AEBIOM STATISTICAL REPORT 2017

European Bioenergy Outlook

KEY FINDINGS

AEBIOM
EUROPEAN BIOMASS ASSOCIATION

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About & Timeline

Every year since its debut release in 2007, AEBIOM's Statistical Report has provided an in-depth overview of the bioenergy sector in the EU-28 Member States.

The AEBIOM Statistical Report has been enriched each year with new figures and information, collecting unique data on the developments of the European bioenergy market from a growing number of international contributors.

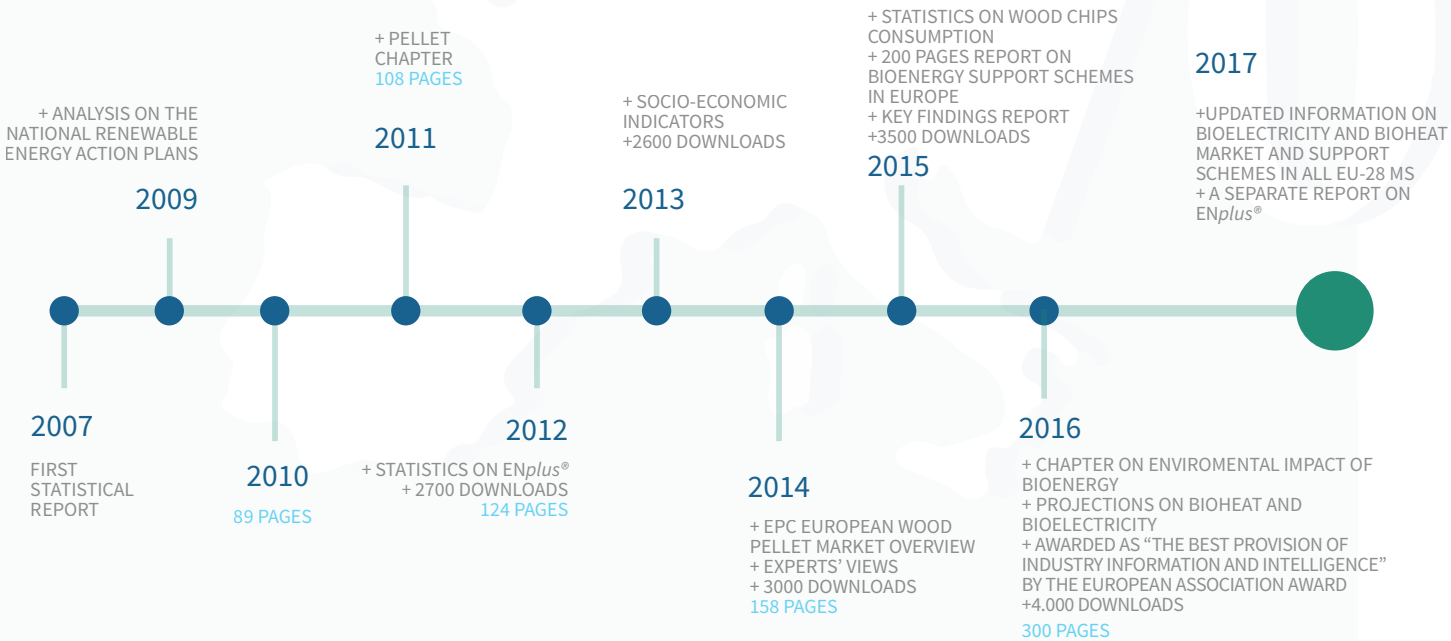
AEBIOM is therefore able to develop a detailed report that helps industry leaders, decision makers, investors and all bioenergy professionals to understand the situation of bioenergy in Europe.

With more than 150 graphs, readers of AEBIOM´s Statistical Report can get accurate and up-to-date information on the EU-28 energy system such as the final energy consumption of biomass for heat and electricity, the number of biogas plants in europe, the consumption and trade of pellets, the production capacity of biofuels and other key information to help break down and clarify the complexity of a sector in constant evolution.

This 300-page report was further enriched in 2016 with an exhaustive analysis of the support schemes in place for biomass for heating, electricity and transport, covering all EU-28 countries and market forecasts based on past trends and the existing reality. Key data have been reviewed by key national experts in order to give the most accurate visions of how European bioenergy markets will evolve in the coming years.

In 2017, AEBIOM statictical report was rewarded by the European Association Awards for being the "*best Provision of Industry Information and Intelligence*", a recognition after a decade of collective work.

THE EUROPEAN ASSOCIATION AWARDS 2017 | FINALIST
Best Provision of Industry Information and Intelligence



AEBIOM Statistical Report

Get a copy of the Full Report

AEBIOM Key Findings compiles general data and conclusions on bioenergy's role in EU-28 for a broad audience.

AEBIOM Full Report on the other hand combines the latest statistics on bioenergy development for profesionnals. This is why the full report is charged to interested companies and individuals. This sectorial contribution mainly enables AEBIOM to ensure the steady improvement of its statistical report for the next editions.

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About the

European Biomass Association

The European Biomass Association (AEBIOM) is the common voice of the bioenergy sector with the aim to develop a sustainable bioenergy market based on fair business conditions.

AEBIOM is a non-profit Brussels-based international organisation founded in 1990 which brings together 45 national associations and over 100 companies from all over Europe – thus representing more than 4000 indirect members, including mainly companies and research centers.
>>> www.aebiom.org

AEBIOM
EUROPEAN BIOMASS ASSOCIATION

Academia

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Associations

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About the

European Biomass Association

Companies

AEBIOM's

Networks

The European Pellet Council (EPC) is an umbrella organisation of the European Biomass Association (AEBIOM) founded in 2010, representing the interests of the European wood pellet sector. Its members are national pellet associations or related organisations from 16 countries. EPC represents the interests of the sector in Brussels and communicates the contributions the European pellet sector can make to increase the use of renewable energy in Europe.

The European Pellet Council is a platform for the pellet sector to discuss the issues that need to be managed in the transition from a niche product to a major energy commodity. These issues include the standardisation and certification of pellet quality, safety, security of supply, education and training, and the quality of pellet-using devices.

In this regard, EPC is coordinating the development of EN*plus*® quality certification and is constantly adapting this system according to market needs (e.g. certification of industrial pellets, sustainability aspects).

For more information on the European Pellet Council
>>> www.epc.aebiom.org

For more information on the EN*plus*® certification
>>> www.enplus-pellets.eu

EUROPEAN PELLET COUNCIL
AN AEBIOM NETWORK

The International Biomass Torrefaction Council (IBTC) is an umbrella organisation of AEBIOM launched in 2012 and aims to building the first platform for companies having common interests in the development of torrefied Biomass markets. Currently, the IBTC initiative is supported by more than 20 companies active worldwide.

IBTC's objective is to promote the use of torrefied biomass as an energy carrier and to assist the development of the torrefaction industry. In this respect, IBTC's key activities are to undertake studies or projects, and to commonly voice its members' concerns to third parties to help to overcome barriers of market deployment.

IBTC takes part in initiatives and projects dedicated to biomass torrefaction market development such as: collection of statistical data, standardization issues, certification of, and permissions for ,the product, communication initiatives and matters related to health and safety.

For more information on the International Biomass Torrefaction Council
>>> www.biomasstorrefaction.org

INTERNATIONAL BIOMASS TORREFACTION COUNCIL
AN AEBIOM NETWORK

AEBIOM's

Sponsors

Biomasa Partner

Biomasa Partner is a leading manufacturer and supplier of certified wood pellets, wood briquette, top quality sawdust for pellet production and woody biomass.
>>> www.biomasapartner.pl

BioCurve · Biomass Condensing Boilers

BioCurve is a biomass boiler manufacturer, leading the design of condensing boilers.Its pioneering portfolio includes pellet condensing boilers from 25 kW to 150 kW, with efficiencies up to 105,7% and emissions well below the strictest limits. BioCurve has recently received the Expobiomasa 2017 Innovation Award for the first woodchip condensing boiler without need of heat recovers, which will be available from 2018.
>>> www.biocurve-heating.com

STUV

Based in Bois-de-Villers, in Namur province (BE), Stûv designs, produces and markets individual wood, gas and pellet heating solutions. Stûv stoves, fires, inserts and fireplaces are designed with incredible care, offering customer satisfaction in terms of energy performance, enjoyment and durability.
>>> www.stuv.com

Africa-EU Renewable Energy Cooperation Programme

The Africa-EU Renewable Energy Cooperation Programme (RECP) is a multi-donor programme that supports the development of markets for renewable energy in Africa. It was launched by more than 35 African and European Ministers and Commissioners under the Africa-EU Energy Partnership (AEEP).
>>> www.africa-eu-renewables.org

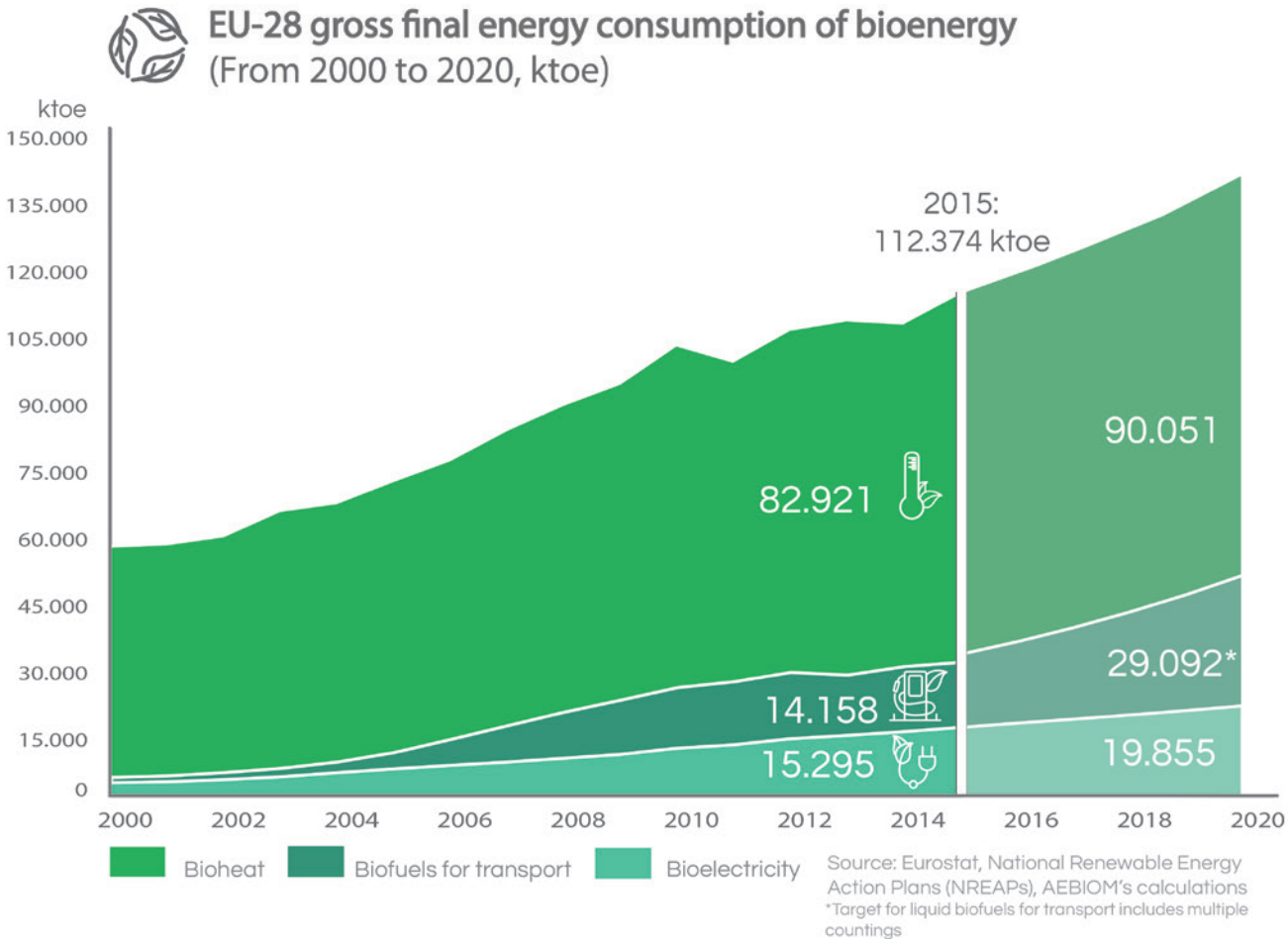
Scandbio

Scandbio is Sweden's largest company within solid processed wood fuels. Scandbio sells 100 % renewable energy in the form of pellets, briquettes, logs and powder.
>>> www.scandbio.com

Badger Pellets - François Group

BADGER Pellets are wood fuel pellets formed from sawdust from wood sawing in our regions. BADGER Pellets are produced on totally integrated bio-sites in Virton (Recybois) and Thimister (Woodenergy) in Belgium and in Bissen (KIOWATT) in Luxembourg.
>>> www.badgerpellets.com

Bioenergy insight



Bioenergy is the only source of clean energy able to provide heat, electricity and transport fuel. In 2015, bioenergy's total consumption reached its highest point in the EU-28. With 112.374 ktoe consumed, the whole sector grew by 6,53% from 2014 to 2015. This increase was also higher than the average annual growth rate recorded in the period 2000-2015 (4,83%).

Looking back, bioenergy consumption has more than doubled since 2000, from 55,4 Mtoe to 112,3 Mtoe. According to Member State projections (NREAPs) bioenergy should account for 139 Mtoe by 2020 in Europe and play a major role to reach its 2020 renewable energy target.

> IN 2015, EUROPEAN BIOENERGY'S FINAL CONSUMPTION REACHED ITS HIGHEST HISTORICAL POINT.
>
> WITH 112.374 KTOE CONSUMED, THE WHOLE SECTOR GREW BY 6,53% FROM 2014 TO 2015.

Bioenergy insight

Can the 2020 bioenergy projections be reached? Considering all types of bioenergy, the necessary annual growth needed after 2015 to meet the 2020 objectives will be around 4% which seems achievable knowing that the average annual growth in the period 2000-2014 was 4,83%.

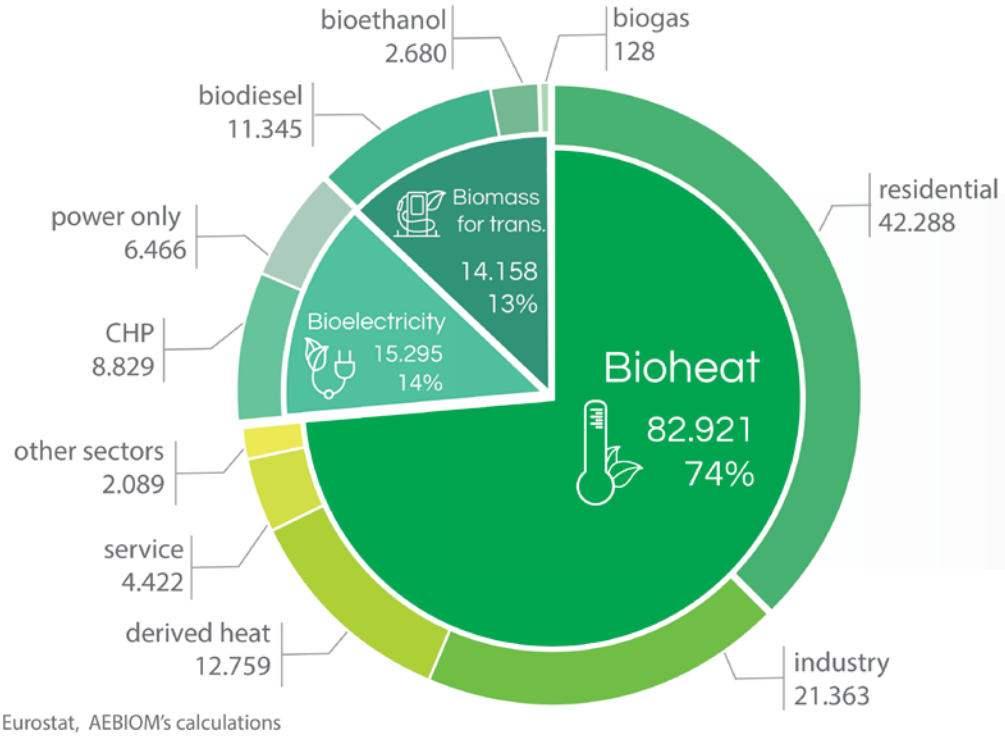
However, findings are different when considering bioheat, bioelectricity and biofuels for transport separately.

The sector that experienced the highest growth from 2014 to 2015 was the bioheat sector with 7,7%.

At this rate, there is no doubt that the objectives set by the Member States will be achieved in this segment. A similar situation can be observed in the bioelectricity sector which grew by 6,6% between 2014 and 2015.

At the other end of this scope, biofuels for transport faced stagnation between 2014 and 2015. Following past years' trends, Member States might be 30% below the projections by 2020. This can be partly explained by the changing and uncertain EU-28 regulatory framework on biofuel sustainability.

EU-28 gross final energy consumption of bioenergy per market segment
(in 2015, ktoe, %)

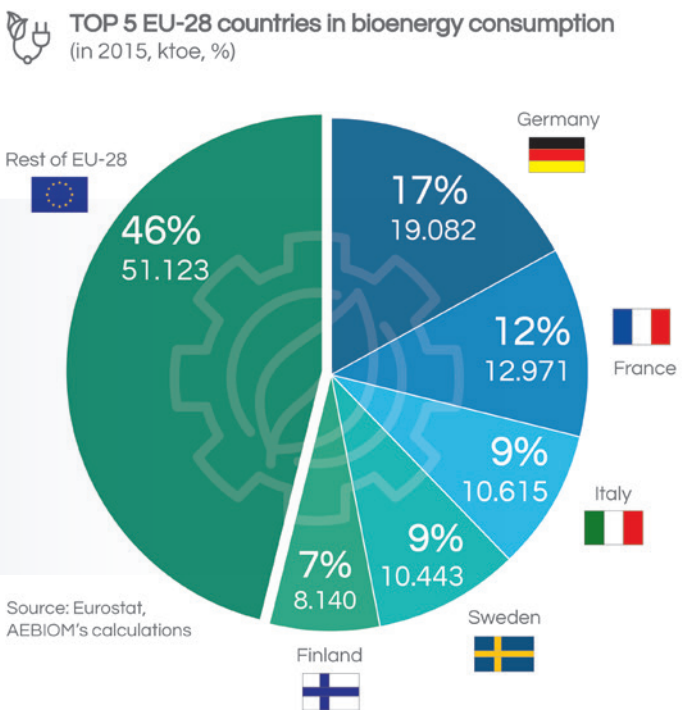


Source: Eurostat, AEBIOM's calculations

Considering the 2015 big picture, 74% of the EU-28 final energy consumption of bioenergy went to heat (82.921 ktoe), 14% went to electricty (15.295 ktoe) and 13% to biofuels for transport(14.158 ktoe).

The following EU-28 bioenergy mix (the ratio between bioheat, bioelectricity and biofuels for transport) is mostly similar in all EU-28 countries, except Luxembourg and Malta where the biofuels for transport represent more than 50%, and the UK where bioheat and bioelectricity show similar shares (with 44% and 40% respectively).

Bioenergy insight



> BETWEEN 2014 AND 2015, BIOHEAT CONSUMPTION GREW BY 7,7% WHILE IN THE SAME TIME BIOPOWER INCREASED BY 6,6%

Looking at national consumption, the 5 largest bioenergy consumers represent more than half of the EU's total bioenergy consumption (54%). All these countries have been benefiting from political supports to the development of biomass. Germany remains the leading country with 17% of the total EU-28 consumption, followed by France with 12%, both Italy and Sweden with 9% and finally Finland with 7 %.

However, the role that bioenergy plays in the energy mix of these countries is more important in Finland and Sweden where the share of bioenergy in the total energy consumption amounts respectively to 33,9% and 32,6%.

EXPERT REVIEWS

AEBIOM
EUROPEAN BIOMASS ASSOCIATION

Bioenergy markets are continuing their growth at a constant pace, as it has been the case over the past 10 years now. These are positive news. However, this general trend hides major differences between the electricity, transport and heat sectors. While the two first are highly dependent on political supports at European and national levels, the heat market remains less supported, but accompanied by standards and emissions regulations. Even with low fossil fuel prices the bioheat business keep its dynamism.

Looking at national situations, bioenergy in Scandinavian countries is mainly driven by the pulp and paper industry, traditionally using bioenergy, and by a switch to biomass in district heating. Germany, Italy and France are more heterogeneous in their markets and political approaches, showing clear national preferences: a model influenced by biogas development in Germany, while Italy decided to bet on wood stoves, etc. At the opposite, national political incoherency or/and limited ambition, explain partly why large energy consuming countries are not ranking among the first bioenergy nations.

Considering bioenergy future, AEBIOM believes that in the short term bioheat and bioelectricity will continue to grow while transport biofuels will suffer from inconsistences in European legislations. Regarding medium-term perspectives, the situation is less clear. Ongoing debates about the role that bioenergy could play in decarbonising EU economy by 2050 are showing political divergences and a growing risk factor. In such a key momentum, clear and coherent policy signals are needed to encourage further investors and business to contribute to the EU energy transition.

Jean-Marc Jossart
Secretary General
The European Biomass Association (AEBIOM)

stûv

The essential fire

Born from Stûv's technology research, the P-10 pellet stove is set to face the challenge of non-polluting wood heating. With nearly zero emission of CO and fine particles*, it anticipates and exceeds the requirements of the ECODesign 2022 directive. Ergonomic and stylish, it is the precursor of next generation ultra-efficient wood heating.

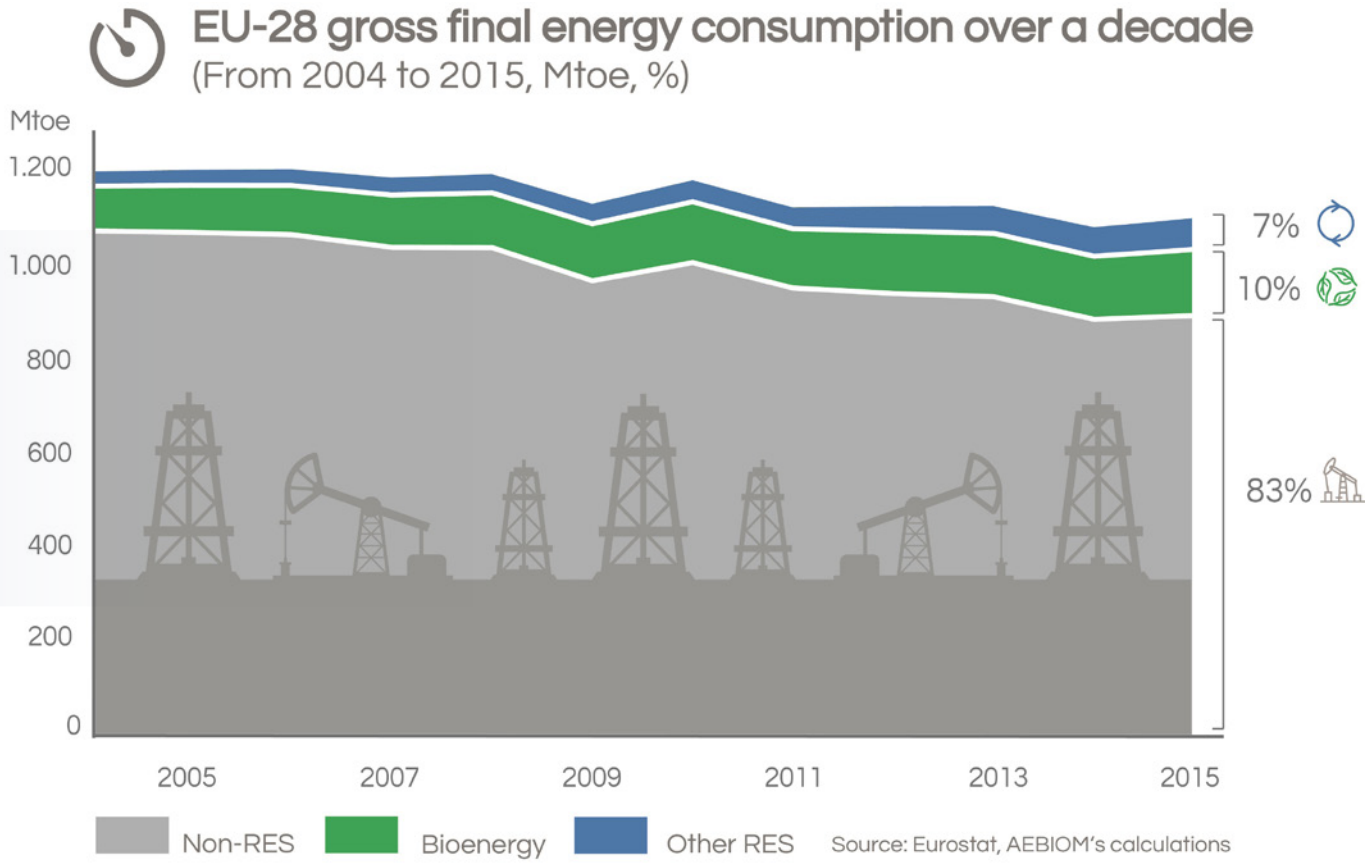
* **Stuv P-10 pellet stove:** Output range: 2,4-8 kW - Efficiency: 90,5 % - CO emissions: 0,001 % Fine particle emissions: 5 mg/Nm³ (IMQ Primacontrol - July 2015).

Complies with the following standards and quality labels: EN 14785 (EU), Flamme verte 7* (FR), Paris PPA (FR), BImSchV2 (DE), 15A (AT), EcoDesign 2022 (EU). Designed and manufactured in Belgium.

reddot award 2016
winner

stuv.com

Bioenergy's role in the EU-28 energy mix



The share of energy from renewable sources in the EU-28's gross final energy consumption (16,66%) slightly increased in 2015 when compared with 2014 (16,13%). Bioenergy represents 10% of the total energy in 2015 and 61,34% of the renewable energy consumed.

However, this upward trend is overshadowed by two conflicting observations. Following the economic recovery observed in 2015, the consumption of non-renewable energy sources also increased in 2015, breaking a continuously decreasing trend observed over the last 5 years.

On the other hand, the renewable energy consumption slow down – the increasing rate between 2010 and 2015 was lower than the growth from 2005 to 2010.

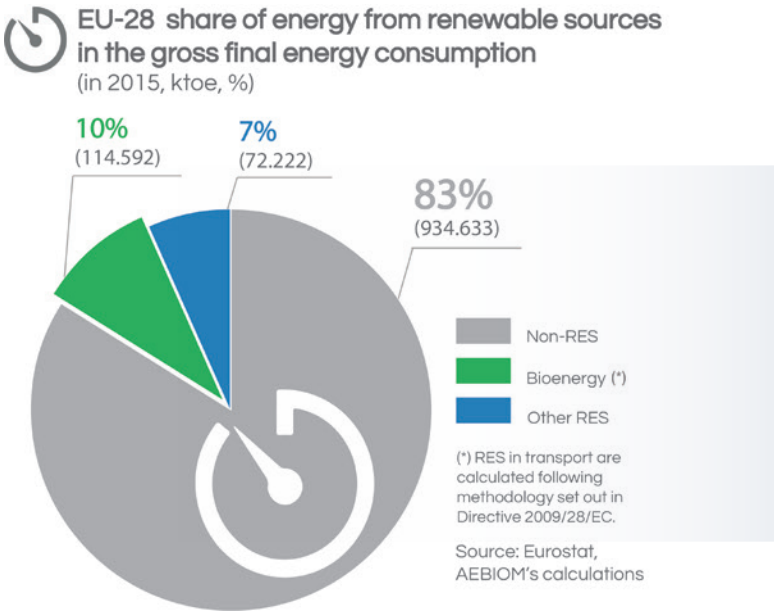
As in the same time EU-28 renewables investment hits 10-year low. According to the REN21 "*Renewables 2017 Global Status Report*", Europe investment in clean energy fell by 21% in 2015, reaching its lowest since 2006.

In this context, even if the EU-28 seems to be on track to reach and possibly overpass its 20% renewable energy share by 2020, efforts should not stop here as fossil energy remains largely predominant (83%). The EU renewable energy industry, including AEBIOM, is actively involved in the debate for setting the EU renewable energy framework for the period post-2020 and is calling for ambitious targets and measures in the Clean Energy Package to ensure that renewables will continue to develop at a sufficient path to allow the EU to reach its commitments under the Paris Agreement.

Bioenergy's role in the EU-28 energy mix

This is why AEBIOM support a 2030 renewable energy target of at least 35%. The governance system should be clear and strong to make sure that their targets are effectively reached.

> BIOENERGY REPRESENTS 7% OF THE TOTAL ENERGY IN 2015 AND 61,34% OF THE RENEWABLE ENERGY CONSUMED IN EU-28.



EXPERT REVIEWS

REN21

With its binding 2020 renewable energy targets, the European Union has been a front-runner in international climate and energy policy design. The global energy transition is well under way. In 2016, renewable energy accounted for two-thirds of all new generating power capacity installed globally, and, according to the IEA, is estimated to grow at twice the rate of coal and gas combined over the next five years. However, the share of renewables in total final energy consumption is not growing as quickly as it needs to be. The heating and cooling sector as well as the transport sector still lag behind when it comes to integrating high-shares of renewables into their energy mix. Climate commitments can only be reached if the majority of remaining fossil fuel reserves are kept in the ground; and both renewable energy and energy efficiency are scaled-up dramatically. To accelerate the transition to a healthier, more-secure and climate-safe energy future, we therefore need to build a smarter, more flexible system that maximises the use of all renewable energy sources.

Christine Lins
Executive Secretary
REN21

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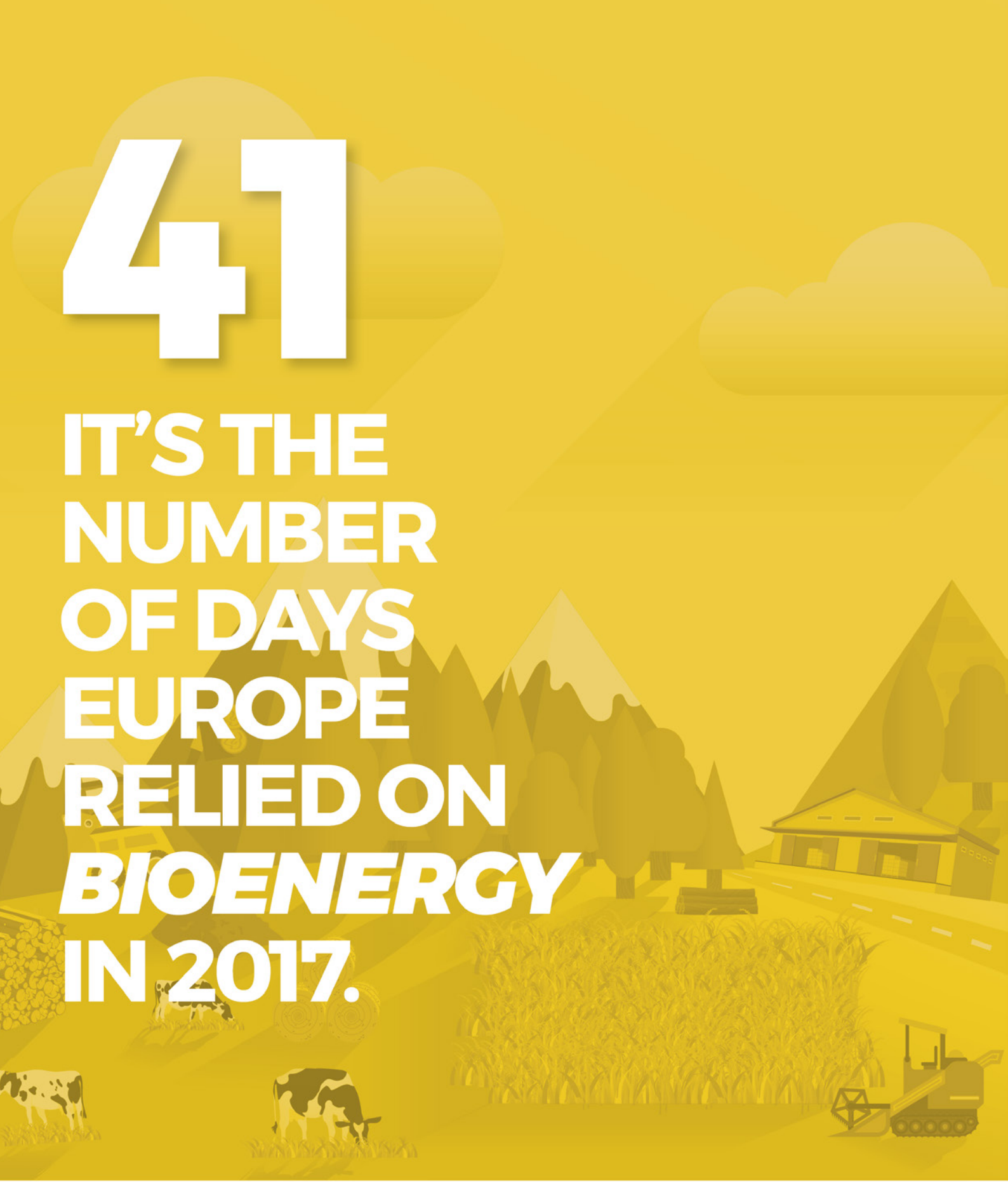
IT'S THE NUMBER OF DAYS EUROPE RELIED ON *BIOENERGY* IN 2017.



EUROPEAN BIOENERGY DAY

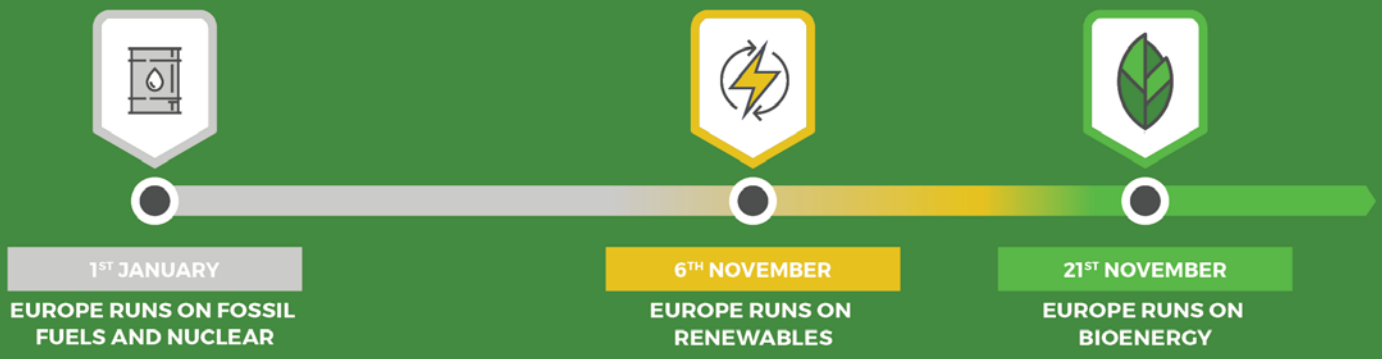
From November 21st until the end of year, the European Union relies only on **biomass** for its energy needs.

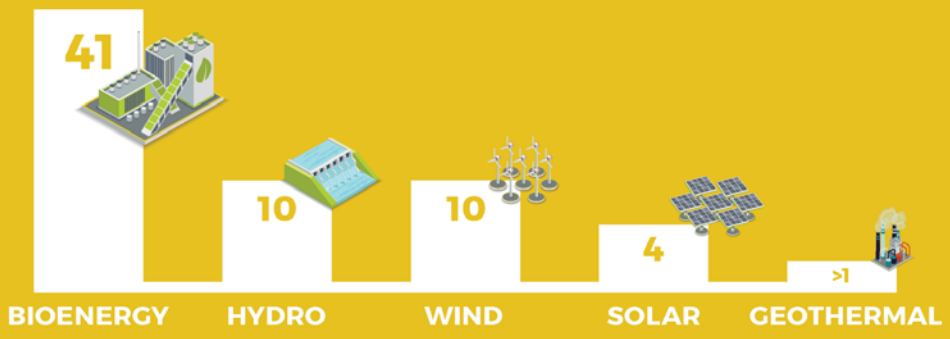
Learn more on **www.europeanbioenergyday.eu**.

EUROPEAN BIOENERGY DAY

Understanding where the EU-28 stands in its energy transition process can be confusing.

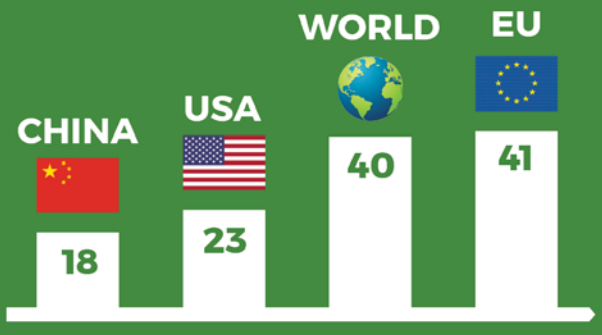
To better understand the situation, let's consider a calendar year and express the share of each energy source in number of days.





Bioenergy provided twice as many days of clean energy that hydro and wind combined

In 2017, bioenergy will provide Europe with 41 days of clean energy, an all-time record number



Whether comparing the EU-28 Bioenergy Day with that of China, the USA, or the rest of the world, the EU-28 remains the world leader

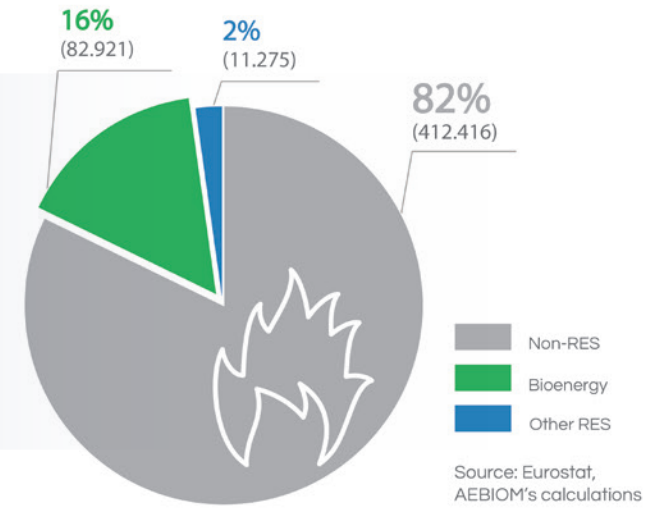
Biomass for Heat

Renewables are often associated with power generation and transport. However, the heating and cooling sector remains underestimated, whereas this sector shows the most important margins of progression. Heating and cooling represents around 50% of the EU-28's total energy consumption with 82% still powered by fossil fuel— a share that remains almost unchanged when compared with 2014.

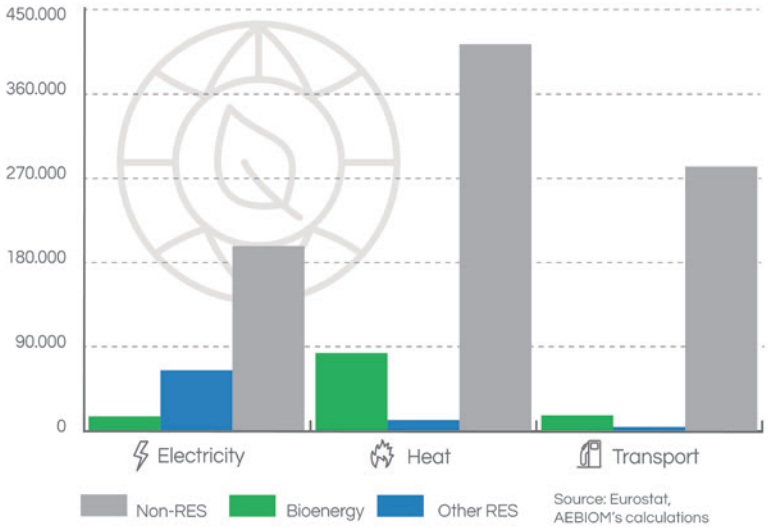
The share of renewable energy sources in the heating and cooling sector (18,59%) increased slightly in 2015 (0,52pp), with bioenergy representing 89% of the total contribution.

> BIOHEAT REPRESENTS 89% OF RENEWABLE HEAT CONSUMED IN EU-28 IN 2015.

EU-28 share of energy from renewable sources in the gross final energy consumption for heating & cooling
(in 2015, ktoe, %)



EU-28 share of energy from renewable sources in the gross final energy consumption
(in 2015, ktoe)



Ongoing EU policy debates regarding the future EU-28 climate and energy framework are raising the question of an increasing contribution of other renewable energy sources in this sector. As the remaining effort to decarbonise the heating sector are significant, there is room for the development of all renewable energy sources, including bioenergy. This is why AEBIOM is very active in the current post-2020 framework discussions to propose ambitious targets and measures for developing the renewable heating sector, as a follow up to the EU strategy on heating and cooling.

The first provisions on heating and cooling in the Clean Energy Package are a major step in recognising the key role played by renewables in this sector. It is now up to Member States to implement the right policies to promote renewables, including bioenergy in this sector. In order to ensure the increased penetration rate of renewables in heating and cooling, it is necessary to set an more ambitious target than the 1% annual increase proposed by the Commission in Article 23 of the new Renewable Energy Directive.

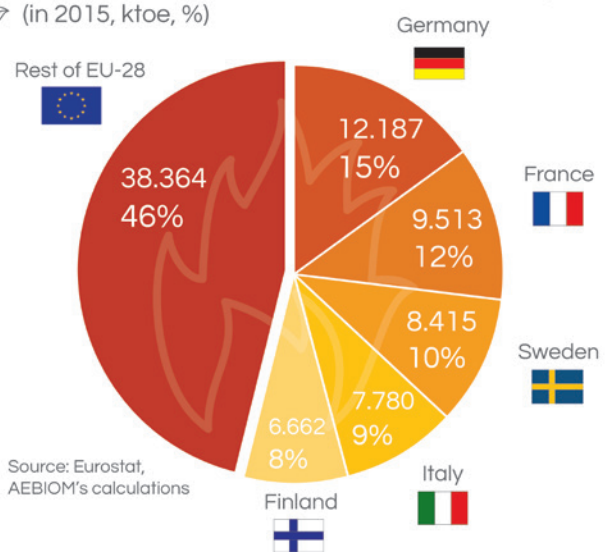
Biomass for Heat

Looking more into the details of the bioheat sector, the residential segment leads with about half of the bioheat consumption (51%). This sector is quite heterogeneous. All new installations put on the market today have to comply with the EU Ecodesign legislation, setting minimun emissions and energy efficiency requirements.

However, a challenge remains in the existing stock of old installations like open fire places which need to be replaced in order to improve air emissions and energy efficiency. The residential sector is the predominant sector for bioheat consumption in all the countries except Cyprus, Denmark, Finland, Luxembourg, Sweden and Slovakia where the share is lower than 40%.

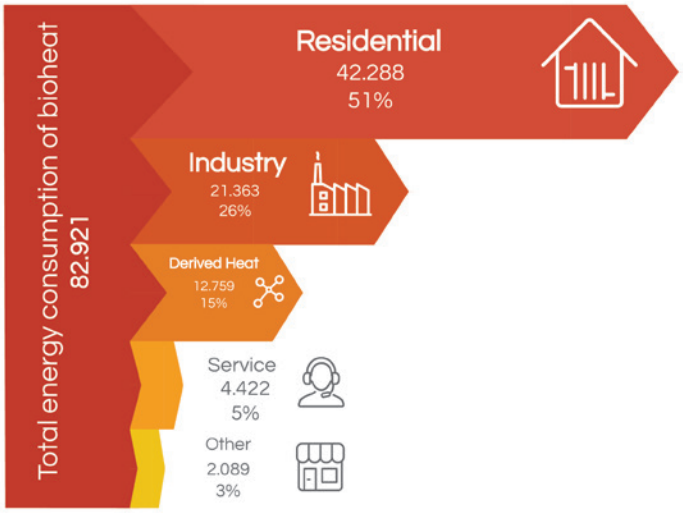
Industrial and derived heat (mostly being district heating) sectors follow in the ranking of bioheat generators respectivelly with 26% and 15%. The consumption of bioheat in the industry sector has a high importance in countries such as Belgium, Finland, Ireland, Portugal, Sweden and Slovakia. The countries with the biggest share of bioheat consumption through district heating are Denmark, Lithuania and Sweden with more than 30%. On the contrary, bioheat district heating are few in Ireland and Mediterranean countries like Spain, Greece and Portugal.

TOP 5 EU-28 countries in bioheat consumption
(in 2015, ktoe, %)



Source: Eurostat, AEBIOM's calculations

EU-28 gross final energy consumption of bioheat
(in 2015, ktoe, %)

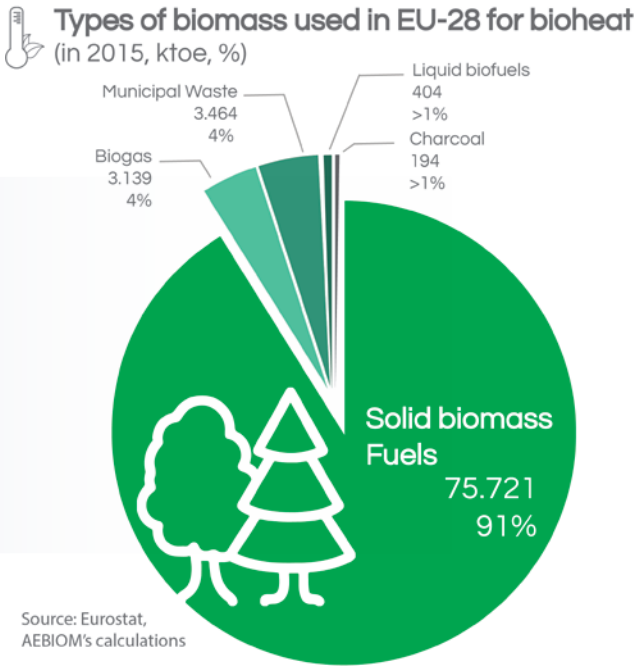


Source: Eurostat, AEBIOM's calculations

The service sector (schools, hospitals, hotels) also have great potential for development, representing only 5% of the gross final consumption in 2015. The use of bioheat in the service sector is rather limited in most countries. Only Germany, Cyprus and Malta present more than 20% share. All these sub-sectors are directly concerned with the ongoing discussion on future EU sustainability criteria for biomass and could be highly impacted depending on the final decision in particular on which installations will have to comply with these criteria. Indeed the bioheat sector mostly consist in small and mid-scale installations.

The distribution of top 5 countries for bioheat consumption is similar to the top 5 countries for bioenergy consumption. This is rather understandable as bioheat represents around ¾ of the total bioenergy consumption. Germany is the leading country with 15% followed by France with 12% and Sweden with 10%.

Biomass for Heat



Solid biomass is by far (91%) the first source of fuel used for bioheat, most of it being woody biomass. Both for environmental and economic reasons, this is mostly sourced from by-products of forest management operations and the wood industry, such as sawmills.

Alternative feedstocks, such as ligno-cellulosic energy crops can complement demand while providing additional benefits (soil erosion prevention, flood protection etc..). This is why AEBIOM advocates for better recognition of agricultural biomass and ligno-cellulosic energy crops within the future common agricultural policy.

The remaining 9% is sourced from municipal waste and biogas generation, accounting for 8% combined. 1% is generated thanks to liquid biofuels and biochar.

> BOTH FOR ENVIRONMENTAL AND ECONOMIC REASONS, WOOD FOR ENERGY IS MOSTLY SOURCED FROM BY-PRODUCTS OF FOREST MANAGEMENT OPERATIONS AND FROM WOOD BASED INDUSTRY, SUCH AS SAWMILLS

EXPERT REVIEWS

Alan Sherrard
Editor in Chief
Bioenergy International

Bioheat is the real unsung bioenergy hero. By its very nature, the biomass used, the technology solutions deployed, the financing and business models applied and the heat use applications vary tremendously. Across Europe, bioheat installations range from industrial units of a few hundred MW down to household appliances of a few kW – from designer wood and pellet stoves providing supplementary heat and solace in living rooms, industrial boilers providing process energy to large municipal and independent combined heat and power (CHP) plants distributing heat and cooling via district energy networks.

For the most part, growth in bioheat has come about without the need for long-term direct subsidies. Instead, stable long-term technology agnostic "Polluter Pays Principle" (PPP) style of steering instruments such as a carbon dioxide (CO2) tax provide financial incentive and environmental motivation. Subsidised or not, each and every installation has either replaced an existing fossil fuelled alternative or prevented the installation or building of a new one while at the same time, creating new jobs and supporting existing ones right across the bioenergy value chain for every ktoe displaced.

Bioheat delivers on all of these social, economic, environmental and climate benefits yet the total annual volume of available biomass for energy use in Europe continues to accumulate. This is perhaps the best news of all given that over 80 percent of Europe's heat demand is still met using fossil fuels. Together with other measures, such energy efficiency and waste heat utilisation biomass is warming up to the challenge.

BioCurve

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This Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 738569

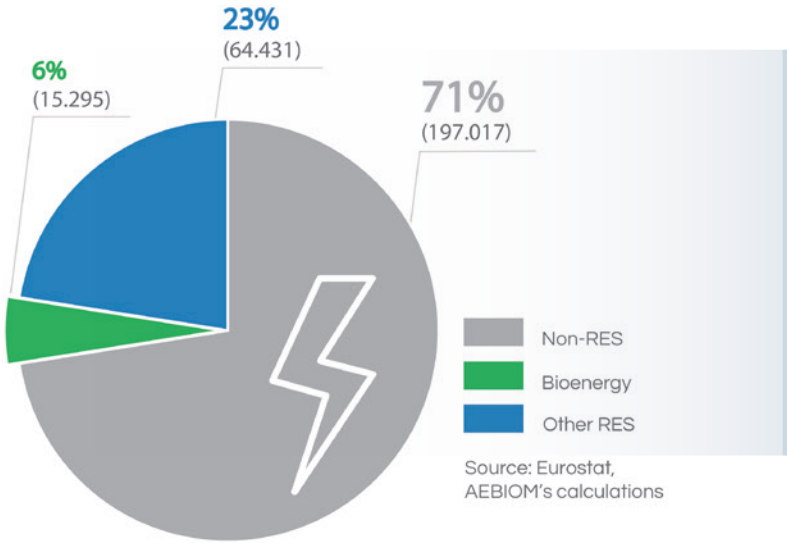
GERMAN DESIGN AWARD NOMINEE 2018

10 years warranty for the boiler shell

Biomass for power generation

The renewable energy share in the power sector keeps growing. Electricity is the sector where renewables have experienced the largest increase over the last decade (14,3% in 2004 compared to 28,8% in 2015). Renewable electricity sources like wind, photovoltaic and hydro lead the growth in the power sector but, because of their variable nature, require flexible and dispatchable electricity generation to complement them. The biopower sector is currently under scrutiny by EU legislators and may be severely limited by stringent sustainability criteria. This would be shortsighted as biopower could displace environmentally harmful fossil fuels, while providing green electricity as well as heat (in the case of cogeneration plants).

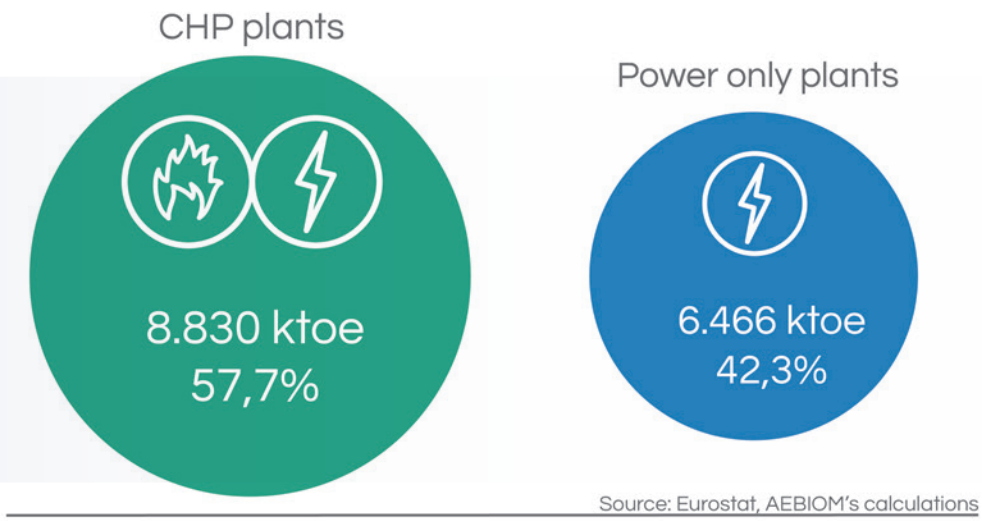
EU-28 share of energy from renewable sources in the total gross electricity generation
(in 2015, ktoe, %)



Share of bioelectricity produced in EU-28 member states per type of plant
(in 2015,%)

Biomass for power generation

Bioelectricity generation in EU-28 by type of plants
(in 2015, ktoe, %)



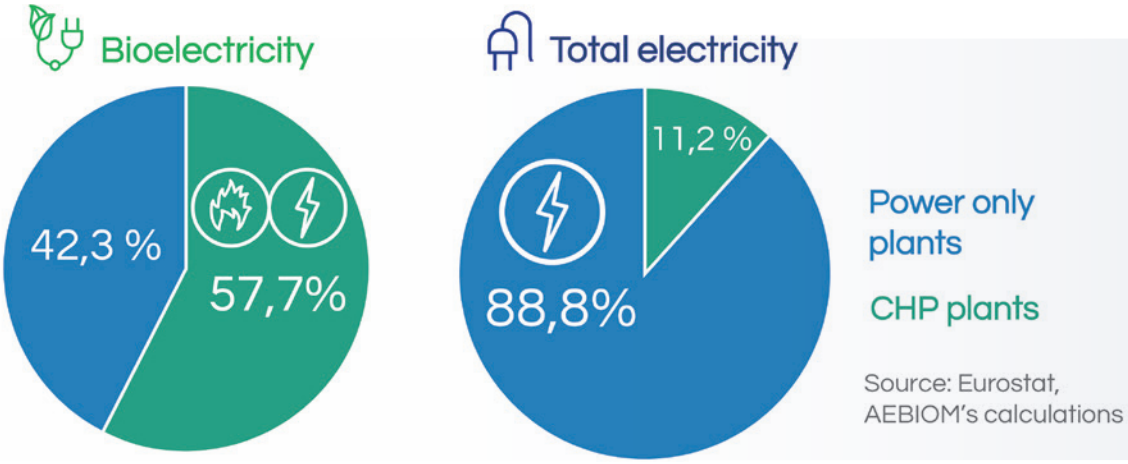
Source: Eurostat, AEBIOM's calculations

Total electricity generated from biomass in EU-28 : 15.295 ktoe

Contrary to what the current EU-28 discussions on biopower may suggest, the majority of bioelectricity (57,7%) is generated by combined heat and power plants (CHP). This is the case for 22 of the 28 EU member states. Only Belgium, Italy, Hungary, Spain, Ireland and the UK have more than 50% of their bioelectricity produced in power only plants. On the opposite, power only plants are predominants in the EU total electricity mix.

The current EU debate on biomass sustainability seems to suggest that as far as biopower is concerned, only biomass used in CHP should be considered as sustainable in the future. This simplistic approach undermines the potential and need for biopower to complement variable renewable energy sources, while displacing environmentally harmful fossil fuels.

Share of electricity generated in CHP and power only plants in EU-28
(in 2015, ktoe, %)



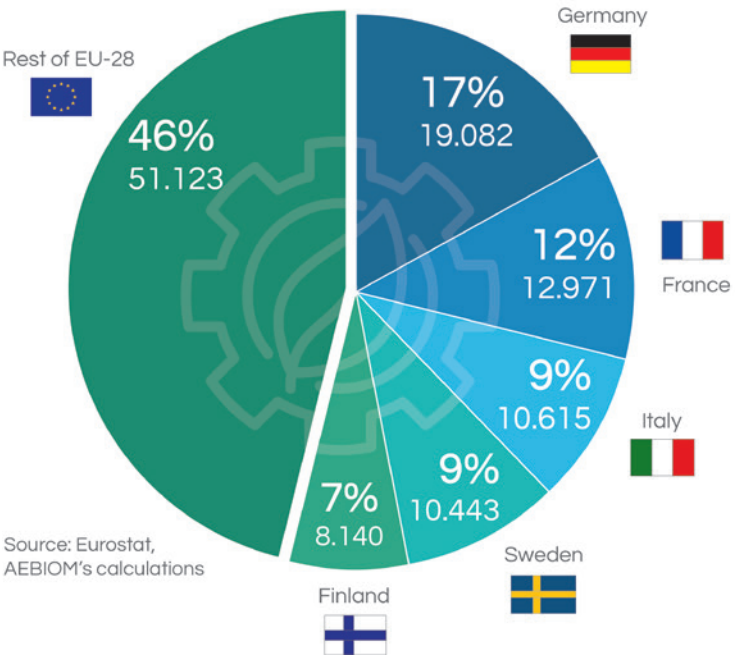
Source: Eurostat, AEBIOM's calculations

Biomass for power generation

The top 5 EU-28 countries in biopower represent 68% of the total EU biolectricity generation. In comparison to the top 5 in bioheat, it can observe that the bioelectricity market is more concentrated. Among the following top 5, led by Germany (28%) and the UK (17%), different approaches exist. While in Germany and Italy, the majority of bioelectricity is produced in a high number of small/medium size biogas plants, the UK is showing an alternative model with a limited number of large installations consuming woody biomass.

> THE TOP 5 EU-28 COUNTRIES IN BIOPOWER REPRESENT 68% OF THE TOTAL EUROPEAN BIOPOWER GENERATION.

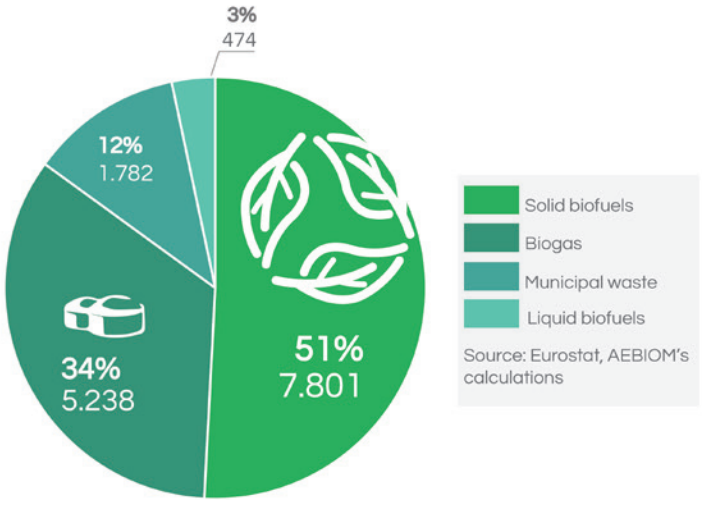
TOP 5 EU-28 countries in bioenergy consumption (in 2015, ktoe, %)



Solid fuels (mostly woody biomass) amounts to more than half of the biomass fuel consumed by the biopower industry mainly in the form of woodchips and pellets.

Compared to heat generation, biogas plays an important role in power generation with more than a third of the fuel used for this purpose. Germany alone represents more than half of all EU-28 biogas consumption for power generation.
Municipal waste recovery and liquid biofuels represent the remaining 15%.

Types of biomass used in EU-28 for bioelectricity generation (in 2015, ktoe, %)



Biomass for power generation

EXPERT REVIEWS

BioPower in Europe doubled between 2000 and 2005 and tripled between 2000 and 2015: this came about mainly due to the conversion of several coal boilers to wood pellets. This trend is led mainly by Belgium, the Netherlands, the UK and Denmark. However, since this time the growth has been much more modest due to a significant reduction in the support given to cofiring, where this support existed.

The main growth of renewable electricity has come from wind power and, especially at the beginning, from solar power, whose growth has been much smaller in recent years due to reduced support.

Biopower generates slightly less than 20% of the total renewable electricity output in Europe, comparable to the situation in Belgium. Today the debate on EU sustainability criteria for biomass places the sector under scrutiny: depending on the final outcome it may be severely restricted. Nevertheless, biopower will be needed in the future to sustain further ambitious targets for the decarbonisation of the power sector in Europe in the coming decades. Biopower also has a role to play as a major source of low-carbon dispatchable power needed as a backup to erratic generation of wind and solar power.

In the short term, the growth of biopower is expected to remain relatively stable in countries such as Belgium and the UK, to remain low in the Netherlands and to grow most strongly in Denmark, as well as in Northern and Eastern Europe as this is the area where most of the solid biomass resources are available in large quantities. The recent development by SBP of third-party certification of solid biomass resources has gained sufficient recognition to offer guarantees that the biomass used for large scale biopower is sustainable.

Yves Ryckmans
Chief Technology Officer Biomass and Solid Fuels
Engie-Laborelec

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Biomass for transport

While biodiesel (FAME) and ethanol from sugar and starch feedstocks have already long been commercially available, and HVO has just recently been commercialised, advanced biofuels produced from lignocellulosic material have not yet arrived at this level of maturity.

Of all pathways for the production of advanced biofuels from lignocellulosic material, the production of ethanol through hydrolysis and subsequent fermentation has reached the highest level of maturity and is now on the edge of commercialisation. Several facilities at industrial scale have been installed and started up during the past few years, and the two largest ones, those of DuPont and POET-DSM, are just entering into production. This has been a painful process with many challenges, but now both companies are confident to ramp up production over the coming year. Another positive news is that Raizen, operating an industrial scale facility on sugarcane bagasse and molasses and currently ramping up production towards nameplate capacity, has announced plans to build further facilities once the first one has reached full capacity.

These developments mark a major milestone in the development of lignocellulosic ethanol, as they indicate the transition from the phase of technology demonstration to the phase of technological learning, which is necessary to come down the cost curve and allow for rapid multiplication of optimized facilities

Dina Bacovski
Senior Researcher
Bioenergy2020.eu

EXPERT REVIEWS

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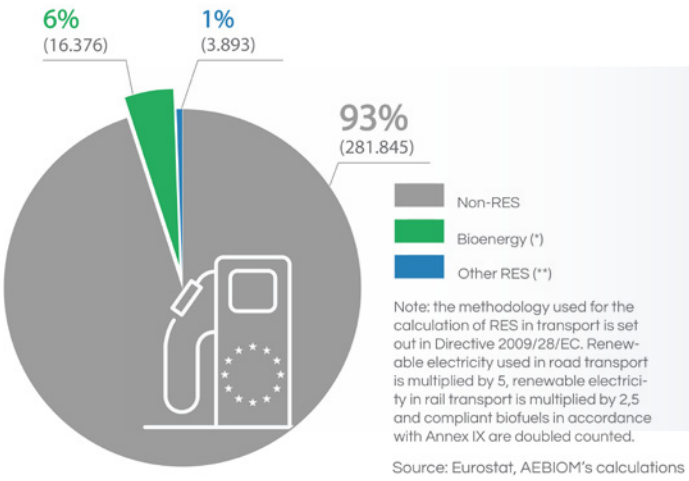
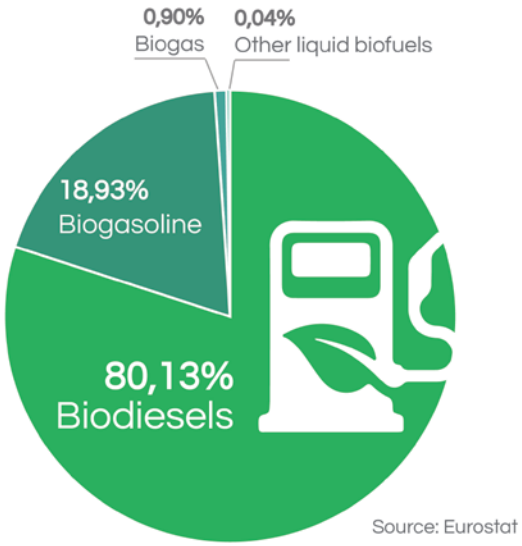
EU-28 share of energy from renewable sources in transport
(in 2015, ktoe, %)

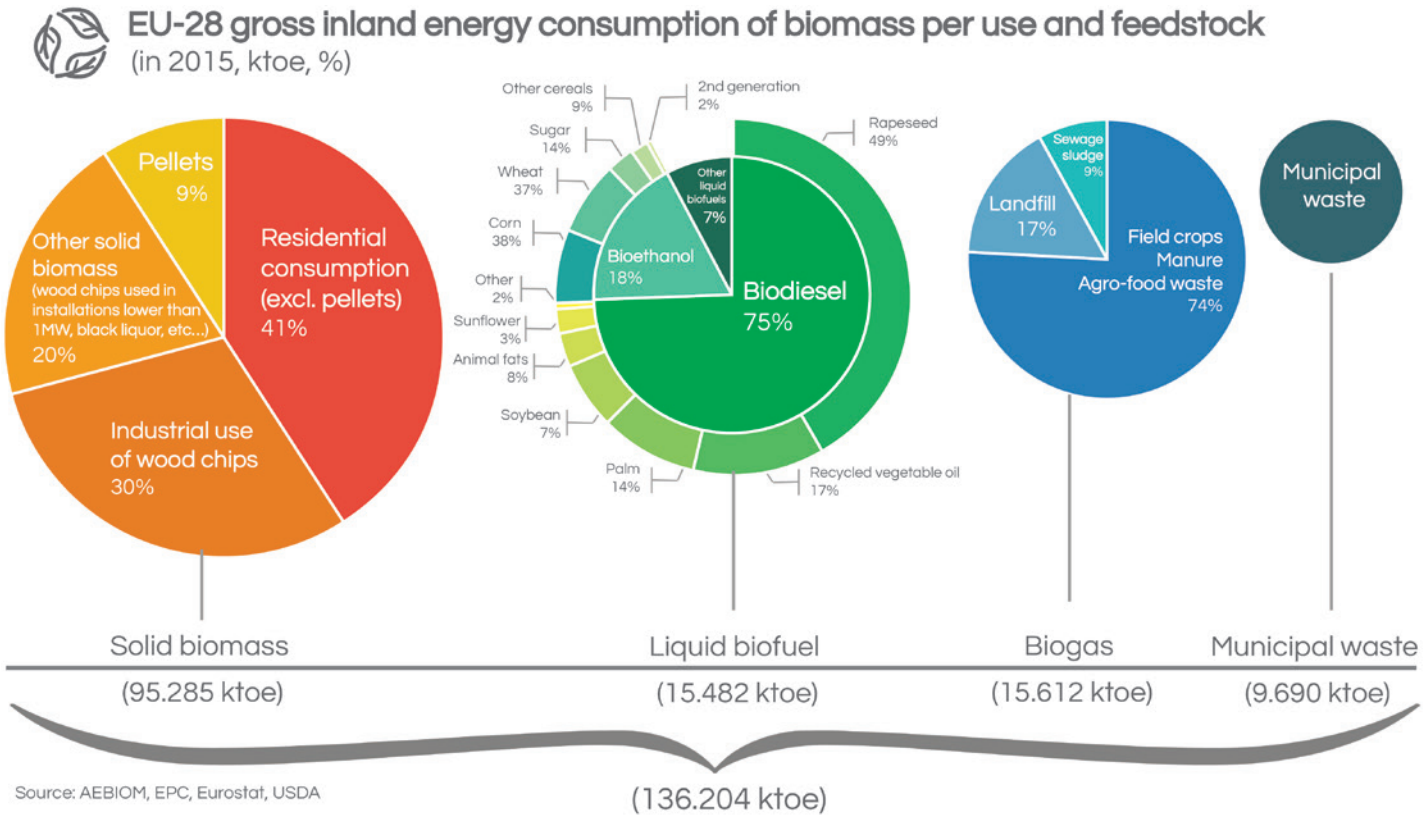


Bioenergy amounts to 6% of the EU-28's total energy consumption in transport, while another 1% came from other renewables in 2015. Non-renewables are still dominant with 93%, a slight decrease when compared to 2014 situation (94%). 98% of the consumption of bioethanol and biodiesel are used for transport.

Share of the final energy consumption of biofuels in transport by type
(in 2015, ktoe, %)



Biomass landscape



Considering the EU-28 gross inland consumption of biomass for energy, solid biomass clearly appears as the main source of fuel consummed, representing 70% (95.285 ktoe) of the total.
The liquid biofuel and biogas sectors accounted respectively for 11,4% and 11,5% of the total gross inland consumption of bioenergy. Municipal waste for energy completes the picture with 7,1%.

Zooming in on the internal structuration of the solid biomass market, it can be observed that the residential consumption of solid biomass dominates with 41% of total solid biomass consumption. Wood pellets, often at the top of the media agenda accounts for 6,3% of the total biomass used for bioenergy, while wood chips, for industrial and small scale uses, represent one of the most common type of fuel used in the sector.

> CONSIDERING THE EU-28 GROSS INLAND CONSUMPTION OF BIOMASS FOR ENERGY, SOLID BIOMASS CLEARLY APPEARS AS THE MAIN SOURCE OF FUEL, REPRESENTING 70% (95.285 KTOE) OF THE TOTAL.

Biomass landscape

Regarding the liquid biofuels situation, biodiesel gross inland consumption remains dominant with 75% of the total. The main development in the biodiesel sector between 2010 and 2015 has come from the growing use of recycled vegetable oil (four-fold increase). Bioethanol represents 18% of all liquid biofuels. A minor share of it (2%) is coming from 2nd generation biofuels. Biogas is largely dominated by the agricultural sector and food industries representing more than 70% of the biogas consumption.

EXPERT REVIEWS

Even opponents of biofuels recognise that Europe is falling behind when it comes to decarbonising its transport sector. What they fail to acknowledge is the reality that without using all the tools in its box, Europe will not be able to reverse that trend. Europe needs a new commitment to sustainable biofuels, not a policy— as proposed by the European Commission— that only serves to help the fossil fuel industry.

The Commission admits that transport is the only sector in which EU countries are consistently falling short of their targets for renewable energy. The lack of progress is already dramatic in when looking at how many Member States are well below 10% (figure 6.4). The results are even worse when you remove multiplier factors and look at the real numbers: even stars like Sweden are only at 16% renewable energy.

So why would the EU want to turn back on its ambitions and leave room for 90% or more fossil fuel in its 2030 transport energy mix? Fortunately, many lawmakers see the Commission's RED II proposal as flawed and are trying to change it— – either by setting higher ambitions for renewables or by opposing an effort to phase out truly sustainable crop-based biofuels such as European ethanol. As Europeans' concerns about climate change and air quality grow more urgent— – and as the EU seeks to re-assert its role as a leader in the fight against climate change— – it's clear that all sustainable biofuels (first- and second-generation) have to play a role. It is important to remind lawmakers that crop-based biofuels don't just contribute to reducing emissions of greenhouse gases and harmful pollutants, they also have other societal benefits, such as offsetting the need to import animal feed and , providing income for farmers and jobs in rural communities.

Emmanuel Desplechin
Secretary General
ePure

EXPERT REVIEWS

The biogas sector in Europe flourished in 2015: the number of biogas installations went from 16.834 to 17.439 (+3,6%), the installed electric capacity increased from 8.288 MWel to 8.728 MWel (+5,3%), while the number of biomethane installations went up by 25% (456 plants in 2015). Biomethane production especially (based on biogas upgrading) is on the rise thanks to its versatility (ease to use with properties similar to fossil methane, injection in existing gas grid).

Biogas and biomethane represent a versatile renewable energy, the further expansion of the sector could contribute significantly to decarbonize the most polluting European industries:

•In the electricity sector (27% of EU gross GHG emissions), biogas production can stabilize the variations of solar and wind electricity generation due to weather dependencies by on-demand production and long-time storage capability;

• In transport (20% of EU gross GHG emissions), biomethane can be used as fuel in light-duty vehicles (such as passenger CNG cars), heavy-duty vehicles (such as truck and bus fleets) and marine transport;

• In agriculture (12% of gross EU GHG emissions), the anaerobic digestion of agricultural by-products avoids the rotting of biocomponents on the fields and the release of high warming potential methane;

• In waste management, anaerobic digestion can treat organic waste and avoid the rotting of organic materials in landfills.

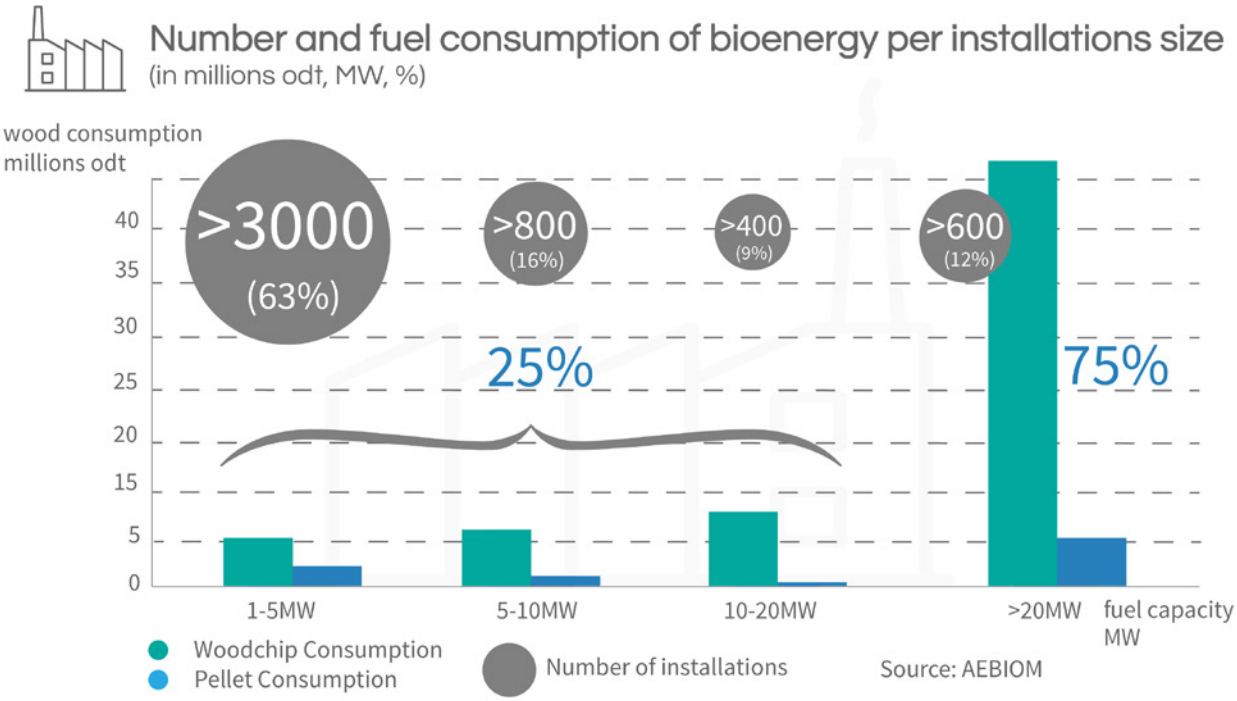
Anaerobic Digestion (AD) is a well-developed and optimized technology for biogas production. Other technologies are also on the rise such as biomass gasification (synthetic natural gas production) and the highly-anticipated Power-to-Methane technology, which allows the production of renewable gas by using renewable excess electricity to power water electrolysis. Together, these technologies provide a significant potential for Europe to succeed in its energy transition from fossil to renewable gas.

Bruno Deremince
Technical and Project Officer
European Biogas Association

Biomass landscape

The statistics on solid biomass consummed in Europe are enlightening, going against the clichés. In fact, small and medium size installations (1-20MW) consumming woodchips and/or pellets represent an overwhelming majority of plants (88%) with more than 4.000 plants spread throughout all member states. On the contrary, installations with a capacity higher than 20MW are limited in number, representing only 12% of the total number of installations (>600 plants). However,looking at the woody fuel consumption of these two groups, it appears that 1-20MW installations consummed only 25% of the fuel wood while installations over 20MW use 75% of the total consumption.

This data shows that the 20MW threshold proposed by the Commission for the implementation of future EU sustainability criteria for biomass (RES II Directive) would be effective and appropriate as it would cover a large share of biomass fuels, while only concerning a limited number of installations, therefore limiting the administrative burden related to proving that the criteria are fulfilled. This is why AEBIOM supports this threshold in the ongoing institutional debate on bioenergy sustainability.



Furthermore, it is important to highlight that all types of installations have to comply with emissions level requirements, ensuring the limited impact of biomass on air quality.

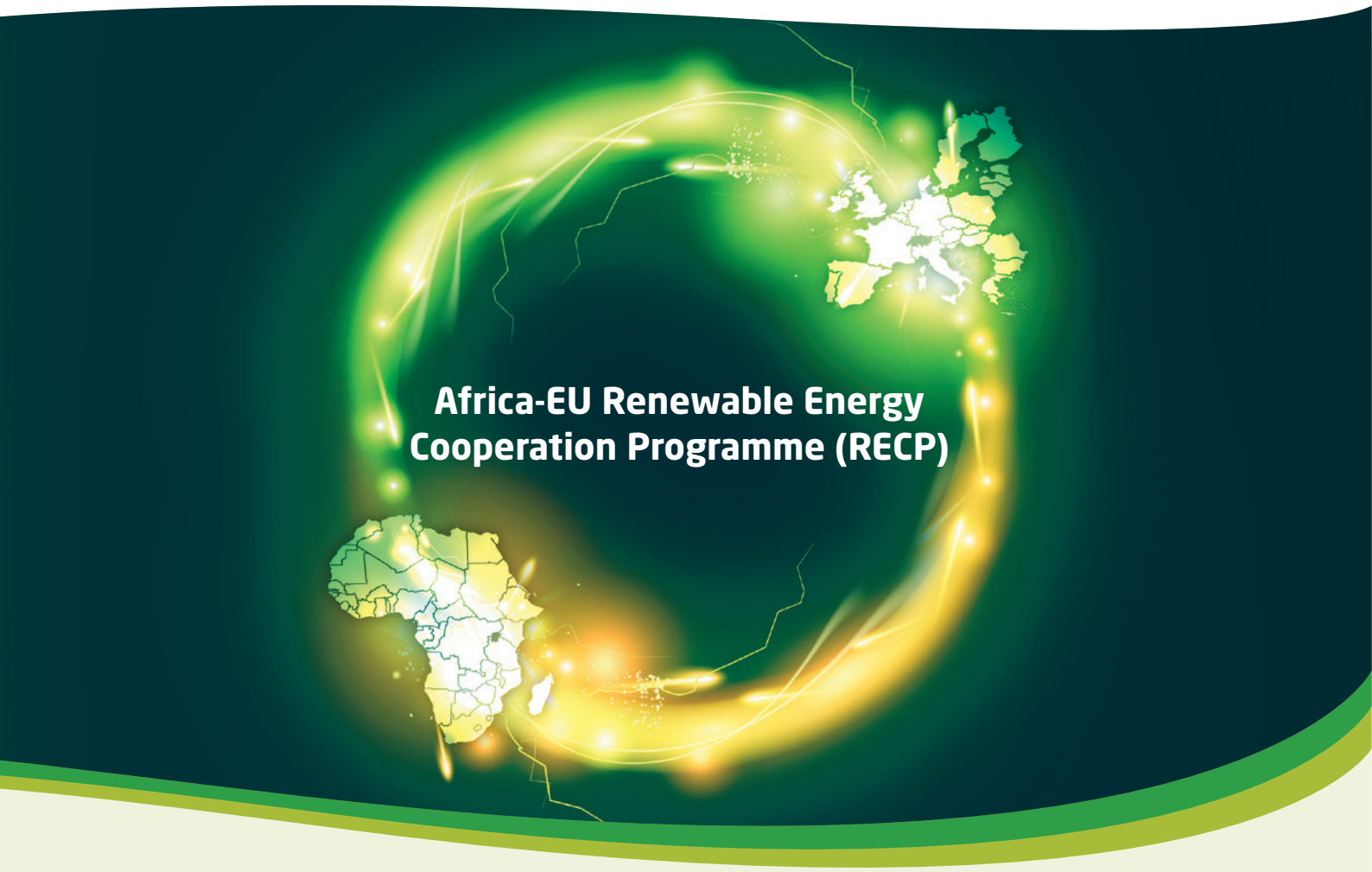
The Ecodesign directive is setting minimum emissions levels for solid fuel heating installations below 500kW (stoves and boilers).

The Medium Combustion Plant Directive sets minimum emissions levels for installations between 1-50 MW, while the Large Combustion Directive is covering installations above 50 MW.

This ensures that the bioheat and biopower sectors, from residential to industrial use, are regulated and comply with air quality requirements.

RECP
Africa-EU Renewable Energy Cooperation Programme

Africa-EU Energy Partnership



Africa-EU Renewable Energy Cooperation Programme (RECP)

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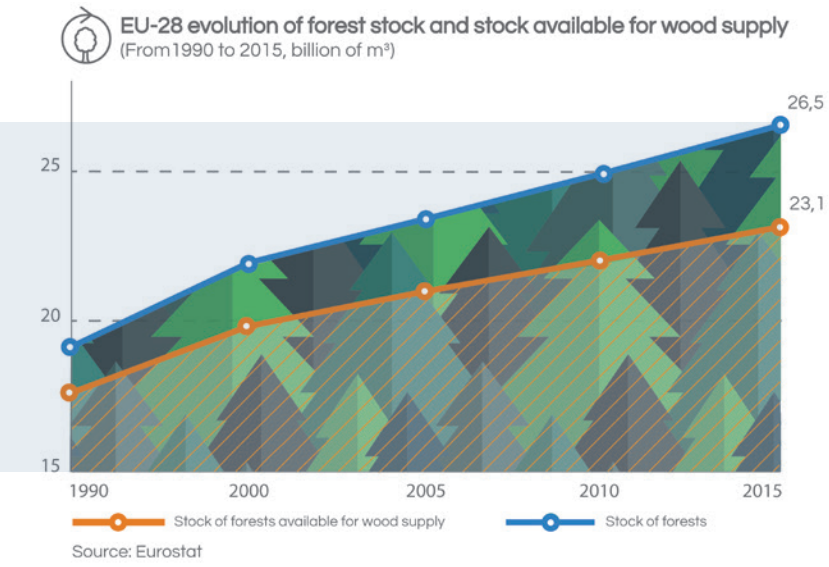
The RECP is a programme of the Africa-EU Energy Partnership (AEEP), a partnership between the European Union and the African Union

Biomass landscape - A focus on Forest



Contrary to common belief, EU-28 forests have been steadily growing over the past decades. In 1990 European forests represented a total of 19,7 billion m^3. In 2015, EU-28 forests reached 26,5 billion m^3, meaning that forest stock increased by 32% over the last quarter of a century. This growth is due to two main reasons: forest areas increasing (1) and a growth of standing volumes (2) :

(1) According to Eurostat, EU-28 forest coverage gained 322.800 hectares every year, meaning that European forests are increasing by the size of a football field every minute.
(2) On average, about 63% of the annual forest increment in Europe is actually felled, meaning that 38% of this annual increment remains in forests. The situation can vary from one country to another. Forest densification is more common in the Mediterranean region, in countries such as Italy, France, Spain, and Slovenia, where at least 40% of the annual increment remains untouched.

Bioenergy can play a major role in combatting forest degradation, thanks to extra sources of income to forest owners, municipalities and governments to manage their forests sustainably in the long-run.

EXPERT REVIEWS

eustafor

Sustainably managed forests are able to ensure significant wood availability as part of the solution to decarbonize European societies. Wood substitutes for non-renewable materials and energy, wood products store carbon and growing forests remove CO_2 from the atmosphere. The triple climate benefit coming from forestry is of vital importance to reach the Paris Agreement goals for mitigating climate change.

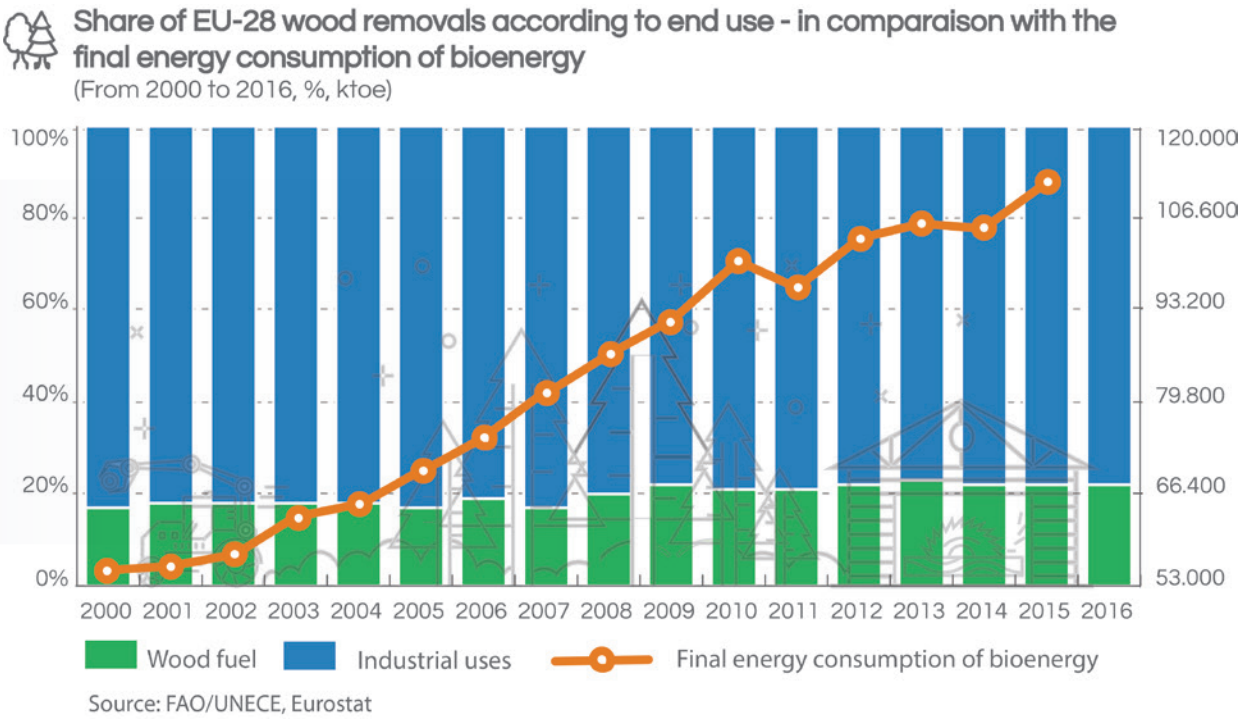
Investments by European countries have already resulted in a very positive trend in the development of forest area and resources. Over the past 25 years, the growing stock of European forests has increased by 7,3 billion m^3, whereas the stock available for wood supply has grown by more than 5 billion m^3. Furthermore, only about 63 % of the annual increment is used, allowing for additional availability for the future. These figures are promising for the shift towards a European bioeconomy.

Fostering innovation and promoting wood use are crucial in order to ensure the vitality of the forest-based sector. Low quality assortments continue to represent 21 % of the primary production from European forests and the bioenergy sector is a natural customer for this significant resource. The promotion of bioenergy can play a key role in providing incentives and financial means for forest owners and managers to take additional measures to guarantee the high-quality management of their forests.

A dynamic forestry sector throughout Europe is essential to ensure the provision of the wide array of ecosystem services coming from forests. The use of forest biomass for bioenergy supports forest managers in balancing environmental integrity, societal values and the economic viability of sustainable forest management.

Piotr Borkowski
Executive Director
The European State Forest Association (Eustafor)

Biomass landscape - A focus on Forest



The percentage of wood removal harvested for the purpose of wood energy increased softly from 18% in 2000 to 22% in 2016. This remains around one fifth of the total harvest in the EU-28, a situation comparable to the 90's. At the same time the consumption of bioenergy has doubled in Europe.

This shows that the energy sector is not the main driver for forest owners to mobilize their forest resources, and that the bioenergy sector relies mainly on wood by-products and other types of biomass.

EXPERT REVIEWS

Food and Agriculture Organization of the United Nations

THE PERCENTAGE OF WOOD REMOVAL HARVESTED FOR ENERGY PURPOSE IN EUROPE REMAINS AROUND ONE FIFTH OF THE TOTAL HARVEST SINCE 2000. IN THE MEANTIME, BIOENERGY CONSUMPTION DOUBLED.

It should be remembered that these wood fuel data count the amount of wood removals that are burnt directly (i.e. residential use of firewood and industrial burning of chips). Most energy from wood comes from the use of forest-based industry co-products such as chips or black liquor from pulping.

The Joint Wood Energy Enquiry shows that these co-products represent the majority of wood for energy uses (62%). Recovered wood waste´s share is about 5% (mainly waste from construction, but also packaging and old furniture). The remaining part corresponds to woody biomass from forest and other wooded areas.
For wood pellets the source is also mostly industry co-products (74%).

Florian Steierer
Alex McCusker
UNECE/FAO Forestry and Timber Section

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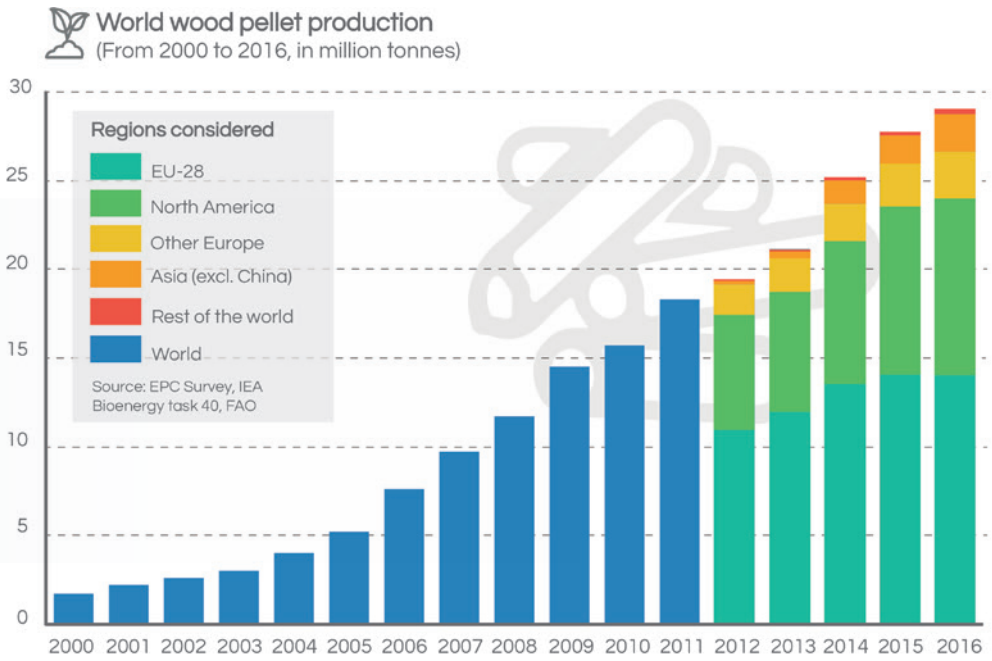
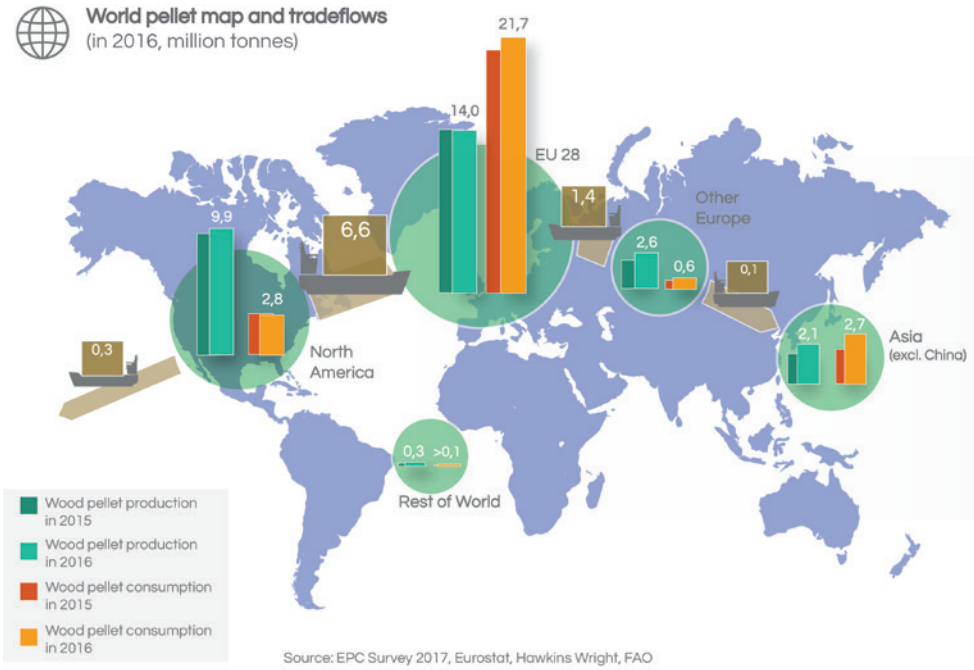
A focus on the pellet market



The pellet industry is now a global market witnessing growth both in production and consumption in many regions around the globe. In 2016, 28,9 million tonnes were produced globally. The EU-28, as the historic world leader, has strongly contributed to the growth of this sector but its position is increasingly contested by other regions, in particular, Asia where the industry is booming both in production and consumption.

The EU-28 produced 14,0 million tonnes of pellets providing for 65% of its own demand of 21,7 million tonnes in 2016. Therefore, most of the demand in the EU-28 is met by its domestic production.

The rest of the pellets used in the EU are mainly sourced from North America. Other areas such as Russia and the CIS countries complete the pellet supply to the EU-28.

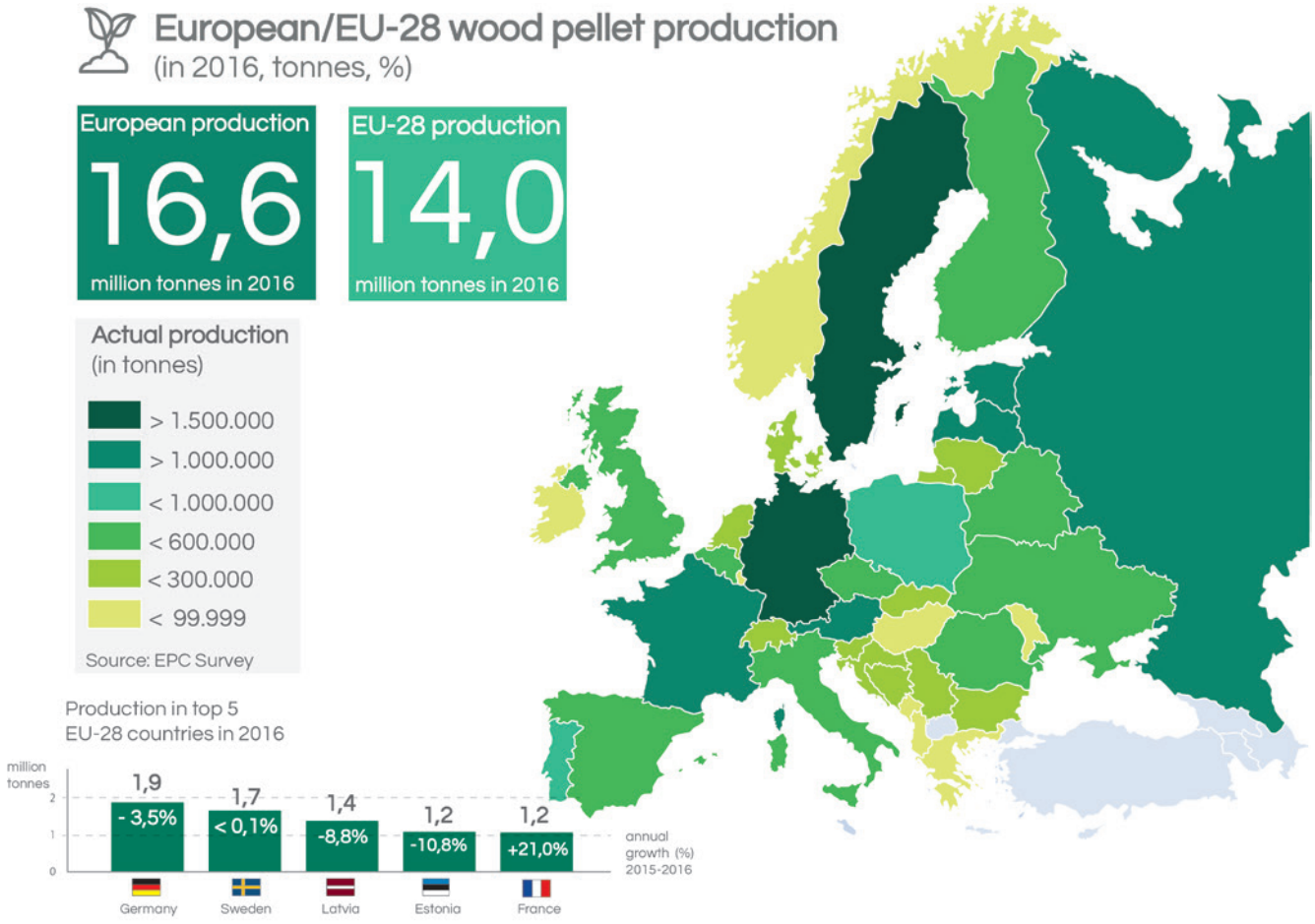


Source: EPC Survey 2017, Eurostat, Hawkins Wright, FAO

A focus on the pellet market

Wood pellet production areas are spread all over the EU Member States. The wood pellet sector therefore contributes to rural regional economies, thanks to the jobs and value it creates throughout the EU-28. Additionally, it contributes to the mobilisation and valorisation of local resources, thus decreasing the energy dependency of the EU-28.

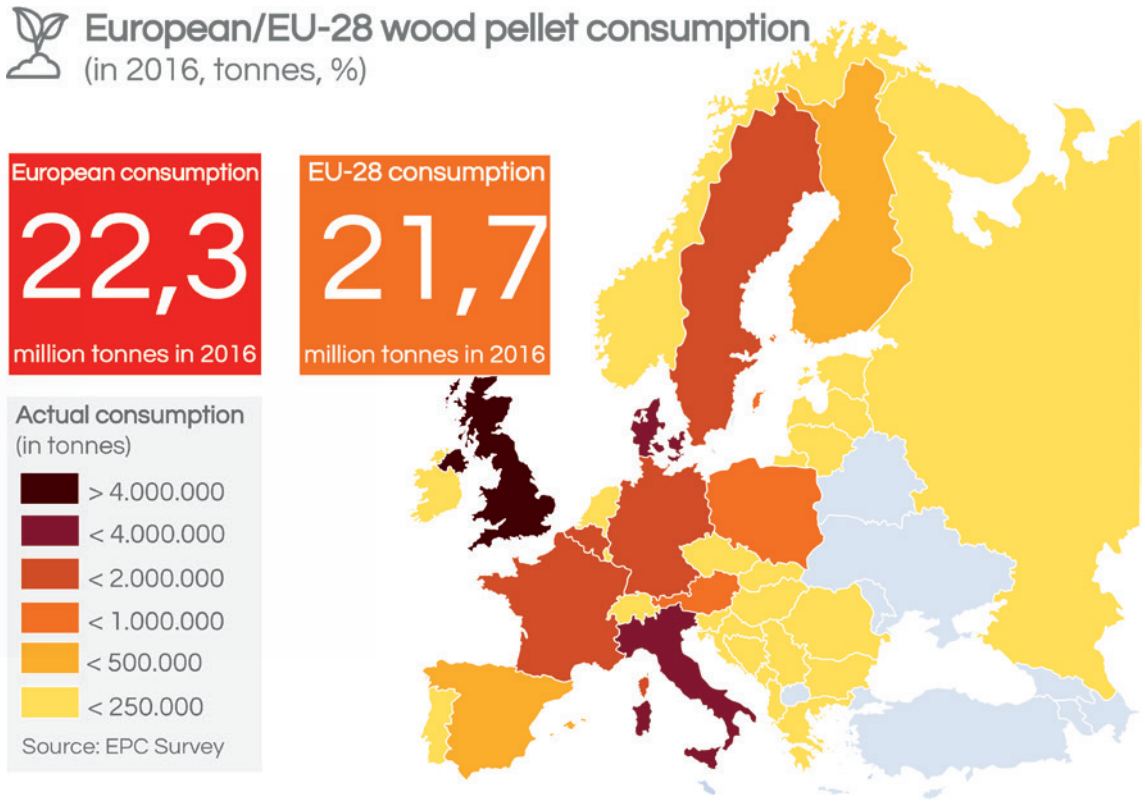
After years of sustained growth, EU-28 pellet production experienced a slight decrease of 0,4% for the first time. As the majority of the European pellet production is destined for the heating market, it has been strongly impacted by the contraction of the European demand due to the mild winter of 2015-2016 and the decrease in sales of heating appliances. The heating season 2016-2017 witnessed a more rigorous winter that rebalanced supply and demand and gave most European pellet suppliers a chance to recover from 3 consecutive difficult years.



Pellets are used in various ways in the EU-28, generating heat, electricity, or both in the case of CHP plants, thanks to mature, reliable and efficient high technology processes.

In the EU-28, 21,7 million tonnes of wood pellets were consumed in 2016. A significant portion of this, 61.7%, was used for heat production. Pellet consumption for heat can be further divided into three markets – residential heating (42,6%), commercial heating (11,8%) and heat generated from CHP (7,3%). The remaining 38,3% was used for power production, either through CHP or dedicated power plants.

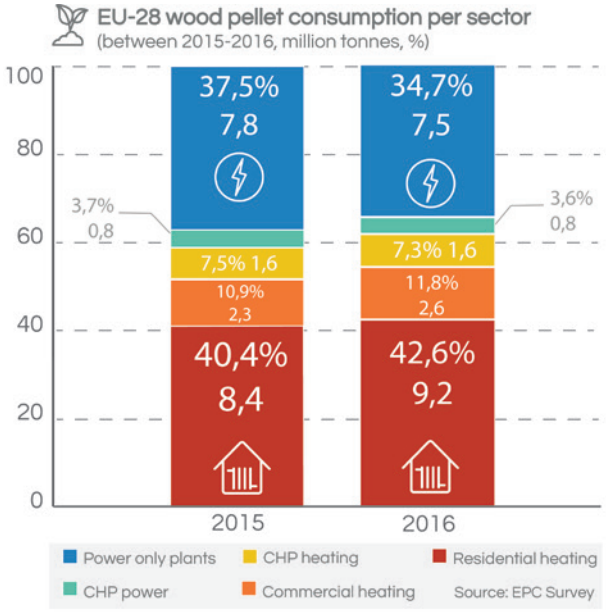
A focus on the pellet market



The market for medium scale pellet boilers has seen more consistent growth recently than the market for domestic pellet heating systems. Particularly high growth rates can be observed in eastern Europe, with especially high numbers in Poland, which can be surprising for this important coal user. It is also interesting to notice that in China pellets are used almost exclusively in mid and large scale commercial heat applications.

While growth rates seem positive, it is still a fact that pellet boilers play a marginal role in the commercial heat market. Several reasons for this can be mentioned. The awareness of the need to contribute to climate protection is on the rise but still limited and often satisfied with cheap mitigation certificates. Energy costs for most companies are small compared to overall operational costs and have declined in recent years. The perception of risk associated with the change to a different fuel is also a barrier. To overcome these barriers, ESCO, Energy Service Companies, are key but are probably not enough today to give a big push to the growth in the commercial heating sector. In Austria we have conducted several campaigns to promote the use of pellets in commercial heat applications. The success was very limited and our conclusion is that this will not change until prices for fossil fuels rise significantly as a result of CO_2 taxation.

Christian Rakos
Managing Director
ProPellets Austria



EXPERT REVIEWS

EUROPEAN PELLET COUNCIL
AN AEBIOM NETWORK

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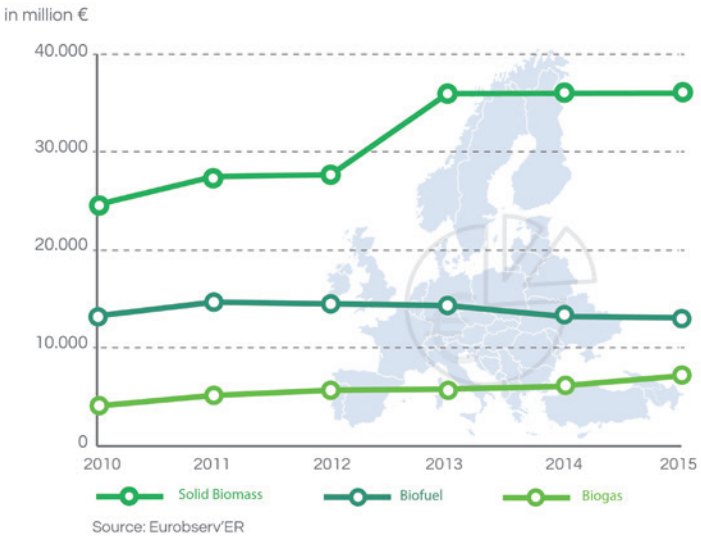
Socio-economic Indicators

The bioenergy sector's general turnover saw a slight increase in 2015, coming close to its highest level (2013) with a 56.010 million EUR turnover.
This growth was mostly driven by the results of a solid biomass market, which reached its highest record with 36.000 million EUR. Biogas and biofuel for transport faced limited decreases with 6.910 and 13.100 million EUR turnover.

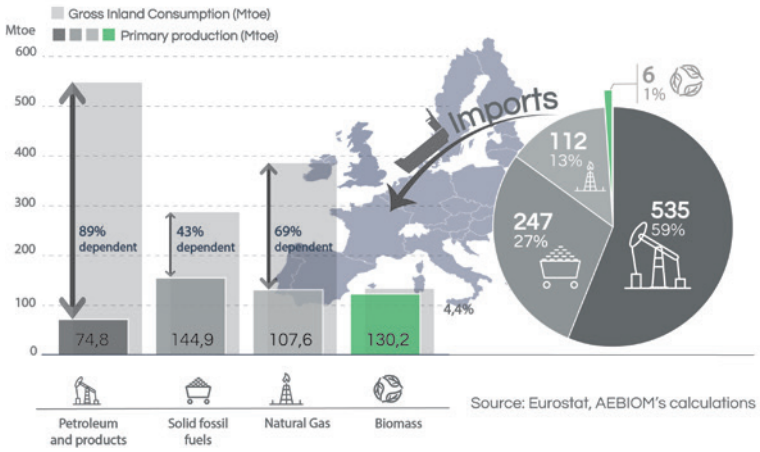
> IN 2015, BIOENERGY REPRESENTED ONLY 1% OF ALL IMPORTED FUELS.

EU-28 evolution of the turnover within the bioenergy sector
(From 2010 to 2015, million €)



Source: Eurobserv'ER

EU-28 energy dependency and imports
(in 2015, Mtoe, %)



Source: Eurostat, AEBIOM's calculations

Bioenergy businesses are mostly regional and national industries bringing wealth and jobs locally - 95% of bioenergy consumed is sourced locally.

Looking at imports, the situation remains rather stable over the past years. Bioenergy in 2015 represented only 1% of all imported fuels. EU-28 bioenergy import dependency is 4,4%, a tiny fraction compared to the fossil energies where dependency reached 89% for oil and 69% for gas.

EXPERT REVIEWS

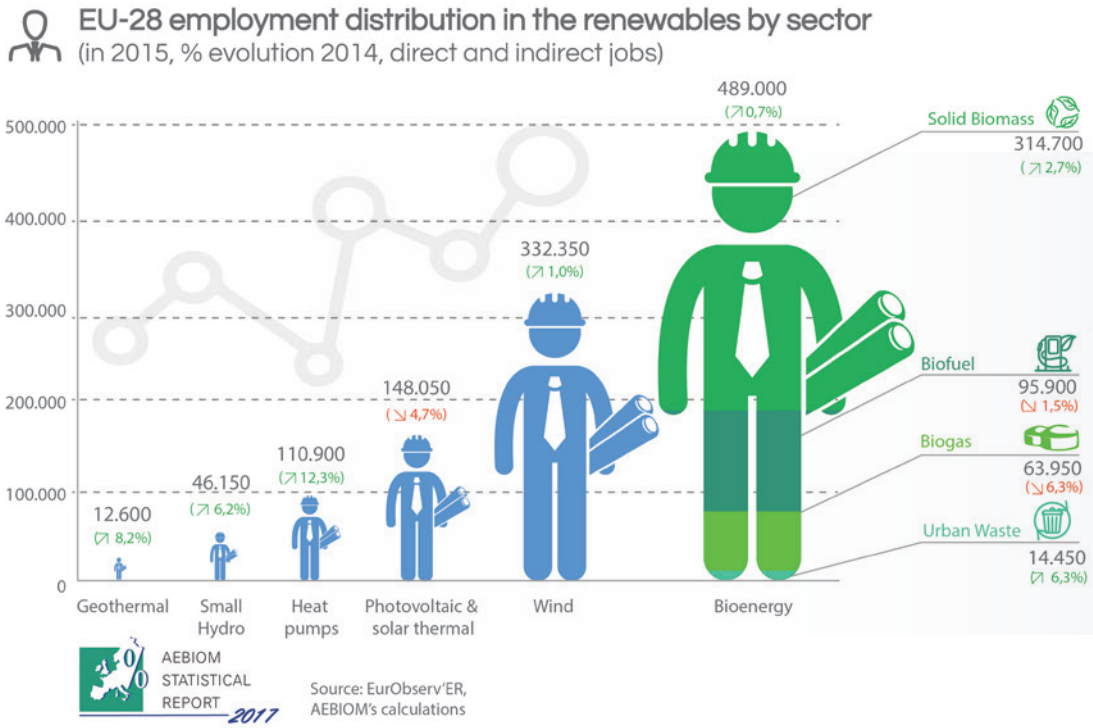
Observ'ER

As far as turnover is concerned, the bioenergy sectors (excluding waste) generated 5,46 billion euros in the same year, which means they contributed to almost 37% of the revenues created in the RES sectors. Major players are the large European countries (DE, FR, UK, IT) but also the Nordic countries (SE, FI) which have a large forestry industry. Bioenergy contributions to European employment and turnover are bound to increase in the near future thanks to the European Commission's proposal for a new directive on renewable energy (The so called "winter package").

Jobs will develop particularly in the solid biomass sector, since the biofuels sector is in a position of wait and see as far as investments in the 1st generation of biofuels are concerned. The future of employment in the biogas sector is largely political, as it depends on the will to support biomethane production to replace part of the natural gas consumption – which could go as high as 10% penetration.

Diane Lescot
Leader of the EurObserv'ER consortium
EurObserv'ER

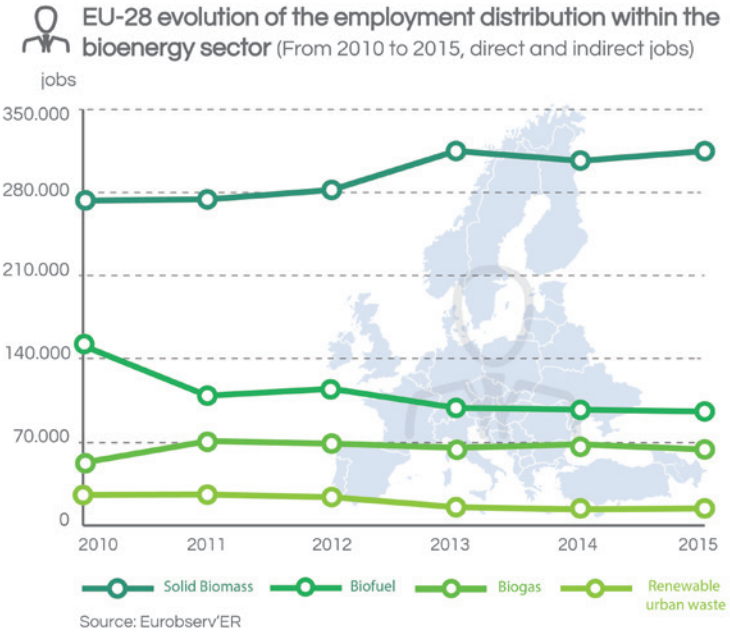
Socio-economic Indicators



In 2015, almost half a million people were having direct or indirect jobs in the bioenergy sector. The bioenergy sector, considered as a whole, creates more jobs than the solar and wind industry combined. At the same time, the solid biomass sector (314.700) almost equals the number of jobs created by the wind sector (332.350).

Comparing with 2014, job creation recorded highest growth in geothermal, hydro and the heat pumps industry, while the solar industry faced a decrease of 4,7%. Wind and bioenergy saw a low increase of 1%. Considering the situation of bioenergy in detail, the situation appears to be rather different between industrial segments. Solid biomass and urban waste kept increasing trends, respectively +2,7% and +6,3%, whereas biogas and biofuel faced a relative downturn with -6,3% and -1,5%.

Trends registered between 2014 and 2015 are reinforcerd by long term perspectives. Since 2010, the solid biomass industry has grown steadily from less than 280.000 jobs in 2010 to more than 314.700 in 2015. On the other hand, the biofuel industry, impacted by political U-turns faced a rather strong decline that stabilised in 2013. Biogas and urban waste sectors are more stable, having experienced periods of limited growth and decline.



Glossary

Biofuels	In this report 'biofuels' refer to liquid fuels produced from biomass. Liquid biofuels are mainly biodiesel and bioethanol used as transport fuels.
Bioheat	Bioheat comprises biomass for heat and derived heat.
Biomass	The biodegradable fraction of products, waste and residues from biological origin from agriculture (in cluding vegetal and animal substances), forestry and related industries including fisheries and aquacul ture, as well as the biodegradable fraction of industrial and municipal waste.
Biomass for heat	Biomass for heat refers to the biomass delivered to the final costumer and used for heat production. Sectors consuming biomass for heat production are: industrial, residential, services and other sectors (fishing, agriculture, forestry and other non-specified).
Derived heat	According to Eurostat, derived heat covers the total heat production in heating plants and in combined heat and power plants. It includes the heat used by the auxiliaries of the installation which use hot fluid and losses in the installation/network heat exchanges. For autoproducing entities (= entities generating electricity and/or heat wholly or partially for their own use as an activity which supports their primary activity) the heat used by the undertaking for its own processes is not included.
Direct jobs	Direct jobs are those directly derived from RES manufacturing, equipment and component supply, or onsite installation and O&M.
Energy dependency	Energy dependency is calculated as net imports divided by the sum of gross inland energy consumption and maritime bunkers. Hence, it describes the extent to which an economy relies on imports to meet its energy needs.
Fellings	Average annual standing volume of all trees, living or dead, measured overbark to a minimum diameter of 0 cm (d.b.h.) that are felled during the given reference period, including the volume of trees or parts of trees that are not removed from the forest, other wooded land or other felling site. Includes: silvicultural and pre-commercial thinnings and cleanings left in the forest; and natural losses that are recovered (harvested)
Final energy consumption	Final energy consumption cover energy supplied to the final consumer´s door for all energy uses. Is the sum of the final energy consumed in the transport, industrial, agricultural/forestry, fishing, services, household and other unspecified sector. It excludes deliveries to the energy transformation sector and to the energy industries themselves.
Forest available for wood supply	Forests available for wood supply are forests where no legal, economic, or environmental restrictions have a bearing on the supply of wood; it is here that large volumes of commercial wood are generally harvested.
Gross Electricity Generation	The gross electricity generation is measured at the outlet of the main transformers, i.e. the consumption of electricity in the plant auxiliaries and in transformers is included.
Gross final energy consumption	Final energy consumption + consumption of electricity and heat by the energy branch for electricity and heat generation (own use by plant) + losses of electricity and heat in transmission and distribution.
Gross inland consumption	Gross inland consumption is the quantity of energy necessary to satisfy inland consumption of the geographical entity under consideration. It is calculated using the following formula: primary production + recovered products + imports +stock changes – exports – bunkers. International Marine Bunkers are quantities of fuels delivered to ships of all flags that are engaged in international navigation. The international navigation may take place at sea, on inland lakes and waterways, and in coastal waters.
Indirect jobs	Indirect jobs are those that result from activity in sectors that supply the materials or components used, but not exclusively so, by the renewables sectors (such as jobs in copper smelting plants part of whose production may be used for manufacturing solar thermal equipment, but may also be destined for appliances in totally unconnected fields).
Industry	Final energy consumption – industry covers the consumption in all industrial sectors with the exception of the "Energy sector" . This refers to fuel quantities consumed by the industrial undertaking in support of its primary activities.
Other sectors	Final energy consumption – Other sectors covers quantities consumed by sectors not specifically mentioned or not belonging to residential, industry or transport (services, agriculture/forestry and fisheries).
Other wooded land	Land either with a tree crown cover (or equivalent stocking level) of 5-10 % of trees that will reach a height of 5 m at maturity in situ; or a crown cover (or equivalent stocking level) of more than 10 percent of trees that will not reach a height of 5 m at maturity in situ (e.g. dwarf or stunted trees) and shrub or bush cover.
Primary energy production	Primary energy refers to the indigenous production, that is any kind of extraction of energy products from natural sources to a usable form. Primary production takes place when the natural sources

Glossary

	are exploited, for example in coal mines, crude oil fields, hydro power plants or fabrication of biofuels. Transformation of energy from one form to another, such as electricity or heat generation in thermal power plants is not included in primary production.
Removals	A synonym for roundwood production. This comprises of all quantities of wood removed from forests and other wooded land or other felling sites during a given period; it is reported in cubic meters (m^3) under bark (in other words, excluding bark).
Residential	Final energy consumption – Residential covers quantities consumed by all householdsincluding "households with employed persons" (NACE Divisions 97 and 98).
Household	Means a person living alone or a group of people who live together in the same private dwelling and sharing expenditures including the joint provision of the essentials of living. The household sector, also known as the residential (or domestic) sector is therefore, a collective pool of all households in a country. Collective residences which can be permanent (e.g. prisons) or temporary (e.g. hospitals) are excluded as these are covered in consumption in the service sector. Energy used in all transport activities are reported in the transport sector and not in the household sector.
Services	Final energy consumption – Services consists of fuels consumed by business and offices in the public and private sectors. NACE Divisions 33, 36, 37, 38, 39, 45, 46, 47, 52, 53, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 80, 81, 82, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96 and 99. (http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2&StrLanguageCode=EN)
Solid biomass	Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation. It comprises: - Charcoal: Covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material. - Wood, wood wastes, other solid wastes: Covers purpose-grown energy crops (poplar, willow, etc.), a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor, etc.) as well as wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs, etc. Combustion is the preferred technology for these solid wastes. The quantity of fuel used should be reported on a net calorific value basis.
Stock of forests	The living tree component of the standing volume excluding smaller branches, twigs, foliage and roots. It is measured in cubic meters (m^3) over bark.
Stock of forests available for wood supply	The forests where no legal, economic, or environmental restrictions have a bearing on the supply of wood; it is here the large volumes of commercial wood are generally harvested
Ton of oil equivalent	Tonne(s) of oil equivalent, abbreviated as toe, is a normalized unit of energy. By convention it is equivalent to the approximate amount of energy that can be extracted from one tonne of crude oil. It is a standardized unit, assigned a net calorific value of 41 868 kilojoules/kg and may be used to compare the energy from different sources.

Definitions for Pellets statistics

CHP heat pellets consumption/use	Volume of pellets used for the heat production within a combined heat and power appliance (CHP) corresponding to 2/3 of the total volume of pellets used in the CHP.
CHP electricity pellets consumption/use	Volume of pellets used for electricity production within a combined heat and power appliance (CHP) corresponding to 1/3 of the total volume of pellets used in the CHP.
Commercial heating pellets consumption/use	Volume of pellets used in dedicated heat boilers with a capacity greater than 50 kW. This class includes dedicated heat boilers used in residential buildings, public buildings, services, industry and excludes combined heat and power appliances (CHP).
Dedicated power pellets consumption/use	Volume of pellets used for electricity production in a plant only producing without recovering the heat generated during the process. Pellet consumption for electricity production. Without a specific note this corresponds to the total volume of pellets used in dedicated power plants and 1/3 of the total volume of pellets used in combined heat and power plants (CHP)
Pellet consumption for heat production	Without a specific note this corresponds to the volume of pellets used for and 2/3 of the total volume of pellets used combined heat and power plants (CHP)
Residential heating consumption/use	Volume of pellets used in domestic's stoves and dedicated heat boilers with a pellets consumption/use capacity below 50 kW

Notes

AEBIOM STATISTICAL REPORT

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Biomasa Partner Group is a leading and preferred manufacturer supplying annually 80 000 tons of certified wooden pellet and briquette. All of the products are made from the highest quality saw dust and wood chips supplied by our biomass department. We deliver annually 150 000 tons of saw dust together with paper, saw mill and forest wooden chips. Our organization guarantees the highest quality products and services to all of our partners. Additionally our logistics and forwarding departments provide deliveries by trucks, trains, sea containers and ships all over Europe.

>>> www.biomasapartner.pl

BioCurve

BioCurve is a biomass boiler manufacturer, leading the design of condensing boilers.Its pioneering portfolio includes pellet condensing boilers from 25 kW to 150 kW, with efficiencies up to 105,7% and emissions well below the strictest limits.The quality of the most powerful boilers of its kind has been endorsed by twelve international awards and satisfied clients in six countries. BioCurve has recently received the Expobiomasa 2017 Innovation Award for the first woodchip condensing boiler without need of heat recovers, which will be available from 2018.

>>> www.biocurve-heating.com

STUV

Based in Bois-de-Villers, in the Namur province (Belgium), Stûv designs, produces and markets individual wood, gas and pellet heating solutions. Our stoves, fires, inserts and fireplaces are designed with incredible care, offering customer satisfaction in terms of energy performance, enjoyment and durability.

>>> www.stuv.com

Africa-EU Renewable Energy Cooperation Programme

The Africa-EU Renewable Energy Cooperation Programme (RECP) is a multi-donor programme that supports the development of markets for renewable energy in Africa. It was launched by more than 35 African and European Ministers and Commissioners under the Africa-EU Energy Partnership (AEEP).

>>> www.africa-eu-renewables.org

Scandbio

Scandbio is Sweden's largest company within solid processed wood fuels. We sell 100 % renewable energy in the form of pellets, briquettes, logs and powder.

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BADGER Pellets are wood fuel pellets formed from sawdust from wood sawing in our regions. The sawdust, without bark, is made into pellets in this form through the combined action of high pressure and lignin, a natural constituent of wood which gives a gloss on the surface of our pellets. BADGER Pellets, no glue or chemical additive is used. It is a 100% natural fuel! They are produced on totally integrated bio-sites in Virton (Recybois) and Thimister (Woodenergy) in Belgium and in Bissen (KIOWATT – www.kiowatt.lu) in Luxembourg. They are real centres of excellence in circular economy. In fact, at BADGER Pellets, nothing is wasted. Wood is used in all its forms with the aim of giving it maximum value at each stage.

>>> www.badgerpellets.com

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