass as far as possible to the production area (due to transportation cost)

Long distance biomass transportation also is possible, but it requires crude
biomass pre-treatment (like pellets).

Small scale woodchip boilers - mainly for local scale District Heating (thermal only)

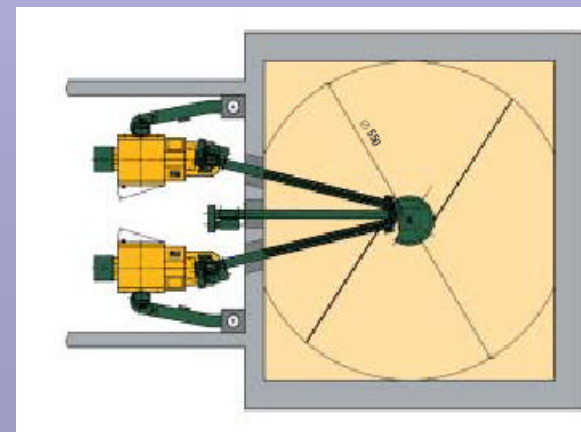
USV 25 D con dispositivo di estrazione



The technology:

- automatic fuelling system
- rotating grid furnace
- local storage (for few days or weeks)

Similar applications exist also by burning straw bales (mainly in Denmark)

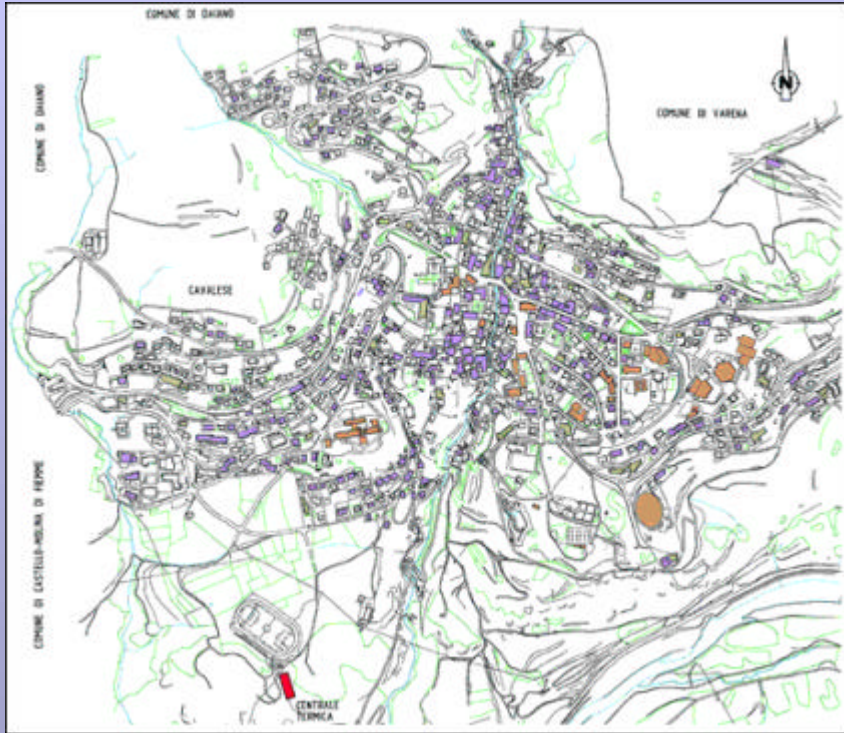




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Cavalese, Trento, Italy (alpine region) District Heating fuelled by forestry woodchips

Thermal installed power: about 10 MWth



Similar projects are in progress in the Italian Dolomite ski-area (Cortina, S.Martino di Castrozza, Madonna di Campiglio, etc.)



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Province of Bolzano/Bozen, Italy (alpine region)

Villages with an existing or planned wood based District Heating network





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Cogeneration and District Heating by woodchips The case of Tirano, Sondrio, Italy (alpine region)



- The small town of Tirano is located in the north Lombardy Region
- Inhabitants: nearly 9'000
 - 441 m above sea level
 - 2'696 degree-day

Some figures of the project:

N. 3 wood boilers (2x6MW, 1x8MW) => total input biomass: 20 MW

Electric power: 1.1 MW (7500 MWh/year)

Woodchips storage capacity: 5'000 m³ inside + 20'000 m³ outside

covered area: 2'500 m², external used area (biomass storage): 3'660 m²

District Heating network:

length (actual): 20 km

of connected users : 340 (6'900 people)

Total users connected power: 34 MWt

Improvements in Forestry production through new “sustainable” technologies

The technology is called “consociated tree growing”.
It consists in reproducing “nearly wild” tree consociations.

Different species have been selected (depending upon the site soil characteristics) in order to create a “wild wood effect”.
“Accompanying” species are selected to increase local fertility, nitrogen fixation, humus, humidity, shadowing, etc.

The nearly wild wood is created after 4-8 years from tree implantation.
Up to 100 tons/ha/year of dry wood production are expected (as results from running experiences in Italian plantations).

Main goal: artificial wood plantations can provide a long term sustainable (and improved) wood production, avoiding soil depletion (as resulting in conventional industrial forestry).