



AEBIOM STATISTICAL REPORT

2016

European Bioenergy Outlook

KEY FINDINGS





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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 EU28 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 STATISTICAL REPORT

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

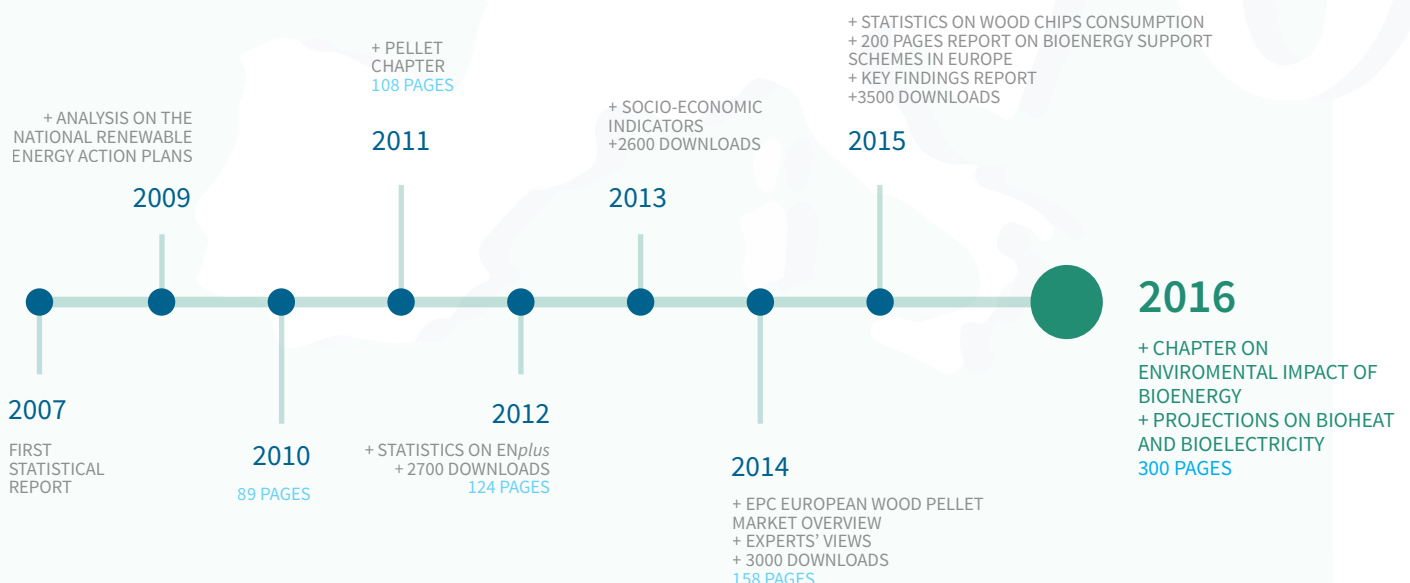
With more than 150 graphs and figures, readers of AEBIOM's Statistical Report can get accurate and up-to-date information on the EU energy system such as the final energy consumption of biomass for heat and electricity, the number of biogas plants in EU countries, the consumption and trade of pellets, 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 has further been enriched since 2015 with an exhaustive analysis of the support schemes in place for biomass for heating, electricity

and transport, covering all EU28 countries (>100 pages).

As each year provides its share of innovation, with this 2016 Edition, AEBIOM has decided to go one step further by providing professionals with its market forecasts. Based on past trends and the existing reality, AEBIOM has developed projections until 2020 for bioheat, bioelectricity and biofuels for transport. These anticipations 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.

The full report is available for sale at www.aebiom.org.



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 bio-energy market based on fair business conditions.

AEBIOM is a non-profit Brussels-based international organisation founded in 1990 which brings together around 30 national associations and 90 companies from all over Europe – thus representing more than 4000 indirect members, including mainly companies and research centers.



www.aebiom.org

Full members



Associated members



AEBIOM's

Networks

The European Pellet Council (EPC) is an umbrella organisation of AEBIOM founded in 2010, aiming at representing the interests of the wood pellet sector and at ensuring its sustainable development at European level. EPC members are made up of 18 national pellet associations and related organisations, from 17 countries and 4 observing members.

EPC's objective is to manage the transition of pellets from a niche product to a major energy commodity. To achieve this general purpose, EPC activities include an important participation to the standardisation and certification of pellet quality, communication and public affairs efforts, the development of key sectoral statistics and education and training seminars around issues of safety, quality and security of pellet supply. EPC also coordinates the ENplus quality certification and constantly adapts this system according to market needs.



**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.



**INTERNATIONAL BIOMASS
TORREFACTION COUNCIL**

AN AEBIOM NETWORK

EU energy system: an increasing fossil fuel dependency



2015 was a year of great commitment to renewables worldwide. Renewables were at the top of high-profile policy agendas throughout the year that culminated with the agreement at the 21st Conference of the Parties (COP21) in Paris. In wake of the Paris Agreement, governments have announced their support to foster the development of renewable energy and adopt energy efficiency measures.

While these initiatives show signs that a global energy transition is underway, the enthusiasm generated by the COP21 agreement should not overshadow the current situation on the European energy front. When looking at the current energy scheme, one is still faced with the grim reality that the EU remains highly dependent on imported fossil fuels to meet

its energy needs. In 2014, the average EU-28 energy dependency was 53,4%, a share that has been steadily increasing over the last two decades. Oil represented the highest import dependency (87,4%), followed by natural gas (67,2%) and solid fossil fuels such as coal (45,6%).

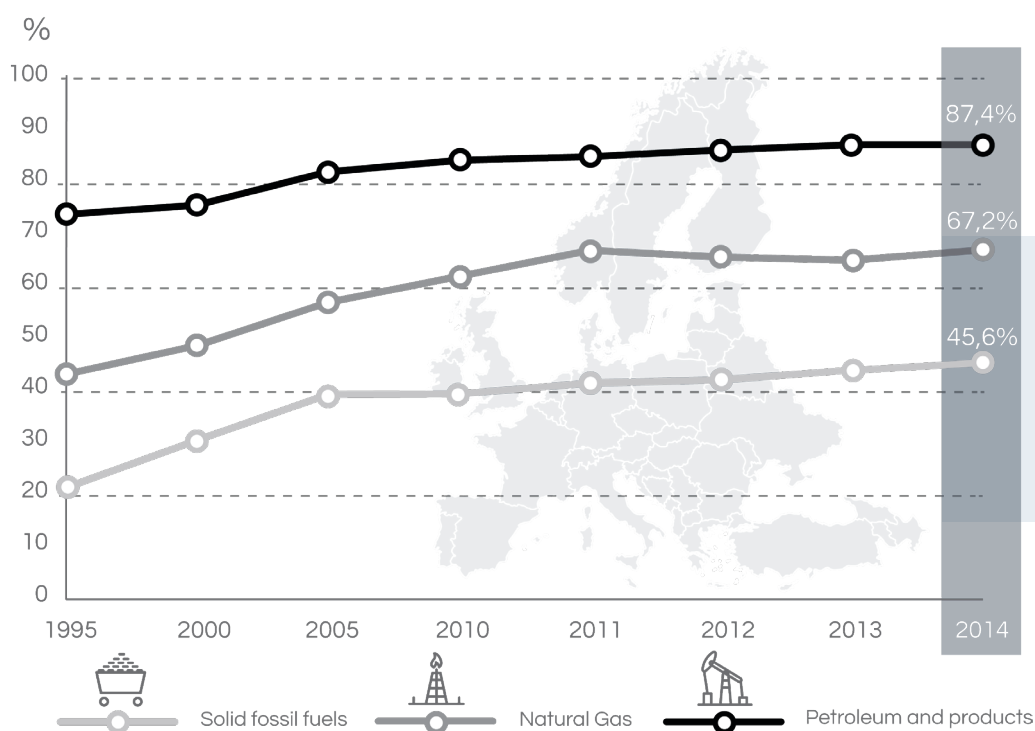


IN 2014, THE AVERAGE EU-28 ENERGY DEPENDENCY WAS 53,4%, A SHARE THAT HAS BEEN STEADILY INCREASING OVER THE LAST TWO DECADES.



EU-28 energy dependency on fossil fuels imports

(From 1995 to 2014, %)




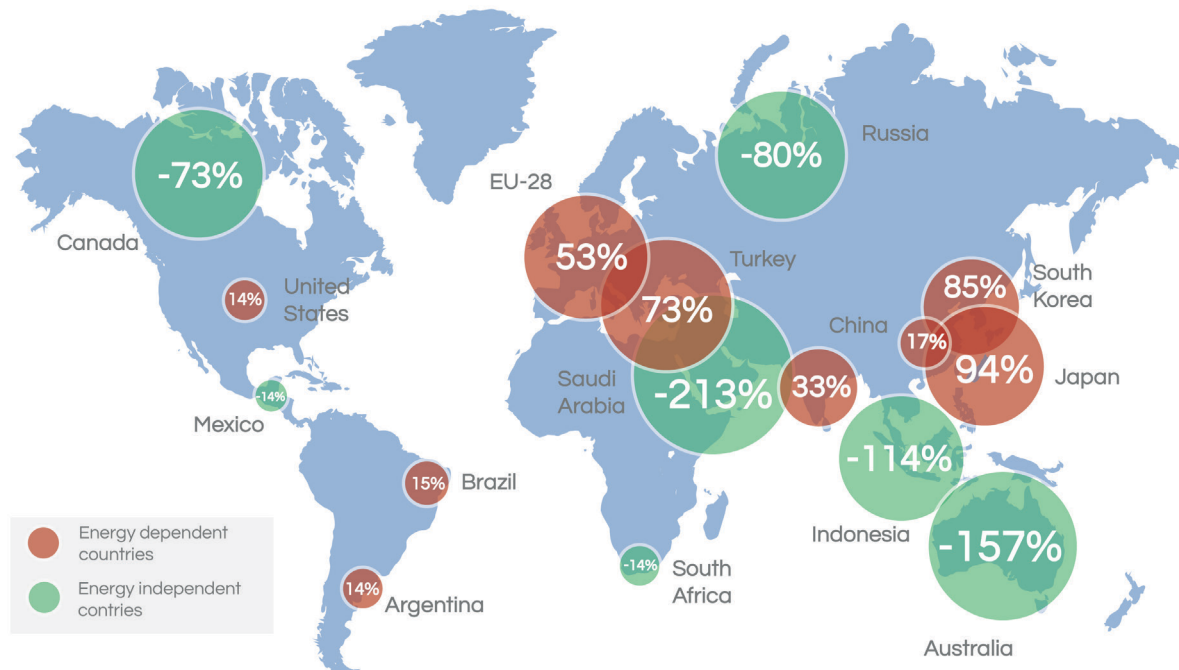
Source: Eurostat, AEBIOM's calculations

Note: All EUROSTAT data in the report has been extracted from the EUROSTAT database of June 2016

EU energy system: an increasing fossil fuel dependency



 **World map of the energy dependency**
(in 2013, %)



Source: Eurostat and the International Energy Agency

The EU-28 ranks among the regions with the highest energy dependency with countries such as Japan (94%), South Korea (85%) and Turkey (73%). China and the United States, in comparison, are far below Europe with an energy dependency under 20%.

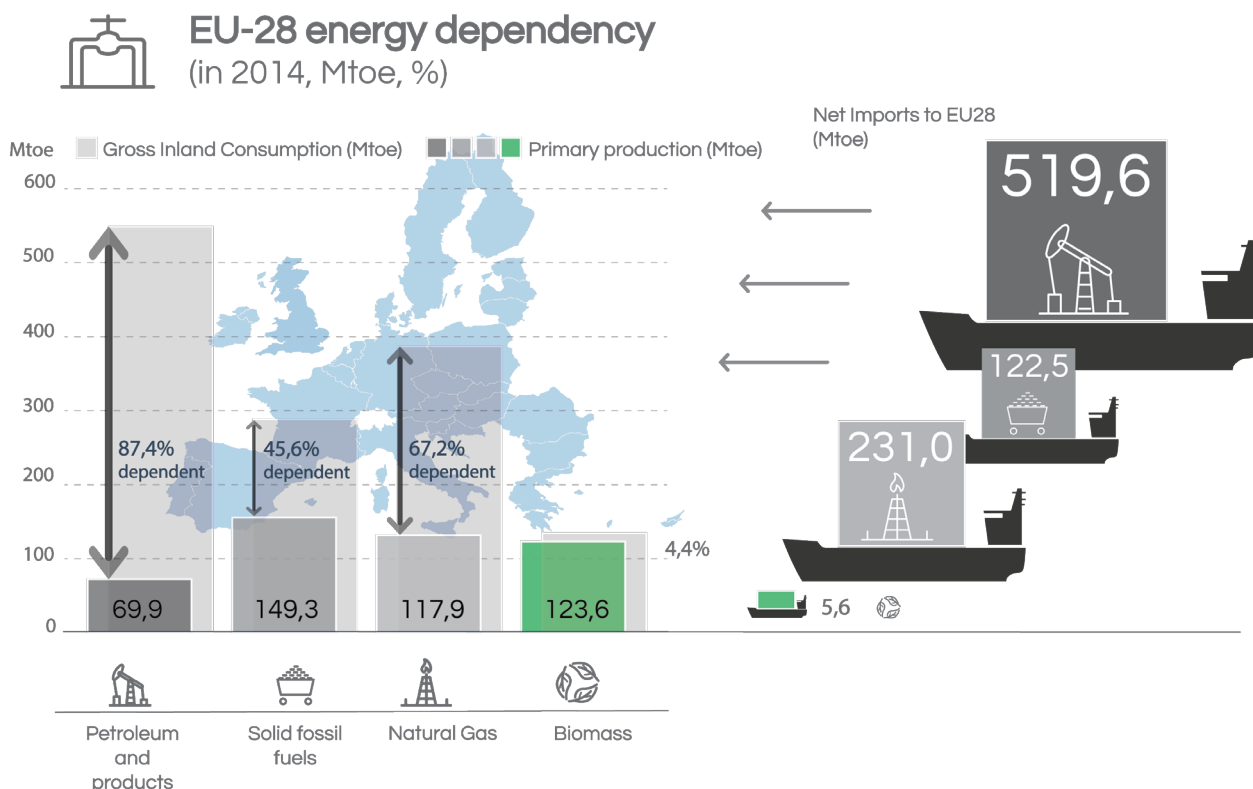
When looking at the nature of the energy dependency, it is important to note that 99,4% of the net imports of energy in Europe were fossil fuels. Such a dependency not only contributes to the weakening of the EU's geopolitical influence, but also creates Gross Domestic Product (GDP) leakage across Europe that could amount to € 1 billion per day^[1].



SUCH A DEPENDENCY NOT ONLY CONTRIBUTES TO THE WEAKENING OF THE EU'S GEOPOLITICAL INFLUENCE, BUT ALSO CREATES GROSS DOMESTIC PRODUCT (GDP) LEAKAGE ACROSS EUROPE THAT COULD AMOUNT TO € 1 BILLION PER DAY .

[1] European Commission « Questions and answers on security of energy supply in the EU » http://europa.eu/rapid/press-release_MEMO-14-379_fr.htm

EU energy system: an increasing fossil fuel dependency



Source: Eurostat, AEBIOM's calculations

To curtail this downward cycle, in May 2014, the European Commission proposed its EU Energy Security Strategy ^[2] to identify measures and solutions. However, one of the initiatives the Commission launched to improve energy security was the EU strategy for liquefied natural gas (LNG) and gas storage ^[3] (February 2016). The European Biomass Association (AEBIOM) considers this strategy the wrong way forward, as it will result in the development of new gas infrastructures, promoting gas imports and narrowing the de facto development of renewable alternatives.

While the European Commission strategy identifies renewables including bioenergy as a key asset to reducing EU energy dependency, this role should have been given greater priority. Renewables have the ability to secure the EU-28's future energy mix. In the specific case of biomass, imports represent only 4,4% of total European bioenergy consumption. The remaining 95,6% contributes directly to the development of local economies, especially in rural areas where most biomass is harvested and transformed.

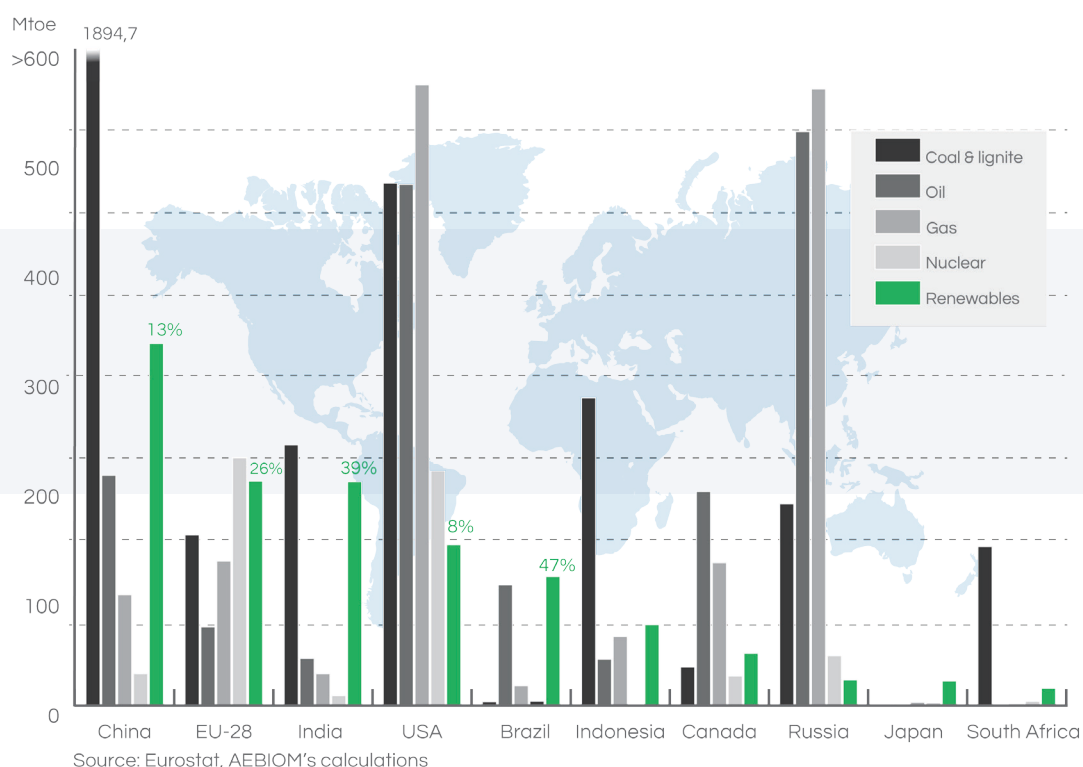
[2] European Commission « Questions and answers on security of energy supply in the EU » http://europa.eu/rapid/press-release_MEMO-14-379_fr.htm

[3] European Commission Communication "EU strategy for liquefied natural gas and gas storage" https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v10-1.pdf

EU energy system: an increasing fossil fuel dependency



TOP 10 countries' indigenous production of renewables compared with EU-28
(in 2014, in Mtoe, %)



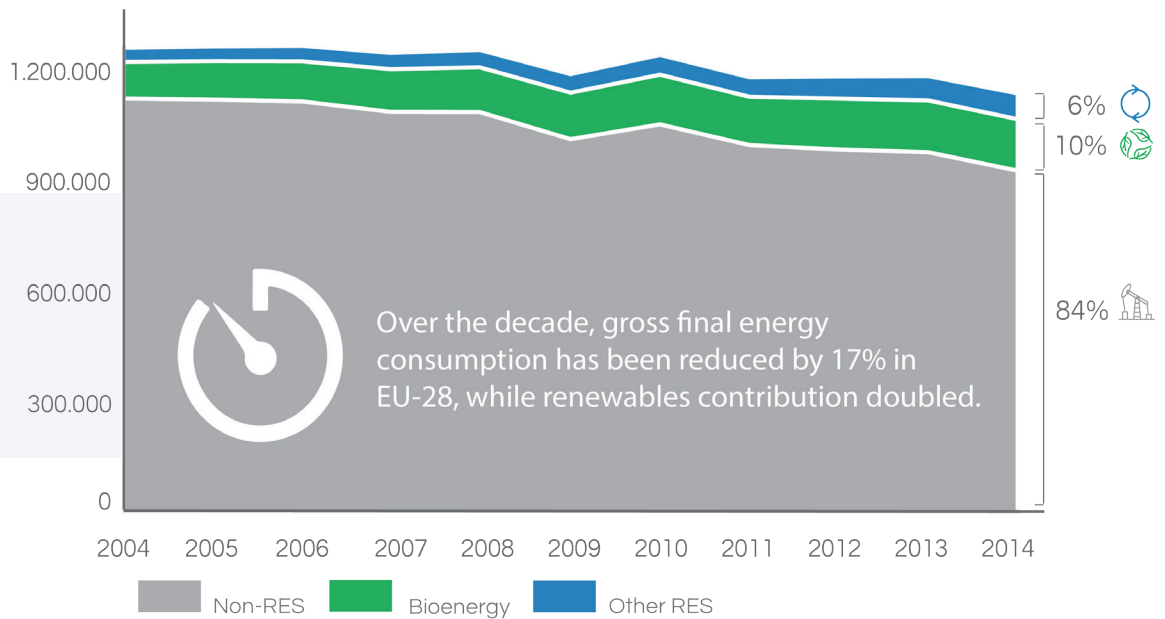
In 2014, renewable energies accounted for almost 16% of total EU energy consumption; however, this upward trend should not be taken for granted. In 2007, Europe was a front-runner in the renewable energy transition with its ambitious target to use 20% renewables by 2020 - a less ambitious increase of 9,5% in 13 years. In comparison, the current discussion to use 27% renewables by 2030, an increase of 7% over a decade, seems less ambitious. This objective does not necessarily mean a high increase in volume due to expecting decrease in energy consumption. This shows that renewables and energy efficiency go hand in hand. This political uncertainty, along with low oil prices, is having great impacts on investment in renewable energy. According to Christine Lins, Executive Secretary of REN21, Europe “lost its

edge” in the renewable energy race, as illustrated by the fact that Europe’s investment in renewables fell by 21% last year, while in the US it grew by 19% and in China by 17%. When European Commission President Juncker took office in 2014, he announced one key priority was to make the EU the world leader in renewable energies. So far, regarding production or consumption of renewables, the EU-28 remains behind countries like Brazil, India, Indonesia and Japan. To become number one, the EU needs strong, clear and ambitious objectives and policy measures that support renewable energy development. AEBIOM, along with other sectoral associations, expressed their views on how this could be reached through the new RES directive.

In the limelight: bioenergy's role in renewables



EU-28 gross final energy consumption over a decade
(From 2004 to 2014, ktoe, %)



Source: Eurostat, AEBIOM's calculations

The renewable share of energy use for electricity and heat has nearly doubled in just a decade. This reflects not just the accelerating inroads of wind and solar power, driven by a virtuous cycle of expanding production and declining unit costs, but also a robust expansion of bioenergy, driven by the ready availability of highly efficient, highly economical, long-proven technologies for using biomass in combined heat and power plants, urban district heating plants, and modern home furnaces. [Biomass accounts for nearly a fifth of renewable electricity production and nine-tenths of renewable heat.]

Meanwhile, the renewable share of energy use for transport has expanded nearly six-fold. This is due not just to the expansion of electric vehicles, which are fueled in part by renewable electricity, but also to the expanded use of biodiesel and bioethanol. Liquid biofuels play an especially vital role in aviation and heavy freight transport, which require a higher energy density than electric batteries provide. [Advanced liquid biofuel technologies, which can make use of lignocellulosic feedstocks from rapidly growing trees and grasses, should become an important part of the energy picture as they mature.]

Jeffrey Skeer
Senior Programme Officer - Technology Cooperation
IRENA – International Renewable Energy Agency

EXPERT REVIEWS





**Africa-EU Renewable Energy
Cooperation Programme (RECP)**

CONNECTING AFRICAN AND EUROPEAN DEVELOPERS AND INVESTORS



Finance Catalyst

The Finance Catalyst links projects to finance opportunities targeting small- and medium-scale renewable energy projects in Africa.



Funding Database

RECP has developed a database on funding instruments financing private sector projects on renewable energy in Africa.



Events

Our matchmaking and information events provide insights into African RE markets and link European and African entrepreneurs and financiers.



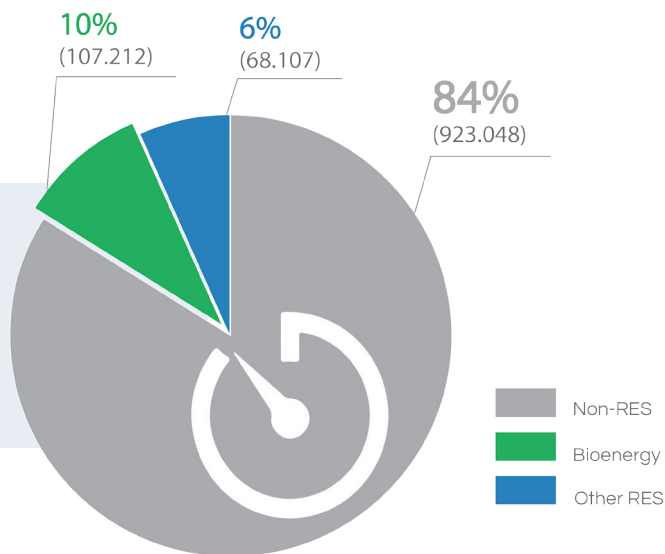
Market Information

RECP offers a variety of products to give your business an overview on the energy markets of selected African countries.

Bioenergy's role in renewables



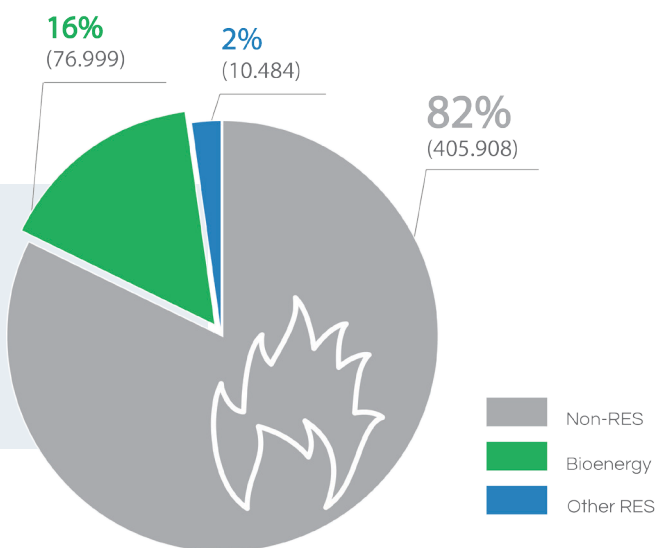
EU-28 share of energy from renewable sources in the gross final energy consumption
(in 2014, ktoe, %)



Source: Eurostat, AEBIOM's calculations

Bioenergy's contribution to the EU's 2020 objectives is crucial. By 2020, bioenergy is expected to contribute to half of the EU's 20% RES target. In 2014, bioenergy (107.212 ktoe) accounted for 61% of all renewable energy consumed, which is 10% of the gross final consumption of energy in Europe. Bioenergy is in fact the only renewable energy source able to provide green fuel for the three energy applications: heating and cooling, power generation and transport applications. Analysing each of these sectors individually provides a better understanding of the contribution bioenergy has to future European energy mix developments.

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



Source: Eurostat, AEBIOM's calculations

Renewables are often associated with power generation and transport. However, the heating and cooling sector remains underestimated, showing great room for improvement. Heating and cooling represents around 50% of total EU energy consumption, of which 82% is powered by fossil fuels. Renewables are becoming a key priority for EU policy, in buildings specifically. Bioenergy is currently the leading renewable in heating and cooling (88%) representing 16% of European gross final consumption of energy.

AEBIOM has commented on the EU Strategy on Heating & Cooling,^[4] published by the Commission in February 2016 and hopes that this will pave the way to increasing renewable heating and cooling through concrete measures in upcoming legislations such as the future EU Renewable Energy Sources (RES) and Energy Efficiency (EE) Directives.

^[4] AEBIOM "EU Heating and Cooling Strategy: Industry and local authorities join voices to request structural reforms in revised climate and energy legislation" <http://www.aebiom.org/160216-eu-heating-and-cooling-strategy-industry-and-local-authorities-join-voices-to-request-structural-reforms-in-revised-climate-and-energy-legislation/>

Bioenergy's role in renewables



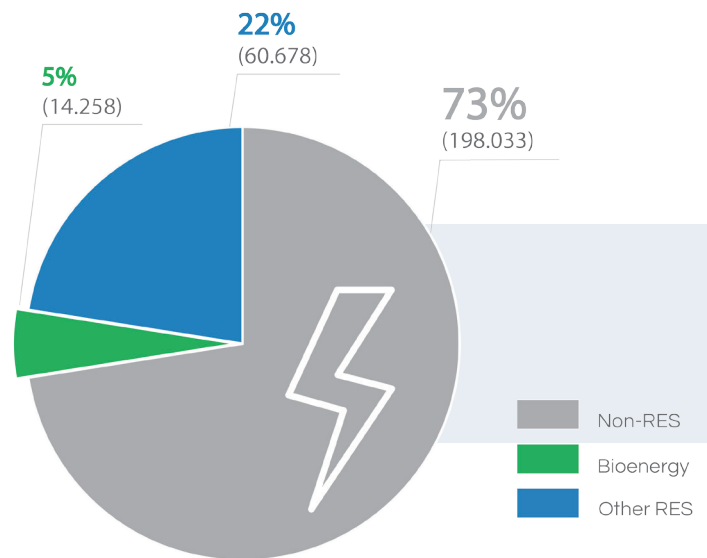
Traditionally, the electricity market has been more closely addressed by European regulations, allowing renewable energies to make up 27% of the market share. Wind, hydro and photovoltaics are leading the transition in the sector. With regards to power generation, bioenergy represents 5% of the overall EU generation (14.258 ktoe).




IN 2014, BIOENERGY ACCOUNTED FOR 61% (107.212 KTOE) OF ALL RENEWABLE ENERGY CONSUMED, WHICH IS 10% OF THE GROSS FINAL CONSUMPTION OF ENERGY IN EUROPE.

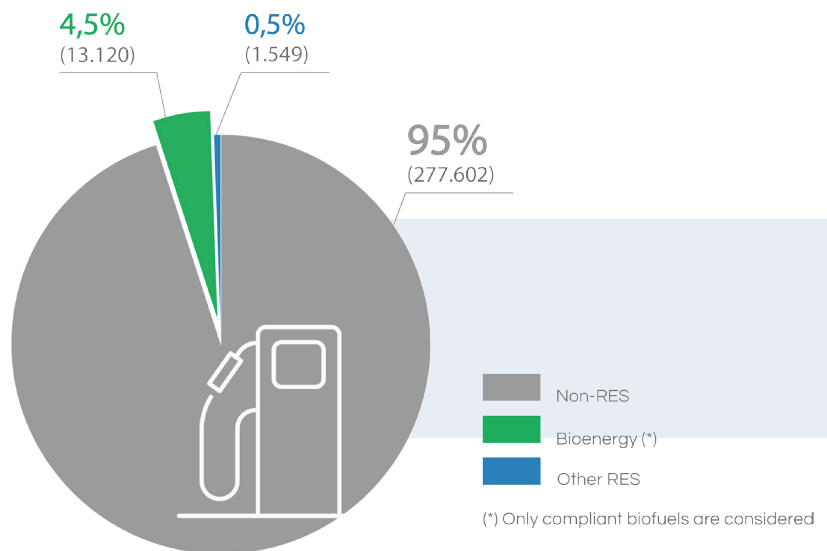
The transport sector has always been the most challenging for renewables in terms of market penetration. Renewables represent 5% of EU total energy consumption (14.669 ktoe) in transport, 90% of which is provided by biofuels. It is rather challenging to foresee how biofuels (in particular first generation biofuels) will continue to develop, as recent EU legislation like the Indirect Land Use Change (ILUC) Directive, from September 2015, has established a quota for these biofuels.

 **EU-28 share of energy from renewable sources in the total electricity generation**
(in 2014, ktoe, %)



Source: Eurostat, AEBIOM's calculations

 **EU-28 share of energy from renewable sources in the final energy consumption in transport**
(in 2014, ktoe, %)



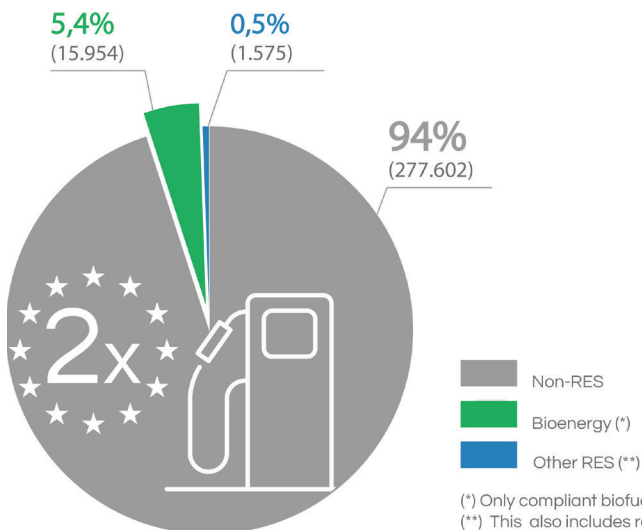
Source: Eurostat, AEBIOM's calculations

(*) Only compliant biofuels are considered

Bioenergy's role in renewables



EU-28 share of energy from renewable sources in transport - EU multiple counting system (in 2014, ktoe, %)



Source: Eurostat, AEBIOM's calculations

- Non-RES
- Bioenergy (*)
- Other RES (**)

(*) Only compliant biofuels are considered

(**) This also includes renewable electricity used in transport. Part of this renewable electricity can be produced with biomass. A multiplier of 2,5 is applied to renewable electricity in road transport.

EU statistics on renewables in transport can be misleading regarding the actual production. As multiple counting rules are applied according to the RES Directive, figures are artificially increasing the renewables' share in this sector by 0,9 percentage points (from 5% to 5,9%). The ILUC Directive has further developed this logic, by applying even greater multiplication factor methodology in favor of the use of waste, by-products and electricity, giving a distorted vision of the actual market situation. This virtual energy is not reflecting the real amount of fossil fuel replaced by RES in transport.

The use of renewable energy has many potential benefits, including a reduction in greenhouse gas emissions, the diversification of energy supplies and a reduced dependency on fossil fuel markets (in particular, oil and gas). The growth of renewable energy sources may also have the potential to stimulate employment in the EU, through the creation of jobs in new 'green' technologies. The primary production of renewable energy within the EU-28 in 2014 was almost 196 million tonnes of oil equivalent (toe) — a 25.4 % share of total primary energy production from all sources. The quantity of renewable energy produced within the EU-28 increased overall by 73.1 % between 2004 and 2014, equivalent to an average increase of 5.6 % per year. Among renewable energies, the most important source in the EU-28 was the group of solid, liquid and gaseous biofuels and renewable waste (regrouped in the table under the category biomass), accounting for just under two thirds (63.1 %) of primary renewables production in 2014. Hydropower was the second most important contributor to the renewable energy mix (16.5 % of the total), followed by wind energy (11.1 %). Although their levels of production remained relatively low, there was a particularly rapid expansion in the output of wind and solar energy, the latter accounting for a 6.1 % share of the EU-28's renewable energy produced in 2014, while geothermal energy accounted for 3.2 % of the total. The share of renewable energy in energy consumption in the EU increased continuously between 2004 and 2014, from 8.5 % to 16.0 %, approaching the Europe 2020 target of 20 % by 2020. All Member States increased their renewable energy share between 2004 and 2014, twelve have at least doubled their share.

**EXPERT
REVIEWS**

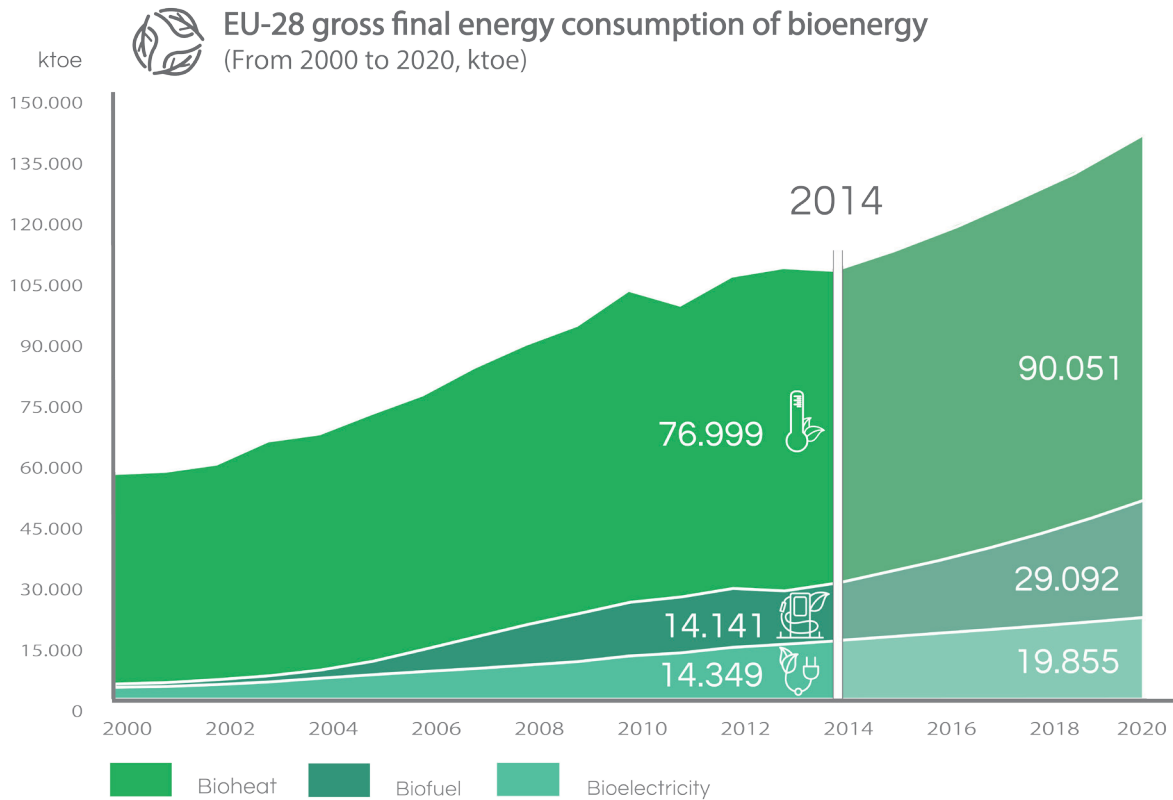
eurostat

Fernando Diaz Alonso

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EUROSTAT (Statistical office of the European Union)



Disclaimer: This contribution does not constitute in any way an implicit approval of any other parts of the report. Responsibility for the information and views set out in this report lies entirely with the authors.



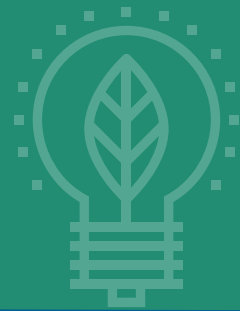
Source: Eurostat, National Renewable Energy Action Plans (NREAPs), AEBIOM's calculations

In 2014, bioenergy consumption reached 105.489 ktoe which is more than double the consumption in 2000. This increase is equivalent to the annual coal consumption in the industry, residential and services sectors together. According to Member States' projections, by 2020, almost 140.000 ktoe are expected to be consumed yearly, which would imply a growth of 32% when compared to 2014. Going into the detail of each market segment, aggregated Member States' projections are expecting an increase of 16,9% for heat by 2020. For electricity, the expected growth reaches 38% by 2020. Finally, transport is expected to grow by 105% by 2020. These projections were provided by Member States in 2010 and were indicative. According to AEBIOM, while the projections for heat and electricity can be reached, this is likely not the case for transport.

From these projections, it is clear that bioenergy will keep playing a major role in reaching EU climate change objectives (80-95% GHG emissions reductions by 2050) and will help the EU-28 to fulfill its COP21 commitments.



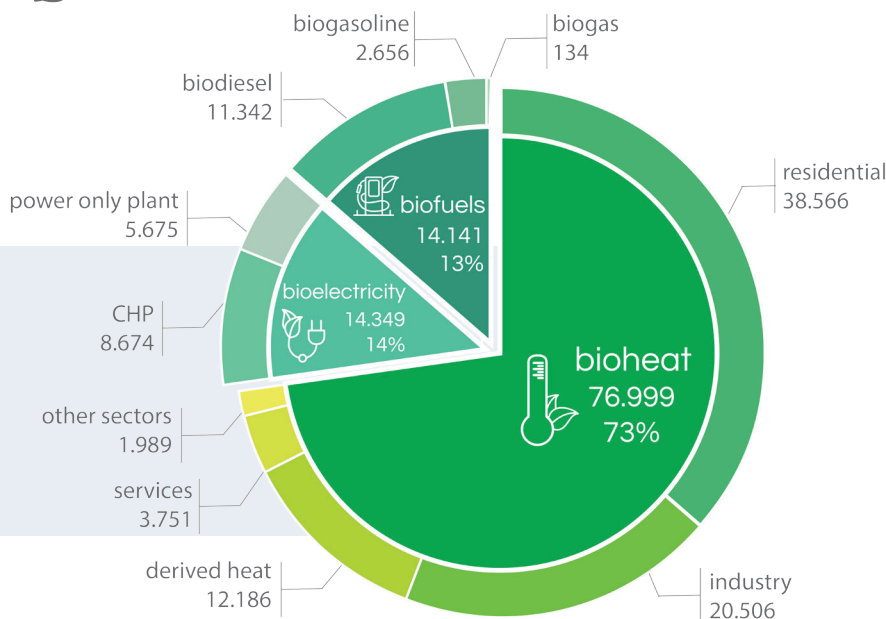
ACCORDING TO MEMBER STATES' PROJECTIONS, BY 2020, ALMOST 140.000 KTOE ARE EXPECTED TO BE CONSUMED YEARLY, WHICH WOULD IMPLY A GROWTH OF 32% WHEN COMPARED TO 2014;



Bioenergy insight



EU-28 gross final energy consumption of bioenergy per market segment
(in 2014, ktoe, %)



In 2014, 73% of bioenergy consumed in Europe was used in the heating sector (76,998 ktoe). Bioelectricity accounts for 14% (14,349 ktoe) while biofuels' share represents the remaining 13% of total European bioenergy consumption (14,141 ktoe).

Source: Eurostat, AEBIOM's calculations

EXPERT REVIEWS

Bioenergy is the largest renewable energy source in the EU-28. The high contribution of bioenergy in the national energy mix is led by countries like Sweden (60%) and Finland (90%) with a large resource base and sustainable forest management as well as Lithuania (80%) that focus on energy security and reducing fossil fuel dependency.

Biomass is moving towards a more globally traded commodity with the increasing trade of pellets and biofuels. Among EU countries, the UK and Italy are large importers of solid biomass – especially pellets.

The significance of biomass is prominent as countries with a high share of renewable energy have a high share of biomass in their energy mix. 23 out of the 28 EU countries have more than 50% of bioenergy in their renewable energy share.

Countries are well positioned to meet bioenergy targets for heating and electricity to a certain extent, but lag far behind in the transport sector. The inconsistency in EU policy, for e.g., the cap of 7% on conventional biofuels and low oil prices is affecting investments in the transport sector.

EU-28 countries are well inline to achieve the overall target in the National Renewable Energy Action Plans (NREAP). Also, with the newly signed Paris climate agreement, the EU needs improved renewable targets. China, USA and Brazil have already ratified the Paris agreement and EU has to do a lot more to be considered a climate leader. One of the ways to a faster transition of the energy system is to develop a fossil exit strategy as technology, experience, capital, potential and positive examples are so prevalent in Europe in comparison to other continents.

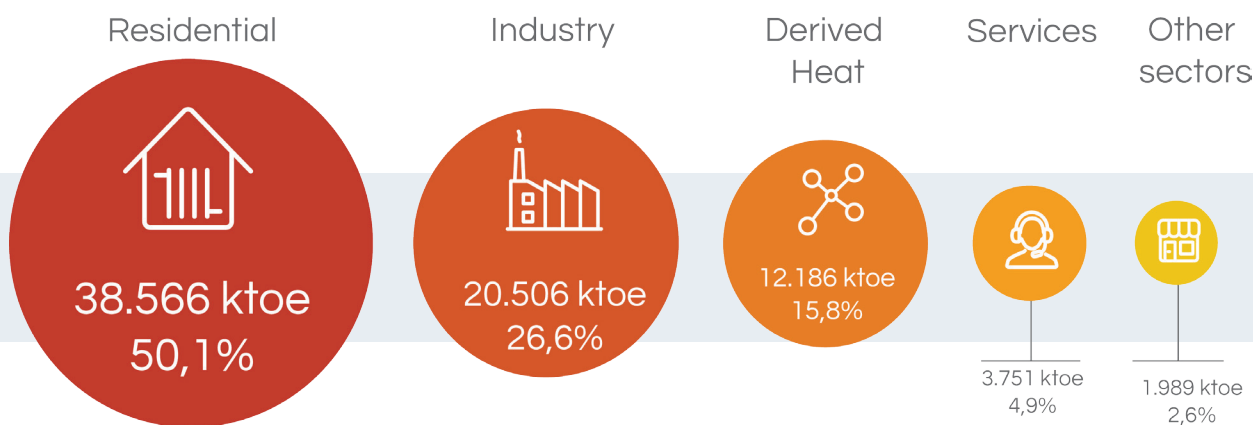
Finally, biomass technologies are under constant improvement and with the right type of policies, cost effective and efficient technologies can be made available for heat and electricity production and in the transport sector.



Remigijus Lapinskas
President
World Bioenergy Association



EU-28 final energy consumption of bioheat (in 2014, ktoe, %)



Total energy consumption of biomass for heating in EU-28 : 76.998 ktoe

Source: Eurostat, AEBIOM's calculations

In the bioheat sector, residential consumption remains a strong driver with half of total consumption (50,1%). The residential sector consists of individual heating appliances such as stoves and boilers using wood logs, woodchips or pellets. This sector may decrease in volume of biomass consumption in the near future due to energy efficiency measures. For instance, the Ecodesign legislation will impact consumption as new domestic heating appliances put on the market will have to comply with a minimum energy efficiency threshold.

Industry (26,6%) and derived heat (15,8%) represent together about 40% of biomass consumption in the heating sector. These sectors, together with medium-scale installations in services such as schools, hospitals and hotels still have a great potential for development.



INDUSTRY (26,6%) AND DERIVED HEAT (15,8%) REPRESENT TOGETHER ABOUT 40% OF BIOMASS CONSUMPTION IN THE HEATING SECTOR. THESE SECTORS, TOGETHER WITH MEDIUM-SCALE INSTALLATIONS IN SERVICES SUCH AS SCHOOLS, HOSPITALS AND HOTELS STILL HAVE A GREAT POTENTIAL FOR DEVELOPMENT.



28 heat markets, 28 stories

Bioheat development is very different in different markets. In some countries, we see a quick development of pellet heating, both residential and for small industries, hotels, etc. Italy is a good example. Other countries build new large-scale CHP plants for biomass, and district heating is moving from fossil fuels to biomass. Lithuania is one of these countries. Even big cities embrace biomass for district heating, like Paris and Copenhagen. Many countries have discovered biogenic waste as a good renewable energy source. Recycled wood and other waste products are used for energy when landfills close down. In industry we see use of biomass not only in the forest industry, which is the traditional large-scale use, but also in the food industry, laundries, asphalt production, cement plants and others.

There is a new interest in renewable heating and cooling from EU level. But the effort sharing targets for the sectors outside ETS for 2030 are sadly low, and the incentives are too weak. Carbon pricing, a carbon tax on fossil heating fuels, would do wonders on all markets.

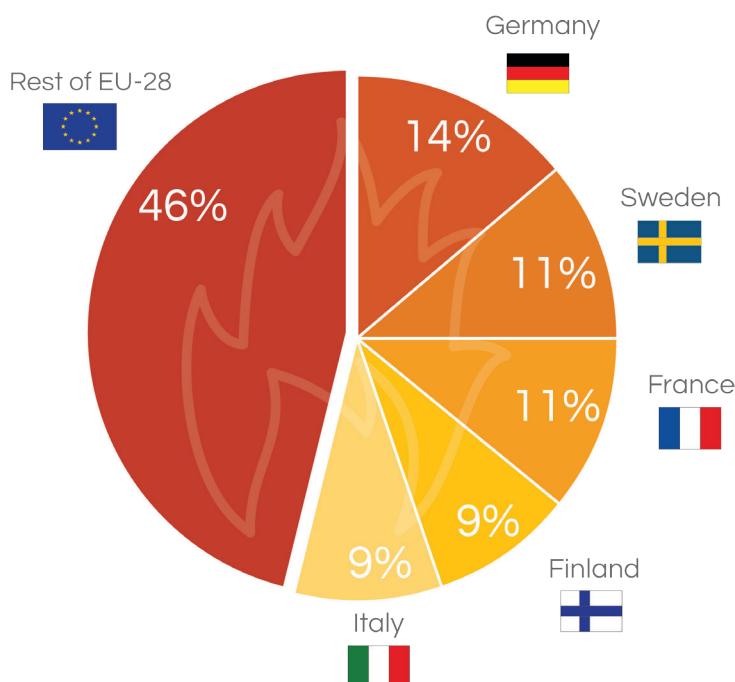
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SVEBIO



Kjell Andersson
Policy Advisor
SVEBIO

 **TOP 5 EU-28 countries in bioheat consumption**
(in 2014, %)



Source: Eurostat, AEBIOM's calculations

As far as industry is concerned, many companies have already switched from fossil fuels to biomass, but more can be done in the coming years. Derived heat, carried through district heating networks to individuals and business, is also an important component of EU bioheat consumption and is essential, especially in Nordic and Baltic countries. This segment has a high potential for being further developed. On this matter, strong political will and support of initial investment are critical to foster these developments.

While looking at the distribution of bioheat consumption, 5 countries accounted for more than 50% of all use in the EU-28. Germany is the biggest producer of bioheat in Europe with 11,1 Mtoe, representing a share of 14%. Sweden followed by France produce with 8,8 Mtoe and 7,0 Mtoe respectively. Nevertheless, the first one suffered from the biggest increase compared with previous years, its bioheat consumption decreasing 1,4 Mtoe from 2013 to 2014.

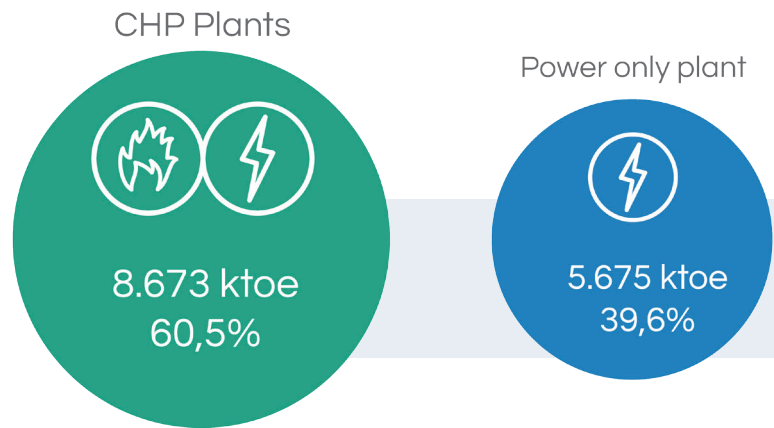
Bioenergy insight



Most renewable power is generated by wind, hydropower and photovoltaic sources. Bioenergy represents 18% of the EU renewable electricity production. As intermittency remains an issue in the near future, biomass will play a growing role as a back-up, dispatchable energy source. It is very important to note that, contrary to what the current EU discussions on biopower suggest, the majority of biomass electricity (60,4%) comes from combined heat and power plants (CHP).

In comparison, for traditional power generation, the situation is exactly the opposite: in the overall EU energy mix in power, CHP plants represent only 11,7% whereas power only plants amount to 88,3%. This shows that bioenergy is actually an effective means to further develop CHP in Europe.

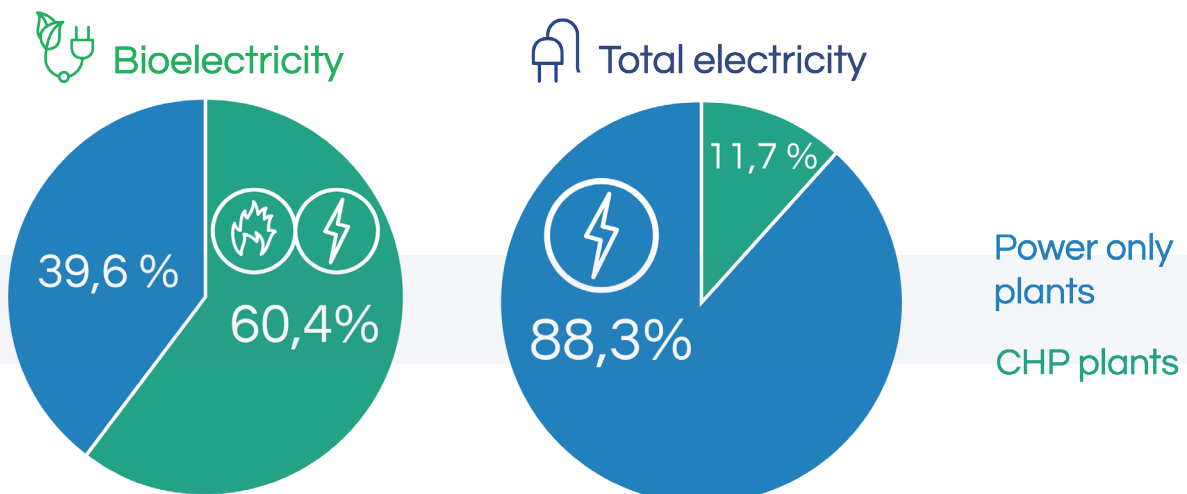
 **EU-28 Bioelectricity generation in EU-28 by type of plant**
(in 2014, ktoe, %)



Total energy consumption of biomass for electricity in EU28 : 14.349 ktoe

Source: Eurostat, AEBIOM's calculations

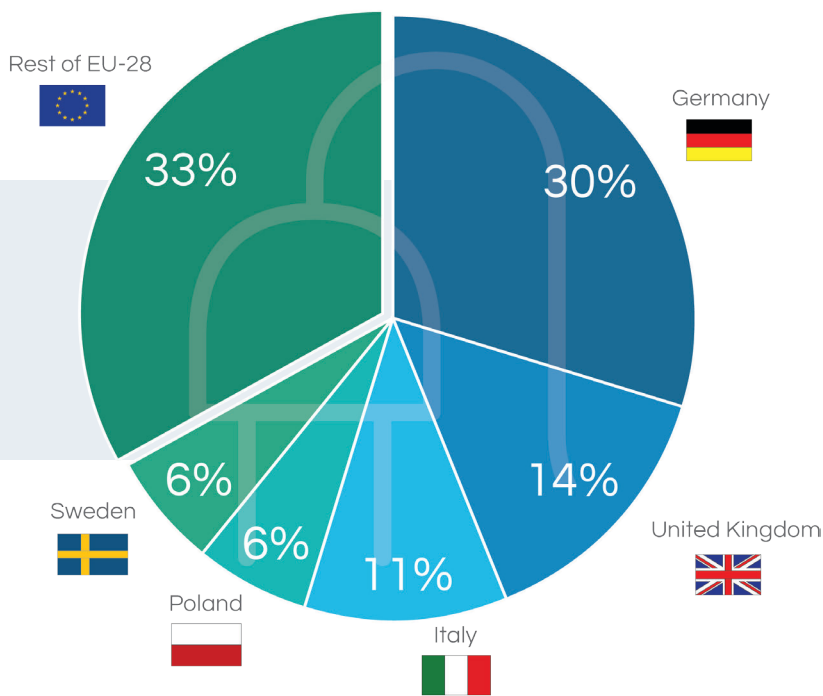
 **Share of CHP and power only plant in the electricity generation in EU-28**
(in 2014, ktoe, %)



Source: Eurostat, AEBIOM's calculations



TOP 5 EU-28 countries in bioelectricity generation
(in 2014, %)



Source: Eurostat, AEBIOM's calculations

As for bioheat, the EU-28's top 5 countries generating bioelectricity represent more than half of the total (66,8%). Germany is also by far the biggest producer of bioelectricity with 4,2 Mtoe (30%), followed by the United Kingdom with 1,9 Mtoe (14%) and Italy with 1,6 Mtoe (11%).



CONTRARY TO WHAT THE CURRENT EU DISCUSSIONS ON BIOWATER SUGGEST, THE MAJORITY OF BIOMASS ELECTRICITY (60,4%) COMES FROM COMBINED HEAT AND POWER PLANTS (CHP).

- Renewable electricity grew from 13,5% to 24,9% between 2004 and 2014, at the expenses of electricity generated from natural gas, coal, oil and nuclear.
- After hydro and wind, biomass is the third most important source of renewable electricity.
- More than 88% of the total gross electricity produced in the EU28 was generated in dedicated power only plants. However, in the case of bioelectricity, this share is much lower as 60.4% of biopower is generated in CHP plants.
- Half of the EU28 Member states produced more than 80% of the bioelectricity in CHP plants and countries like Denmark, Sweden, Latvia or Lithuania have no dedicated power only plants fueled with biomass.

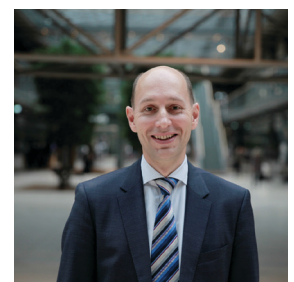
These figures show that biomass is the preferred fuel for CHP production. The use of biomass in combined heat and power increases the overall efficiency and lower emissions and fuel consumption when producing green power. This provides an opportunity to further improve the environmental performance of CHP.

Anders Christian Nordstrøm

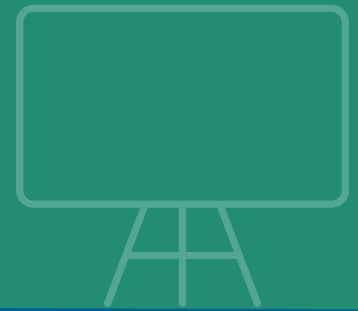
Vice President Bioenergy & Thermal Power division
DONG Energy

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**DONG
energy**



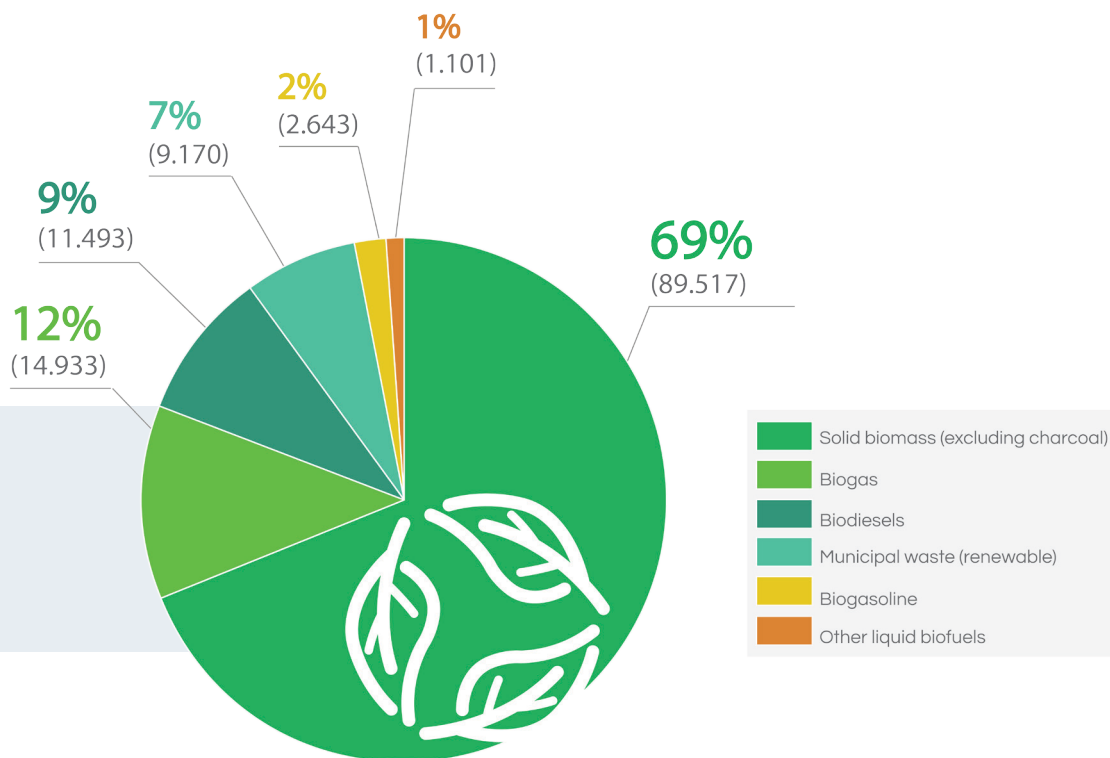
Biomass landscape



Bioenergy covers – more than any other renewable energy – a wide range of raw materials and conversion technologies. In general, more than two thirds of biomass consumed in Europe consists of solid biomass (69%). Biogas and biofuels represent

12% and 13% of gross inland energy consumption of biomass and biowaste. Finally, renewable municipal waste used for energy purposes reached 7% in 2014.

 **EU-28 gross inland energy consumption of biomass and biowaste**
(in 2014, ktoe, %)



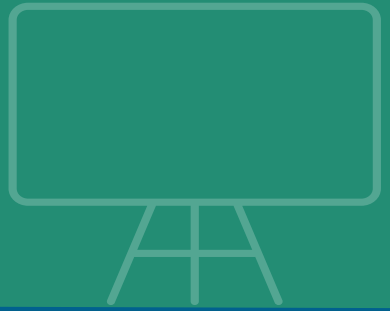
Source: Eurostat, AEBIOM's calculations

Solid biomass is therefore the market driver for bioenergy, essentially comprising woody biomass. However, wood fuel is quite heterogeneous as it includes logs, chips and pellets. This diversity makes it difficult to properly assess the breakdown of each type of biomass products consumed in Europe.

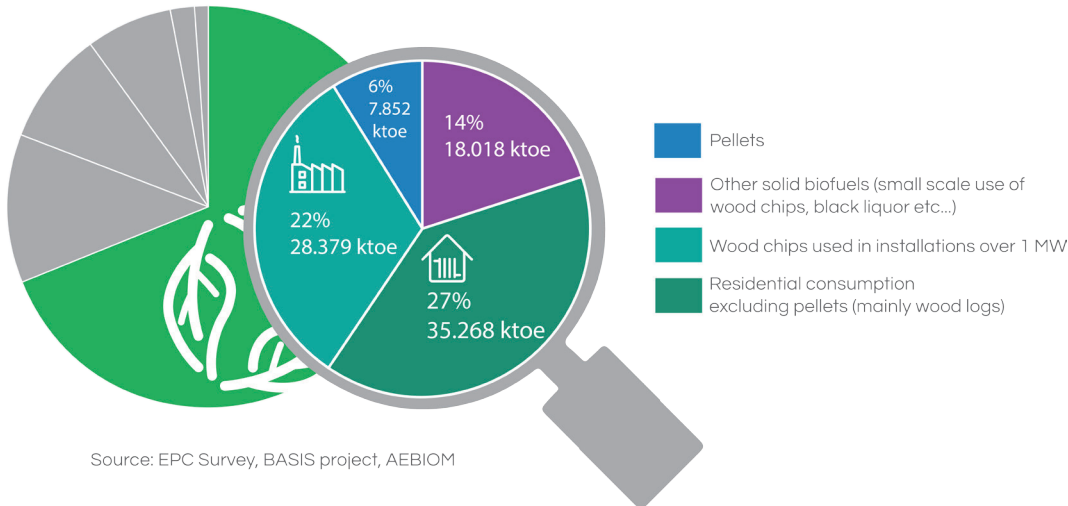


IN GENERAL, MORE THAN TWO THIRDS OF BIOMASS CONSUMED IN EUROPE CONSISTS OF SOLID BIOMASS (69%).

Biomass landscape



A zoom on EU-28 gross inland energy consumption of solid biomass (in 2014, ktoe, %)



Source: EPC Survey, BASIS project, AEBIOM

In 2015, thanks to different research projects, AEBIOM was able to offer a comprehensive insight on how woody biomass is consumed at EU level. The residential sector is still the main share of wood energy consumption (27%) which is mostly driven by the use of traditional appliances using wood logs. In this context, AEBIOM has welcomed the eco-design legislation under which new

equipment sold on the market has to comply with minimum efficiency requirements. This is closely followed by the industrial use of wood chips – in installations above 1 Megawatt (22%) - and small scale use of wood chips (14%). Pellet consumption, despite its important growth over the decade represents 6% of total EU wood energy consumption.



BREXIT

5 stats to understand the place of the UK in the European bioenergy picture

For John Bingham, one of the leading UK analysts on bioenergy markets, “the Brexit vote will have potentially profound implications for biomass markets on many different levels: financial, economic, political and legal. Some of these impacts are known, some are unknowable. Some will be negative in the short term, but others could prove positive in the longer term. [1]” On the European Union side, it is actually important to understand the exact role played by the United Kingdom within the bioenergy field until 2016:

1. In terms of total bioenergy consumption, the UK represents

5% of total bioenergy consumption in the EU-28.

2. However, looking at the biopower sector, this share is slightly more important with the UK representing today 13% of this market.
3. When looking more specifically at the pellet sector, the UK accounts for 29% of total pellet consumption and 69% of EU pellet imports.
4. According to the UK-based Renewable Energy Association, in 2014, the bioenergy sector represented more than 35.000 jobs[2], which is almost one third of the general employment from renewables in the country.

[1] <http://www.hawkinswright.com/news-and-events/blog/post/hawkins-wright-blog/2016/07/04/brexit--implications-for-biomass>

[2] <http://www.r-e-a.net/news/uk-renewable-energy-jobs-grow-over-7-times-faster-than-national-average-employment-growth>



- Vyborg Forestry Development Corporation is the biggest pellet producer in Russia, with a production of about 900.000t of pellets per year.



- The mill is located close to the Finnish border, not far from Saint-Petersburg.



- Due to modern design and big production capacity we can produce different quality of pellets, simultaneously: from the industrial up to premium pellets for small users.



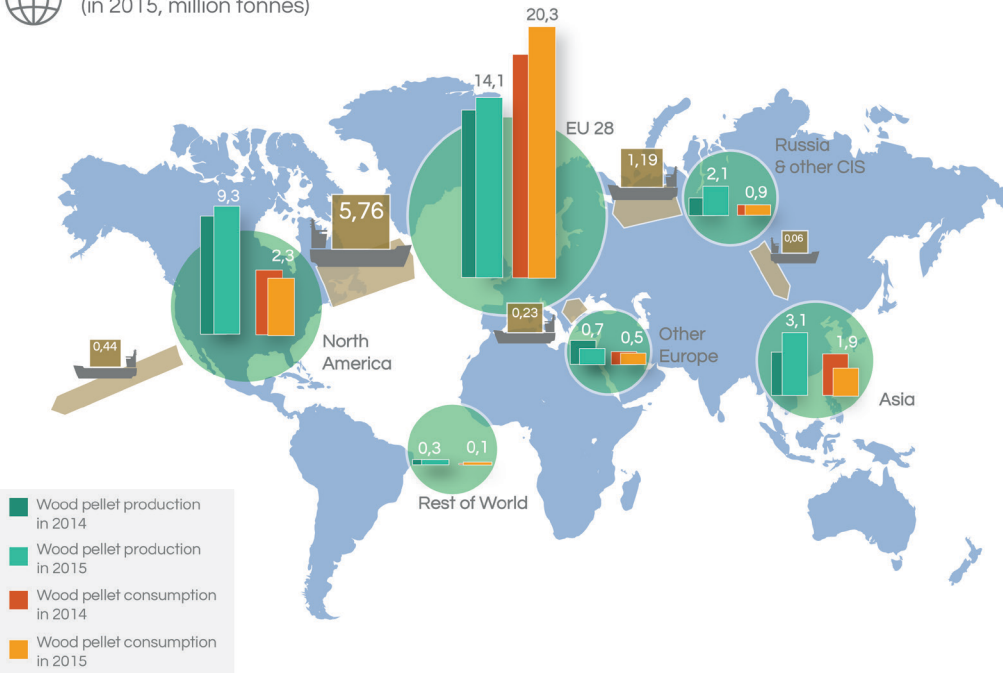
www.vfdc.ru/en



A focus on the pellet market



World pellet map and trade flows
(in 2015, million tonnes)



Source: EPC Survey, Eurostat, Hawkins Wright, FAO

In 2015, wood pellet consumption in the EU-28 reached 20,3 million tonnes which represented 6 % of total solid biomass used in Europe. In contrast with other parts of the world where pellet consumption has stagnated or decreased, pellet consumption increased in the EU-28. The EU produced 14,1 million tonnes of pellets covering 70% of its demand. Therefore, the majority of wood pellet demand in the EU-28 is covered by its own domestic production. The rest of the pellets used by the EU are sourced mainly from North America. Other areas such as Russia and the CIS countries complete the pellet supply to the EU.

I believe the pellet sector will have to address 4 key issues:

The first issue is technical, requiring to further pursue improvement of efficiency and quality in pellet production, of logistics and of heating appliance efficiency and technologies. This will not only create fewer emissions, but allow for extended ranges, giving consumers the convenience of smaller appliances.

Secondly, from a market standpoint, we must reinforce our actions in our current markets but also target underestimated markets such as the medium scale to extend pellet market's share.

Thirdly, we have to realise the necessity of investing in efficient, fresh communication strategies that not only influence public perception, but gain visibility to current and possible pellet users in order to grow the sales in the pellet sector.

Lastly, from a political point, the past several months have seen large incentives from national governments showing their limits while in the meantime, uncertainty in ongoing debates at EU level on bioenergy future raised new questions. Advocating pellets benefits towards national and EU policy makers is key while working on the development of public support which could provide stable and long term vision is essential.

Eriv Vial
President
European Pellet Council

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A focus on the pellet market



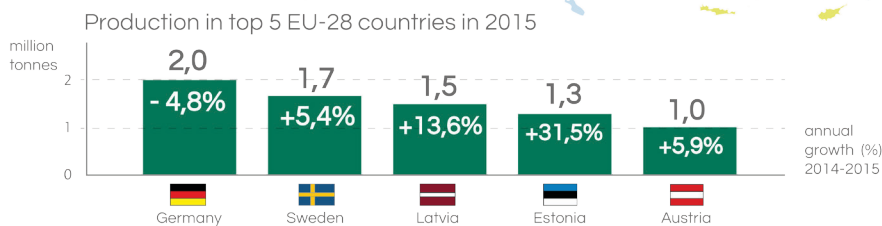
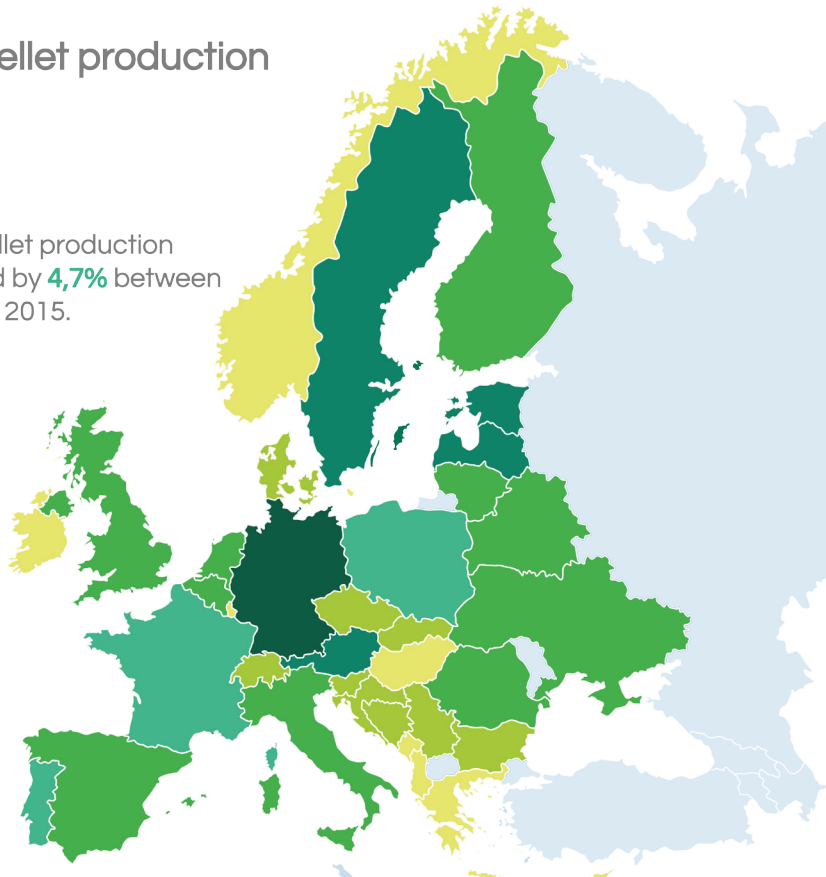
European wood pellet production (in 2015, tonnes, %)

EU-28 production
14,1
million tonnes in 2015

EU-28 pellet production increased by **4,7%** between 2014 and 2015.



Source: EPC Survey



The wood pellet production in the EU-28 is following an upward trend, growing by 4,7% between 2014 and 2015. Wood pellet production areas are spread throughout the Member States. Therefore, the wood pellet sector contributes to rural, regional economies, thanks to the jobs and value it creates all over the EU-28. Additionally, it contributes to the mobilisation and development of local resources thus decreasing the energy dependency of EU-28. Germany is the biggest producer of wood pellets producing 2 million tonnes followed by Sweden, Latvia, Estonia and Austria.

In the EU-28, 20,2 million tonnes of wood pellets were consumed in 2015. The majority of the consumption was for heat production which represented 63,9%. Pellet consumption for heat can be further divided into three markets – residential heating (42,2%), commercial heating (15,7%) and heat generated from CHP (6 %). The remaining 36,1 % of wood pellets were used for power production. It should be noted that the technologies for producing energy out of pellets for heat, electricity or both are mature, offering efficient and reliable processes.

A focus on the pellet market

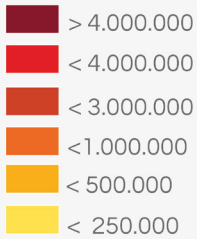


European wood pellet consumption (in 2015, tonnes, %)

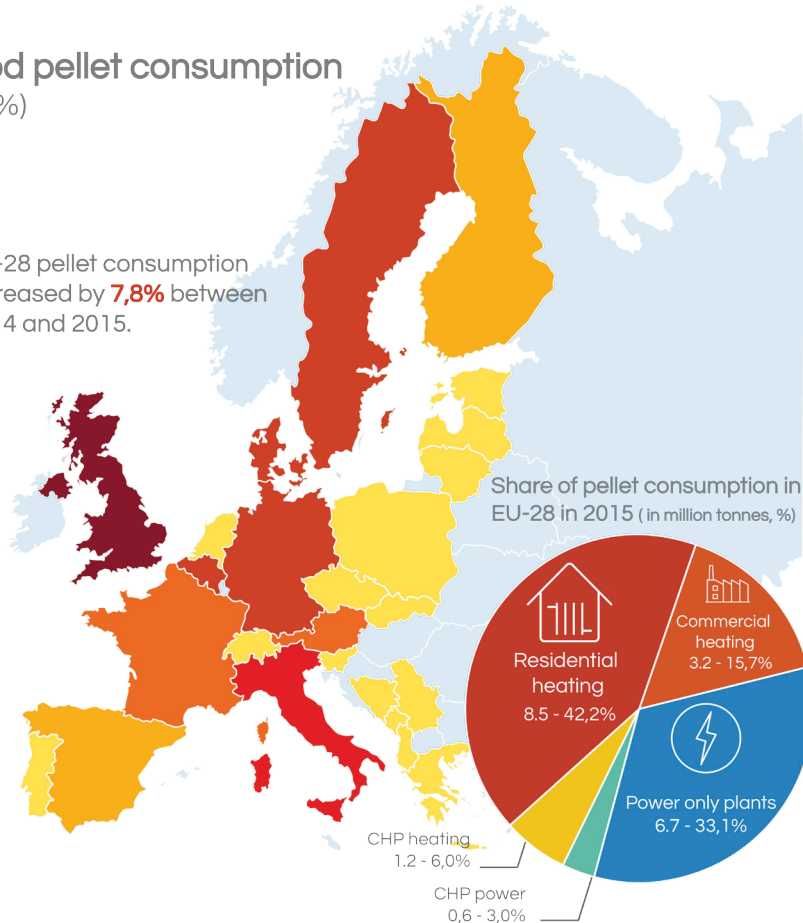
EU-28 consumption
20,3
million tonnes in 2015

EU-28 pellet consumption increased by **7,8%** between 2014 and 2015.

Actual consumption (in tonnes)



Source: EPC Survey



Compressed sawdust creates the humble wood pellet, something so simple it never seems to quite fire the imagination of the general public or be appreciated by urban planners and architects. But this simple product can become a great source of heat and electricity. Wood pellets can be gasified to efficiently produce both heat and electricity. Alternatively wood pellets can simply be ignited to produce either heat or electricity or both at the same time in CHPs (combined heat and power). Wood pellets are an environmentally friendly replacement for coal, oil or gas as well as being an efficient energy source.

Nowhere is this more easily done than in the medium scale heating sector. Scandinavian countries are leading the way with district heating systems of various sizes. However most countries on mainland Europe do not have district heating. But buildings of all shapes and sizes, no matter where they are, can be energy efficient whilst utilising wood pellets for heat. Medium scale heating appliances according to the classification are appliances of over 50 kW in output. Such appliances in most instances are locally made to burn local wood pellets. A simple way to create employment and it's pleasing to see that there is an upward trend in this market sector even when winters are milder. All public buildings such as hospitals and schools need heat and all types of commercial buildings require heat and power in order to function properly. And there is no better way to do this than by using the humble wood pellet.

With more awareness of the potential to use wood pellets for medium scale heating by urban planners and architects the medium scale heating sector will really take off!

Arnold Dale
Vice President Bioenergy
Ekman

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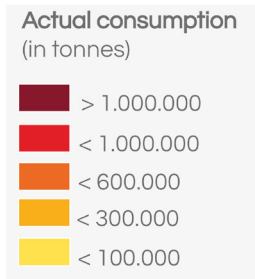
A focus on the pellet market



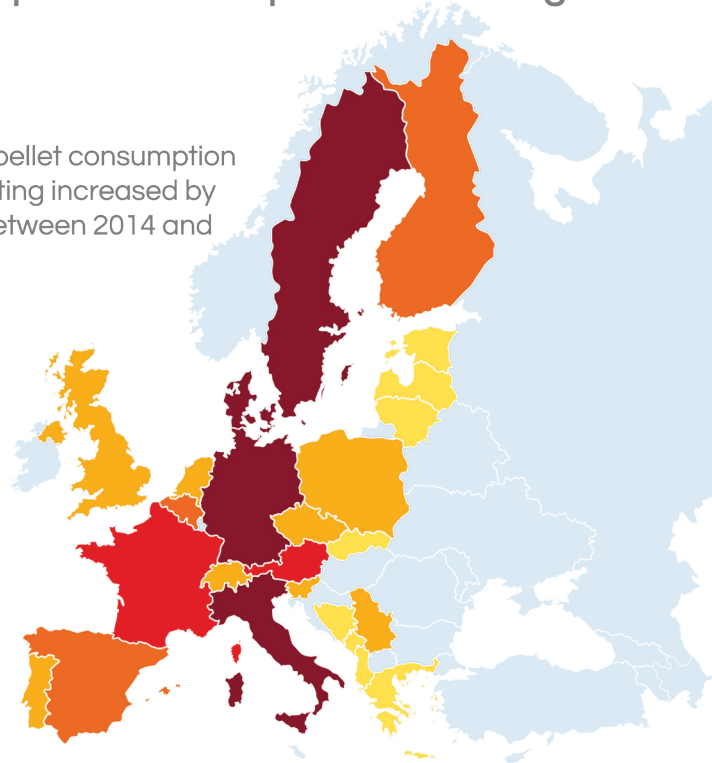
European wood pellet consumption for heating (in 2015, tonnes, %)

EU-28 consumption
12,9
million tonnes in 2015

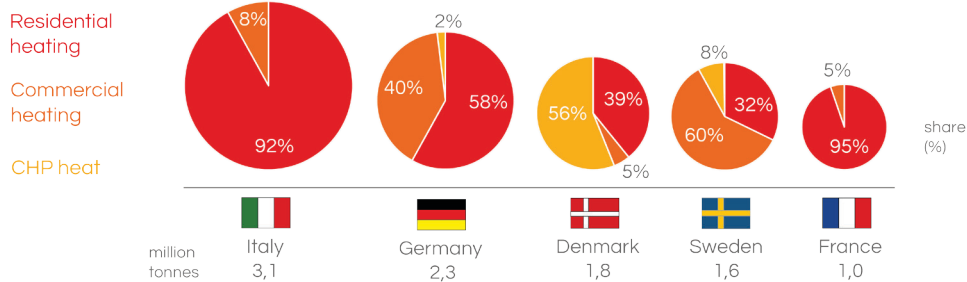
EU-28 pellet consumption for heating increased by **4,2%** between 2014 and 2015.



Source: EPC Survey



Consumption in top 5 EU-28 countries in 2015



Between 2014 and 2015, pellet consumption for heating increased by 4,2 %, despite mild winters and low oil prices. Wood pellet use for energy has penetrated all heat markets across the EU-28 Member States. Italy was the biggest consumer of pellets using 3,1 million tonnes in 2015 for heat production.

Among the top 5 pellet consuming Member States, the proportion of wood pellet use varies. In Italy, Germany and France, the majority of wood pellet use goes to the residential heating market, representing

92%, 58% and 95% respectively. In Denmark, 56% of wood pellets are used in CHP plants for heating production and in Sweden, 60% of pellets go to heating installations for commercial purposes. Among all the heating market segments, commercial heating is often seen as the one offering the highest potential. Unfortunately, there is a clear lack of awareness about the possibility to use pellets in these sectors such as industry or services (hotels, swimming pools or public buildings).



An **Innovative** European project promoting **Sustainable** Regional Supply Chains for Woody **Bioenergy**

Aim?

To develop Biomass Logistics and Trade Centres (BLTCs) in Serbia, Bulgaria and Croatia as regional hubs increasing local supply and demand for woody bioenergy.



Objective?

Market uptake of domestic value chains for quality controlled woody bioenergy products from sustainable sources.

Who?

The BioRES project consortium consists of 9 partner organisations from 8 European countries.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 645994.

A focus on the pellet market



Wood pellet consumption for power is rising in the EU-28. It increased by 14,9% between 2014 and 2015. In contrast with the heat market, the power market of wood pellets is rather concentrated in a couple of Member States.

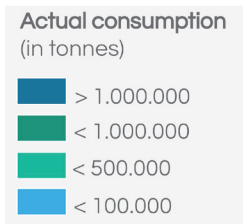
The United Kingdom is the biggest consumer of wood pellets for power production. Its consumption for power production increased by 21,4 % between 2014 and 2015. Belgium is the second biggest consumer for power production, representing 1,1 million tonnes. Between 2014 and 2015, wood pellet

consumption for power rocketed in Belgium. Unlike the United Kingdom and Belgium, for the other big consumers, wood pellet consumption for power was rather sluggish. In Denmark, pellet use for power stagnated in 2015, while in Sweden it decreased by 25,7 % and Germany observed a slight increase. The technologies used for electricity production differ from country to country: the United Kingdom, Belgium and Netherlands are converting dedicated power plants while the Nordic States are converting CHP plants.

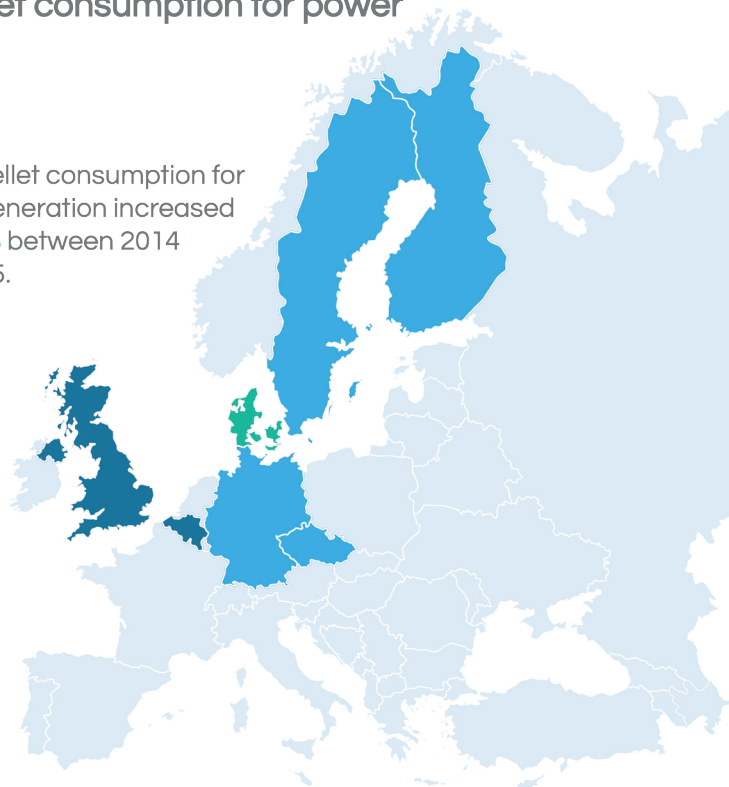
European wood pellet consumption for power (in 2015, tonnes,%)

EU-28 consumption
7,32
million tonnes in 2015

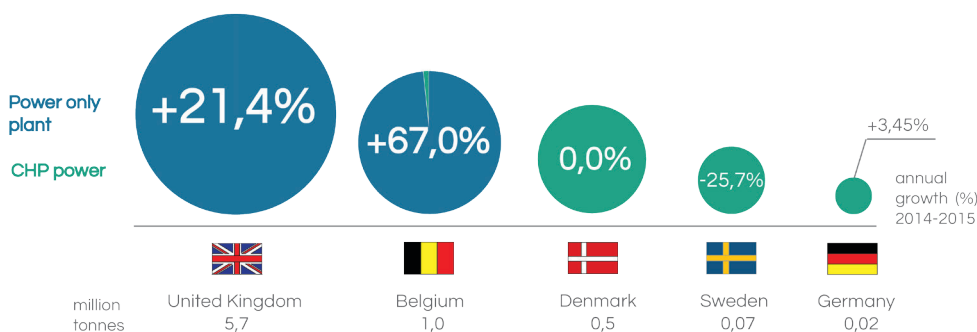
EU-28 pellet consumption for power generation increased by **14,9%** between 2014 and 2015.



Source: EPC Survey



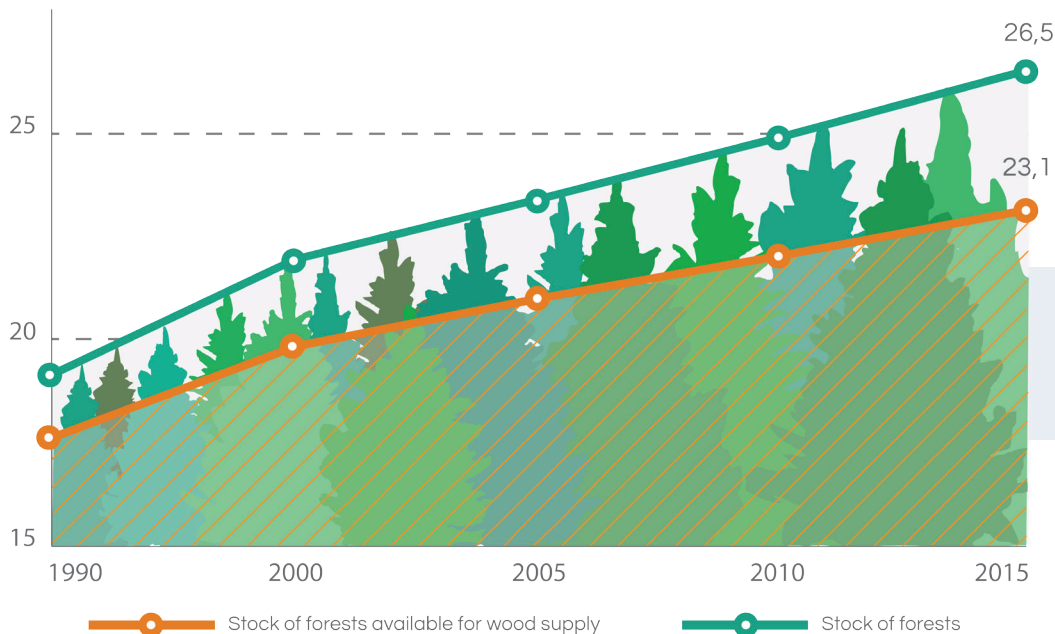
Consumption in top 5 EU-28 countries in 2015



Forest & Bioenergy



EU-28 evolution of forest stock and stock available for wood supply
(From 1990 to 2015, billion of m³)



Source: Eurostat

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The European Commission has carefully followed the evolution of biomass uses over the past decade. The EU already established sustainability criteria for biofuels and bioliquids, and is currently evaluating whether criteria should be set for other types of bioenergy including solid biomass. Regarding the central contribution of solid biomass, such a proposal would have a critical impact on the whole sector and on the capacity of Europe to be the world leader in renewables.

As solid biomass is mostly made out of woody biomass, it is essential to understand the state of play and the actual impact of bioenergy on European forests.

Sustainable forest management provides secure and continuous raw material supply to the bioenergy sector. Introduction of mechanised harvesting systems enabled cost-efficient wood chips production and greater use of available forest biomass. Traditional firewood is still the main solid biofuel product, especially in rural areas, but incentives for a more efficient energy production based on wood chips and wood pellets are giving evident results. Increasing the use of forest residues for energy wood chips production and for the wood processing industry, contributes to the cost-efficiency of the industry and ensures releasing a substantial amount of forest raw material for even greater expansion of biofuel production.

Trends on forest resources data (area, increment and removals) show that the production of biofuels has a solid base to meet the high expectations in future and guarantee that contribution of the forest industry to the renewable energy sector will remain very significant.

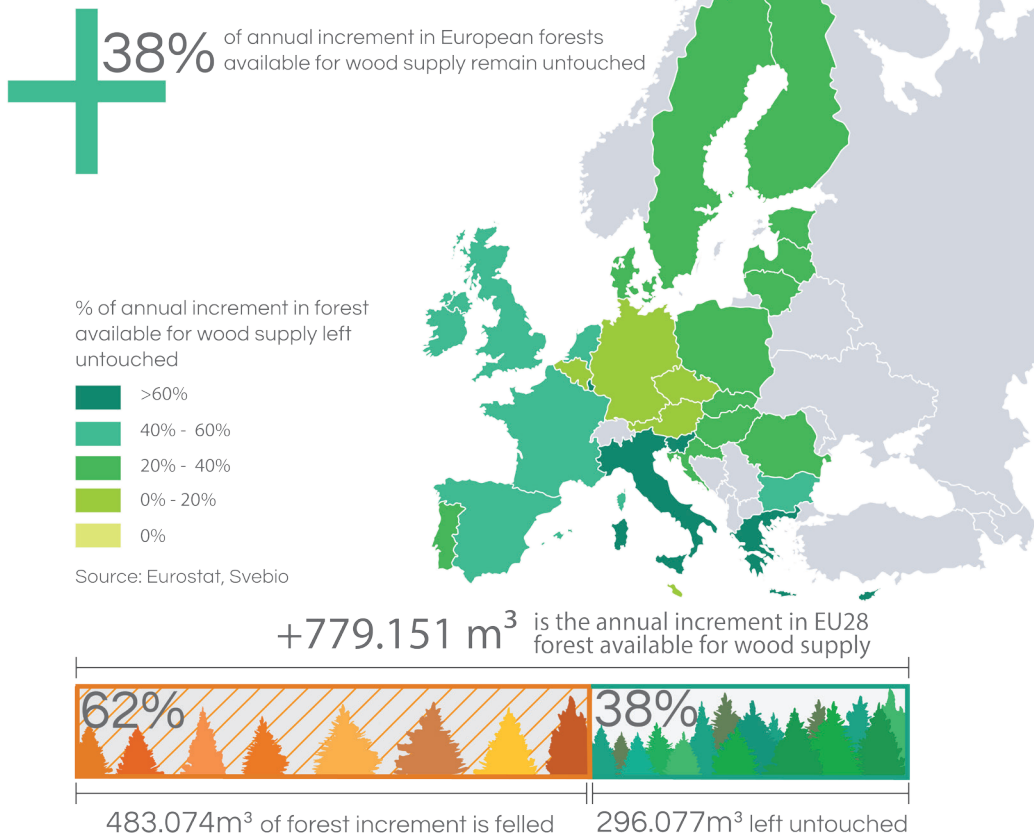


Dinko Vusić

Leader of UNECE/FAO Team of Specialist of Wood Energy
University of Zagreb - Faculty of Forestry



EU-28 Increment and felling in forest available for wood supply (in m³, %)



Contrary to common belief, EU-28 forests have been continuously growing over the past decades. In 1990, European forest represented a total amount of 19,7 billion m³. In 2015, EU-28 forest reached 26 billion m³, meaning that forest increased 34% over the last quarter of a century.

This growth is due to two main reasons: forest areas increasing and a growth of standing volumes. As far as forest areas are concerned, according to Eurostat, EU-28 forests gained 322.800 hectares every year. To visualise this growth, European forest is increasing by the size of a football field every minute. In the meantime, carbon stock is increasing as well. Every year, forests store 362,6 million tonnes of CO₂. This growth results from long lasting trends in Europe

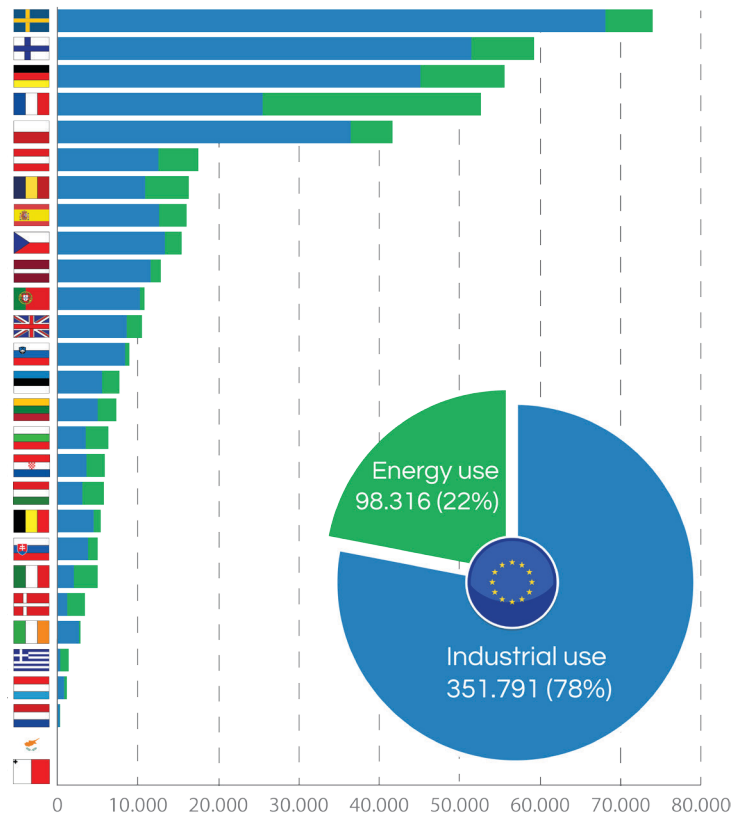
including afforestation, protection programmes developed in most EU Member States, and a decrease in agricultural area. In this context, maintaining and mobilising the full potential of European forest is becoming a central challenge, showing great opportunities for bio-based economies.

On average, about 62% of the annual forest increment in Europe is actually felled, meaning 38% of this annual increment remains in forests. However, the situation can vary from one country to another. Forest spreading 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.

Forest & Bioenergy



EU-28 wood removals according to end use
(in 2015, m³ underbark, %)



Wood removals for Industrial use
 Wood removals for energy purposes
 Source: FAO/UNECE

The fact that forest stock keeps increasing is positive news for Europe, as it could lead to improved forest carbon stock capacity and strengthen all European wood-based industries. On the flip side, this increase of forest stock can be due to a lack of forest management given the inappropriate ownership structures or logistic constraints. In this context, lack of control or management can generate concerns, especially in the Mediterranean region where regrowth is particularly important. In 2015 alone there were more than 58,000 forest fires registered in Europe with a total surface burn of more than 256 thousand ha, releasing massive quantities of CO₂ into the atmosphere.

Active, sustainable forest management that includes cleaning and thinning is therefore essential. It allows an increase in forest productivity and carbon stock capacity, therefore providing more woody materials to substitute fossil materials and energy. Sustainable wood mobilisation is definitely a key challenge for the years to come that should be understood in its overall complexity and handled seriously at EU level.

In 2015, the removal of wood from forest remains largely driven by industry uses (sawmills, pulp and paper, panels etc...) with a share of 78%. In comparison, the energy sector is responsible for 22% of the wood removals, consisting mainly in harvesting residues and low quality wood. In 2015, bioenergy cannot be considered to be the main driver for forest owners to harvest their forests. In several studies and publications over the past years, one can read that the energy use of wood represents more than half of EU wood consumption. This figure is misleading as it actually takes into account not only wood removals from forest for energy, but also wood industry processing residues (eg: sawdust from sawmills to produce pellets). Therefore, it is very important to distinguish the role of the energy sector in forest removals and in total wood consumption. If bioenergy is not the main driver of wood harvest in Europe, the sector is offering an interesting opportunity to forest owners to develop sustainable forest management practices.

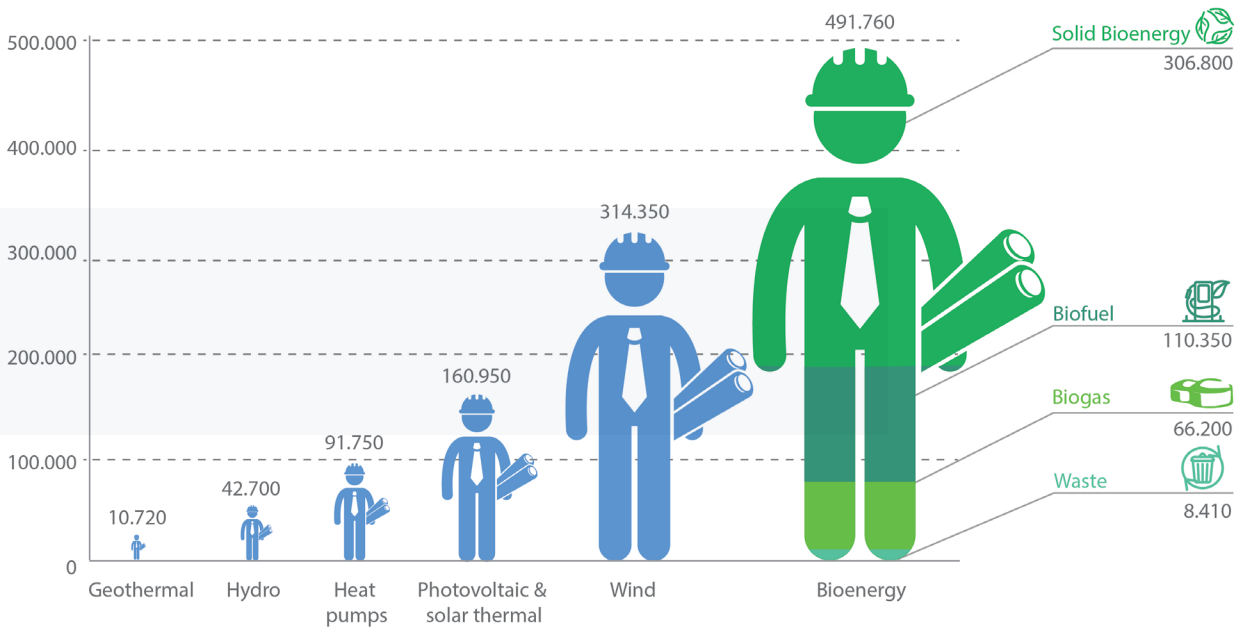


ACCORDING TO EUROSTAT, EU-28 FORESTS GAINED 322.800 HECTARES EVERY YEAR. TO VISUALISE THIS GROWTH, EUROPEAN FOREST IS INCREASING BY THE SIZE OF A FOOTBALL FIELD EVERY MINUTE.

Socio-economic Indicators



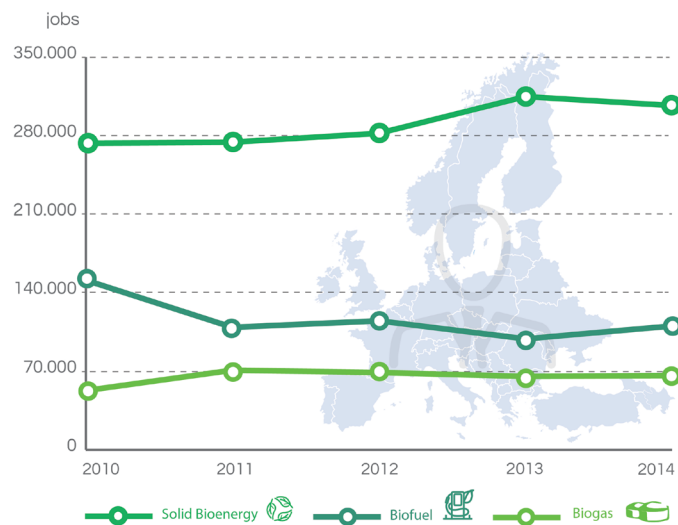
EU-28 employment distribution in the renewables by sector (in 2014, direct and indirect jobs)



Source: EurObserv'ER

Besides multiple environmental benefits, bioenergy is also a leading employer in the renewable field. In 2014, almost 500,000 people were working directly and indirectly within the sector, which is equivalent to the number of jobs created in the wind and photovoltaic industries combined. Looking within the sector itself, solid bioenergy remains the major job provider with more than 300,000 employees across Europe. This large number of jobs compared to other renewables can be easily explained by the fact that bioenergy production encompasses a great number of steps all along the supply chains— from harvesting and collecting raw materials, to the final production of green energy.

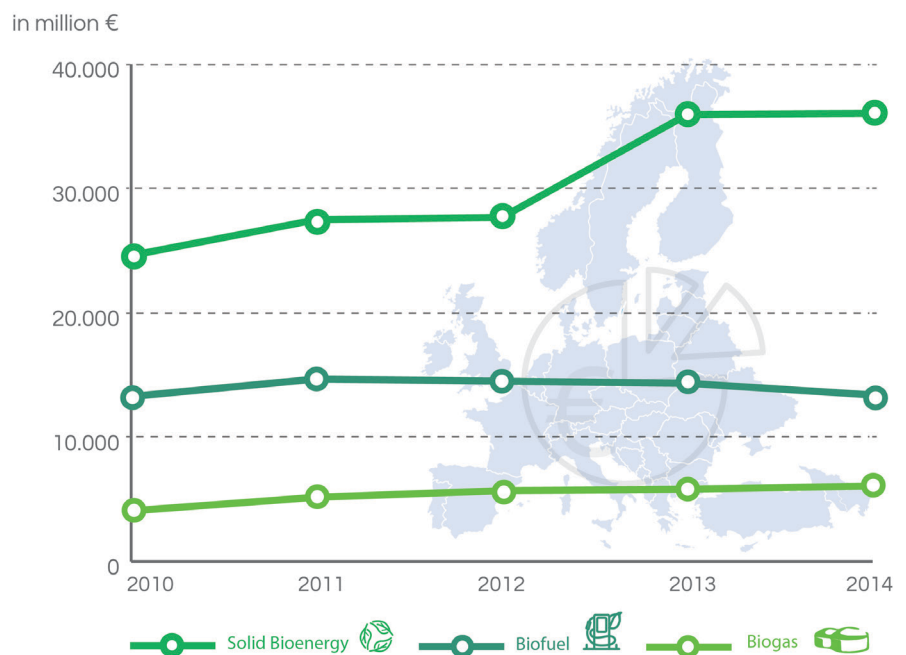
EU-28 evolution of the employment distribution within the bioenergy sector (From 2010 to 2014, direct and indirect jobs)



Source: Eurobserv'ER



EU-28 evolution of the turnover within the bioenergy sector
(From 2010 to 2014, million €)



Source: Eurobserv'ER



ACCORDING TO EUROBSERV'ER, FROM 2010 TO 2014, THE GENERAL BIOENERGY TURNOVER GREW 32%? REACHING 55 BILLION IN 2014.

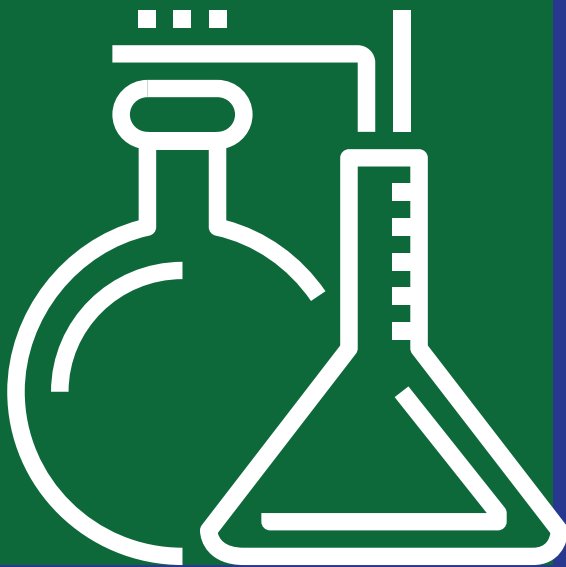
Even compared to fossil fuel energy production, which also requires fuel supply chains, the bioenergy sector generates more jobs. As a comparison, biomass produces 10 times more jobs than nuclear per unit of energy produced.

Besides this quantitative aspect, jobs created within the bioenergy field have other added social and economic value as they are also located in rural areas, promoting local industries and revitalising economically deprived areas. The EU renewable energy sector and bioenergy should constitute a priority for the EU to strengthen job creation and growth. Having a closer look at the evolution of job trends within the bioenergy field exposes a contrast within the sector. Between 2010 and 2014, solid

bioenergy created the most jobs (+33.650). For the biogas industry, the situation has plateaued since 2011 while the biofuel industry has faced a downturn losing around 50.000 jobs in 2011. The situation appears to be stable since then.

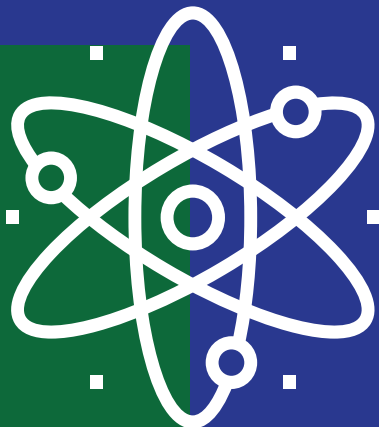
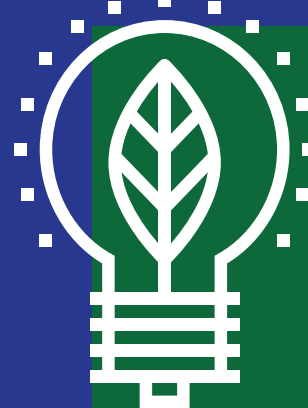
Since the entry into force of the Renewable Energy Directive in 2009, an important flow of investments in bioenergy has been noticed. According to Eurobserv'ER, from 2010 to 2014, the general bioenergy turnover grew 32%? reaching 55 billion in 2014. While looking into details, one can notice similar trends as with employment regarding turnovers of the different bioenergy markets. The solid bioenergy segment experienced the biggest increase with 46% growth from 2010 to 2014.

BiFFiO



BiFFiO is an example of industrial symbiosis. At its core, aquaculture, agriculture and renewable energy industries for sustainable waste management to produce renewable energy from mixed aquaculture and agriculture waste in addition to the production of fertilizer for the agricultural sector.

The partners will develop energy efficient, cost effective, easy to implement and easy to operate biogas reactor technology.



BiFFiO has eleven partners including SME associations, enterprises and research institutions that will run the project until the end of 2016.



This project is funded by the EU Seventh Framework Programme.

www.biffio.com



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 (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, 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 customer 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 households including "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: <ul style="list-style-type: none"> - 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 electricity	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 residential heating, commercial heating and 2/3 of the total volume of pellets used in combined heat and power plants (CHP)
Residential heating pellets consumption/use	Volume of pellets used in domestic's stoves and dedicated heat boilers with a capacity below 50 kW



Notes

Lined area for writing notes, featuring horizontal lines and a faint background illustration of a globe and a large number '0'.



AEBIOM STATISTICAL REPORT

Thanks to our sponsors:



RECP Africa-EU Renewable Energy Cooperation Programme

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



Vyborg Forestry Development Corporation

Vyborg Forestry Development Corporation is the biggest pellet producer in Russia, with a production of about 900.000t of pellets per year. The mill is located close to the Finnish border, not far from Saint-Petersburg. Due to modern design and big production capacity we can produce different quality of pellets, simultaneously: from the industrial up to premium pellets for small users.

www.vfdc.ru/EN



Biffio Project

The Biffio project is an example of industrial symbiosis, initiated from aquaculture, agriculture and renewable energy industries for a sustainable waste management by producing renewable energy from mixed aquaculture and agriculture waste, in addition to production of fertilizer, which will be used in agriculture sector. The partners will develop energy efficient, cost effective, easy to implement and easy to operate biogas reactor technology. Biffio has in total eleven partners including SME Associations, other enterprises, and research institutions participating in the project that will run until the end of 2016.

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