

THE BASICS OF BIOMASS



Getting the facts right

Biomass has a unique and diverse role in the European energy mix today and is essential when it comes to the EU's energy security, affordability and sustainability priorities. The European Biomass Association and its members are the common voice of the European bioenergy sector. We aim to develop the market for sustainable bioenergy by advocating the multiple benefits of sustainable biomass.



WHAT IS BIOMASS ?

Biomass is any material of organic origin such as wood (directly from forest or by-products of the forest-based industry), agricultural crops, agricultural by-products (eg: straw) and residues (eg: manure), agro-industrial by-products, or municipal biowaste that can be used to produce energy.

Forestry



Directly from forest-thinnings and logging residues.
Example: Branches



By-products of forest-based industries.
Example: Shavings



Agricultural by-products.
Example: Straw






By-products of agro-industries.
Example: Olive stones

Waste



Example: Municipal biowaste

 Solid Biofuels	 Liquid Biofuels	 Gaseous Biofuels
Wood Pellets Wood Chips Briquettes Firewood	Biodiesel Bioethanol Advanced Biofuels	Biogas Biomethane Syngas

Did you know ?

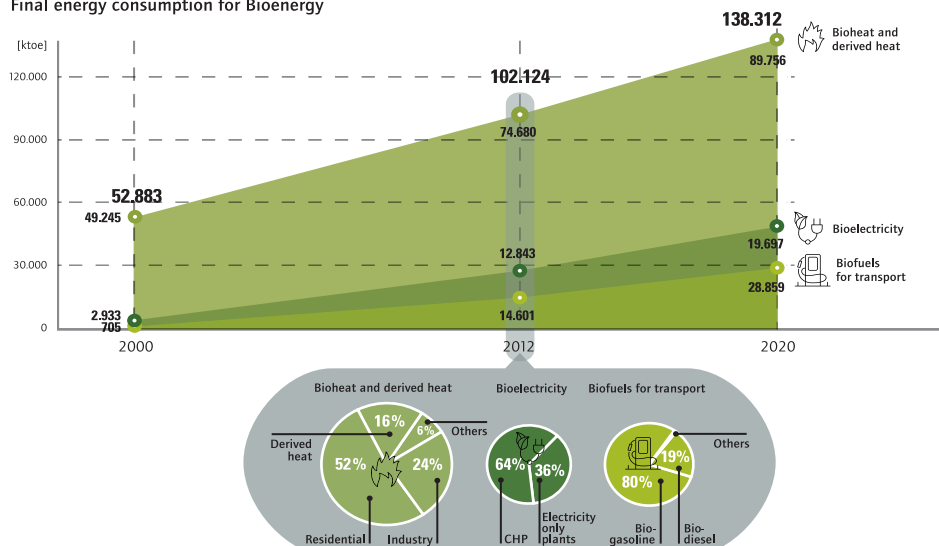
 Biomass accounted for **9,25%** of the total final energy consumption in Europe in 2012.
(Eurostat, AEBIOM)



BIOENERGY

Biomass can be used to produce heat, electricity or transport fuels. A significant increase in bioenergy demand is expected in the coming years. Most of the biomass consumed today for energy purpose is used to produce heat for both domestic and industrial applications.

Final energy consumption for Bioenergy



Source: AEBIOM



BIOMASS FOR HEAT

Of all possible renewable heating options, biomass has a great potential to deliver significant and cost-effective solutions to a concerning heat demand. Biomass heating can be achieved with a wide variety of fuels.

Fuel: Wood pellets, wood chips, briquettes, wood logs.

Technologies and Applications

Stove: Used for residential heating

Boiler: From small scale to multi MW scale used for houses, the tertiary sector, industries and cities.

Heat can be used in buildings (through individual applications or district heating) and for industrial processes.

Heat can be produced through CHP (Combined Heat and Power) together with electricity production.

The Advantages of Using Biomass for Heating

A low-carbon option through the substitution of fossil fuels: The use of biomass in heating can replace oil, gas or coal.


Therefore, if sustainable biomass is used, the short-term replacement of fossil fuels allows savings of GHG emissions.

Operational fuel cost savings: The costs of biomass fuels can be much lower than the fossil fuel being replaced, so biomass heating systems can provide attractive operational cost savings both for households and industry.

Reduced fuel price volatility: Security of energy supply is a recurrent concern with fossil fuels due to geopolitical instabilities which can lead to unexpected price changes. This is the case of gas today with the Ukrainian / Russian gas crisis, which is a heat crisis (more than 70% of the imported gas in the EU is used for the heating of households or for heat needs in industrial processes).

Did you know ?

 Biomass from heat and bioheat represent **74,7 Mtoe**, which is **73%** of the total final bioenergy consumption in Europe. (Eurostat)

 Renewables represent **15,6% (83 Mtoe)** of final EU consumption in heating and cooling. **88,9%** of the renewable heat is provided by biomass. (Eurostat)

Pellet Market Facts

 EU pellet consumption for heating is growing at an average of **1 million tonnes** every year (from 2011). (EPC)

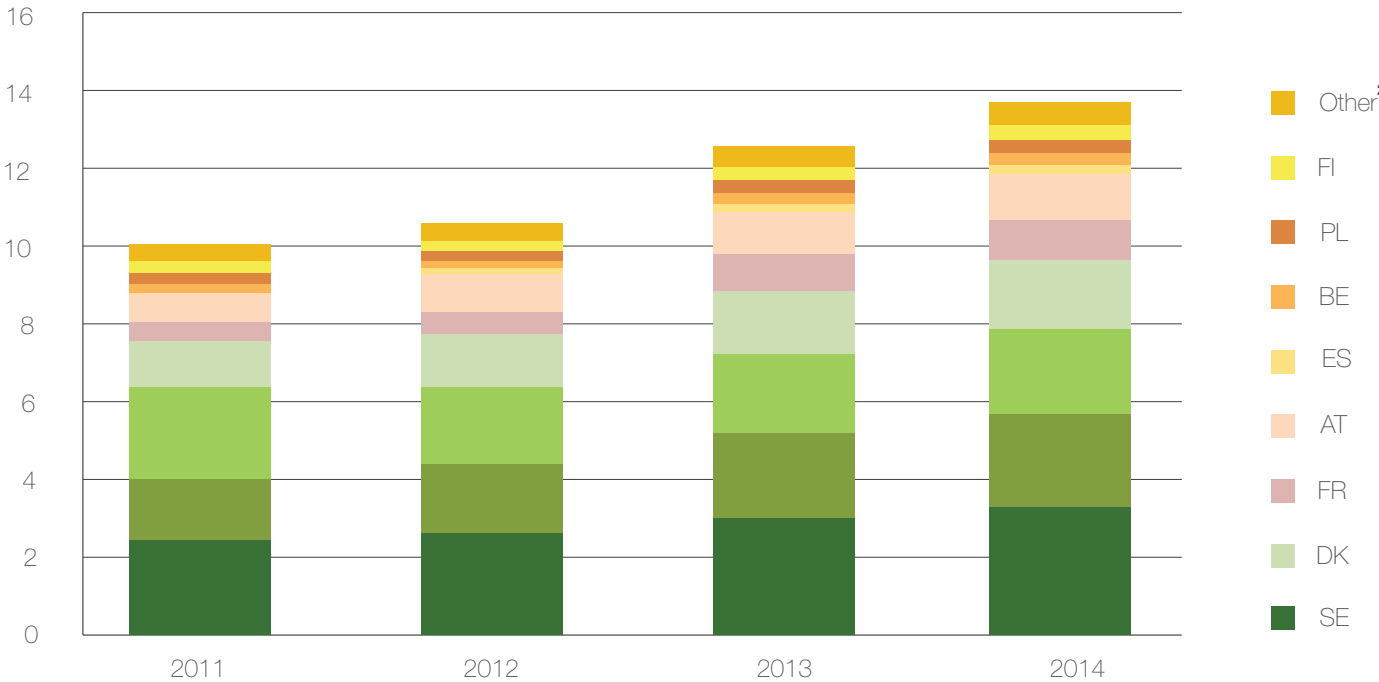
 EU pellet production grew from **1 million tonnes** in 2000 to **12 million tonnes today**. (EPC, IEA Bioenergy Task 40, Ren 21, Hawkins Wright)

 EU is the biggest world pellet producer (**50%**). (EPC, IEA Bioenergy Task 40)

While biomass fuels are subject to changes in price over time, these are less extreme and are independent from geopolitical circumstances as the biomass is mostly EU locally sourced.

A source of economic development and job creation: Biomass used for heating, can stimulate local economics and create jobs by driving investments and jobs in agriculture, forestry, logistics, installation and maintenance activities and giving value to local resources that were not mobilized and used before.

Evolution of EU wood pellet consumption for heating [CHP¹ incl. in millions of tonnes]



Source: AEBIOM, EPC
1. CHP = 2/3 of the global CHP pellet consumption is attributed to heating.
2. BG, CZ, HR, HU, LT, LV, NL, PT, SK.



BIOMASS FOR ELECTRICITY

Fueling Power plants


Dedicated biomass power plants vs cofiring:

dedicated biomass plants are plants specifically designed to use biomass as fuel. They often use low cost fuels such as wood chips and, in some cases, agricultural by-products such as straw.

Cofiring offers a possibility to produce large amounts of renewable electricity using existing power facilities. In this case high quality wood fuels such as pellets are used. Pellets are milled to powder and burned with coal in existing conventional power plants. In some recent cases cofiring plants have been converted to use 100% biomass. Cofiring or conversion of existing coal fired plants to biomass results in fairly low electricity generation costs.

Did you know ?

 Biomass for electricity currently represents around **12 Mtoe**. (Eurostat)

 Renewables represent **24,2% (798,7 TWh)** of EU gross electricity production. **18,7%** of this renewable electricity comes from biomass. (Eurostat)

Technologies and Applications

Electricity can be generated from a wide range of biomass technologies. Biomass can be converted into electricity using processes similar to those used with fossil fuels, such as:

Steam/turbine: This technology is based on the direct burning of biomass in a boiler to produce steam. The steam then drives a turbine, which turns a generator to convert the power into electricity.

Gasification: Through gasification, biomass is heated in an environment that enables the solids to be converted into a synthesis gas, which can then be burned in conventional boilers or used in turbines to produce electricity.

Organic Rankine Cycle (ORC): This technology is based on a turbogenerator working as a normal steam turbine to transform thermal energy into mechanical energy and finally into electric energy through an electric generator.

These technologies can be used in CHP plants together with heat production or only in power plants.

The Advantages of Using Biomass for Electricity

A low-carbon option through the substitution of the most carbon intensive fossil fuel:

If sustainable biomass is used, the short-term replacement of coal in power plants allows savings of GHG emissions and is more beneficial than continuing to burn fossil fuels.

A clean, dispatchable renewable source of power: The use of biomass in power plants is needed as a steady, dispatchable complement to other more variable RES electricity technologies while waiting for new technologies to address this variability.

Reaching the EU climate and energy goals: The use of biomass in power plants is a bridge towards reaching the EU climate and energy goals while continuing to develop other efficient energy systems (eg: CHP) and other RES.



BENEFITS OF BIOENERGY

What are the benefits of bioenergy ?

Environmental

- ✓ Reduce greenhouse gas emissions and carbon footprint;
- ✓ Facilitate forest management and contribute to healthier forests;
- ✓ Valorize by-products and low value materials;
- ✓ Make use of degraded agricultural lands;

Economic

- ✓ Affordable and stable energy price;
- ✓ Strengthen industry competitiveness ;
- ✓ Drive innovation;
- ✓ Support new investment;
- ✓ Foster growth in rural areas;
- ✓ Enhance regional growth;
- ✓ Drive job creation;

Social

- ✓ Increase the standard of living (improved environment, health);
- ✓ Revitalize rural areas;
- ✓ Reduce energy bills for households;

Energy Related

- ✓ Reduce dependence on fossil fuels and increase energy security;
- ✓ Develop renewable energy consumption;
- ✓ Decarbonize the energy sector.