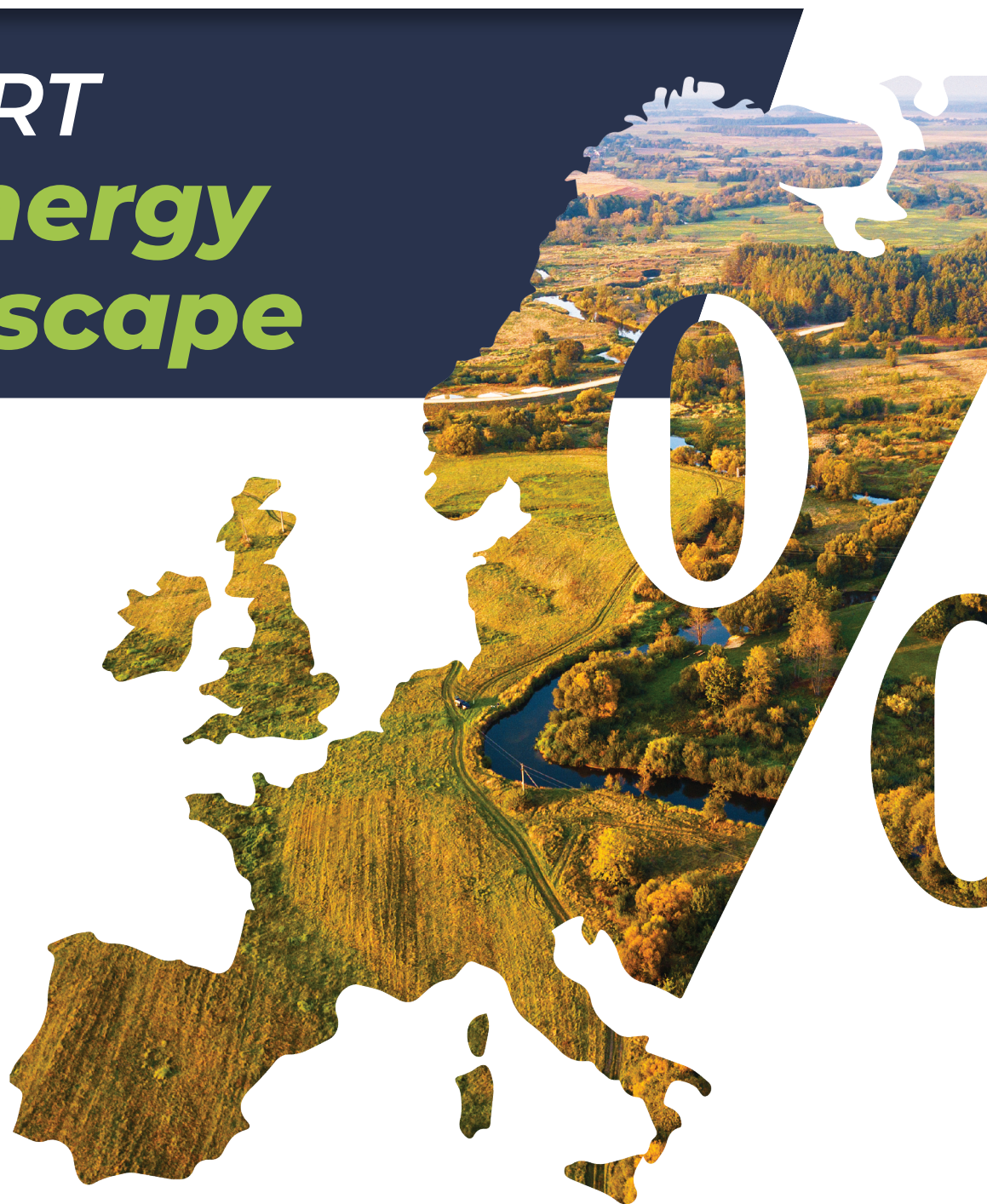
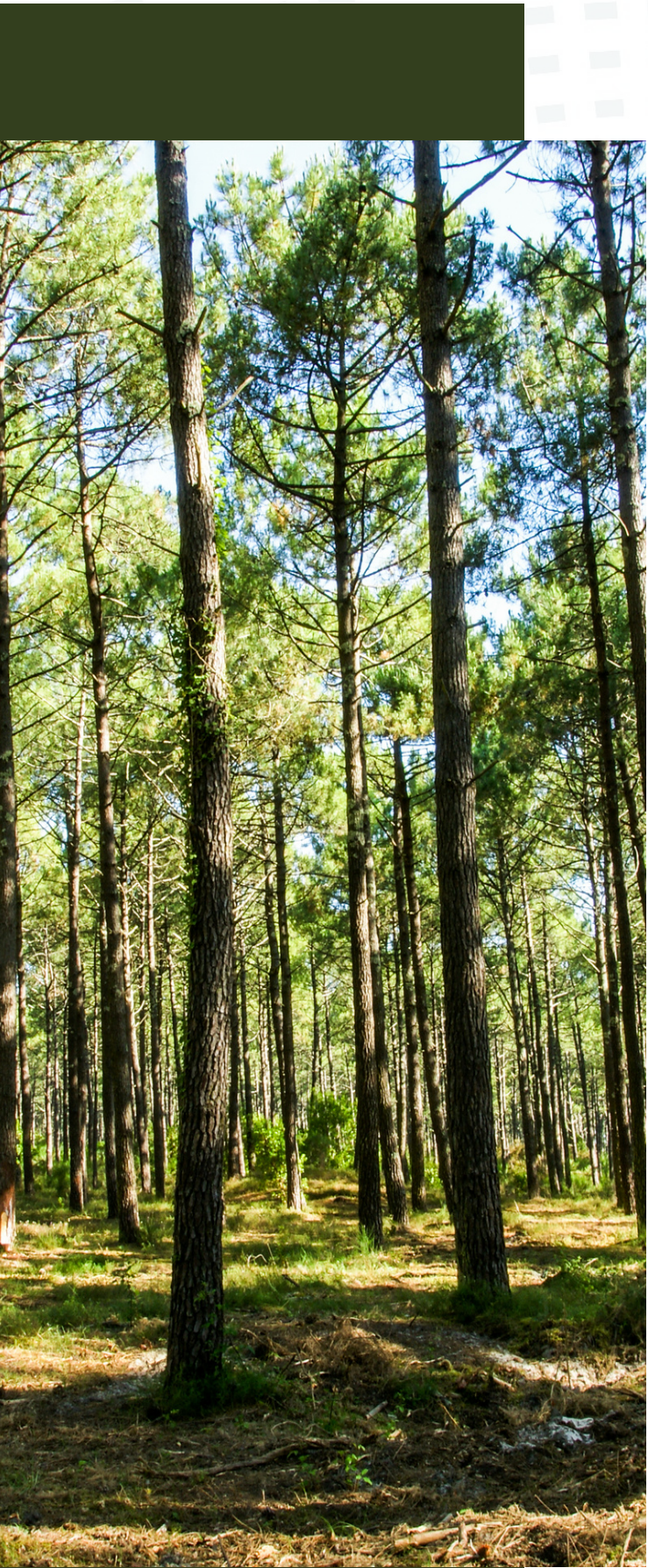




BIOENERGY EUROPE
**STATISTICAL
REPORT**
2020

REPORT
Bioenergy
Landscape





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ABOUT THE STATISTICAL REPORT

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

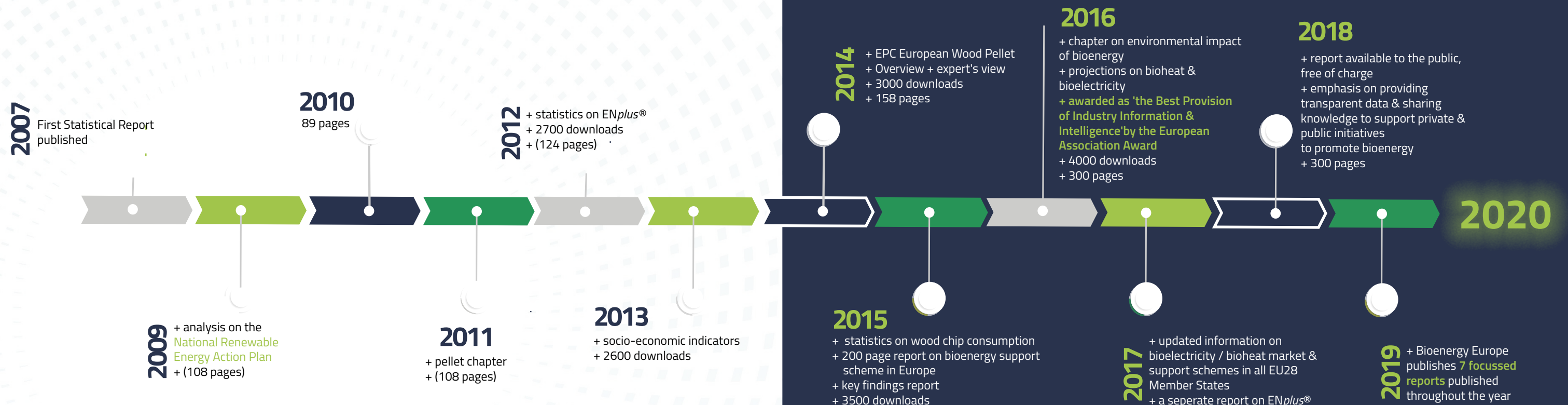
Bioenergy Europe's Statistical Report has been enriched each year with new figures and information, collecting unique data on the developments of the European bioenergy market from a growing number of international contributors.

Bioenergy Europe develops detailed reports that aid industry leaders, decision makers, investors and all bioenergy professionals to understand the situation of bioenergy in Europe.

With more than 150 graphs and figures, readers of Bioenergy Europe'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.

In 2017, the 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.



ABOUT BIOENERGY EUROPE

A bit of history

Bioenergy Europe is the voice of European bioenergy.

It aims to develop a sustainable bioenergy market based on fair business conditions. Founded in 1990, Bioenergy Europe is a non-profit, Brussels-based international organisation bringing together more than 40 associations and 90 companies, as well as academia and research institutes from across Europe.

Our vision

Bioenergy Europe will be the leading player in ensuring that sustainable bioenergy is a key pillar in delivering a carbon neutral Europe.

Our mission

Bioenergy Europe facilitates the development of a sustainable, strong, and competitive bioenergy sector through:

- Promotion towards European policymakers and stakeholders for awareness, acceptance, and reputation of bioenergy.
- Promote the development of consistent, realistic, and sustainable bioenergy scenarios in the heat, electricity, and transport sectors.
- Pro-active proposals to develop more favourable European legislation.
- Market intelligence to support decision making.
- Services to members, including a support to advocacy at national level.
- Tools, including certification schemes, to sustain market growth and credibility.
- Industry collaboration throughout the entire supply chain.
- Promotion of efficient and innovative technologies within the bioeconomy.

OUR ACTIVITIES

Bioenergy Europe carries a wide range of activities aimed at supporting its members on the latest EU and national policy developments. Bioenergy Europe works to voice their concerns to EU and other authorities, including, advocacy activities in key policy areas as well as the organisation of dedicated working groups.

Working Groups

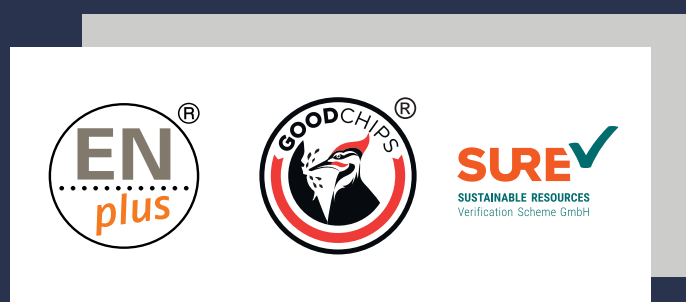
Bioenergy Europe's working groups act as a platform for members to discuss common issues and exchange information on the state of play of bioenergy.

There are currently 7 active working groups:

- Agrobiomass & Energy Crops;
- Biopower & CHP;
- Competitiveness;
- Domestic Heating;
- Sustainability;
- Pellets;
- Wood Chips.

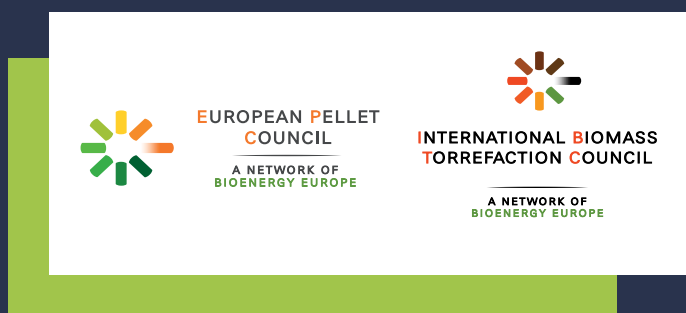
Certification Schemes

Thanks to the experience and authority acquired over the last 20 years, Bioenergy Europe has successfully established three international certification schemes to guarantee high quality standard for fuels, namely, **ENplus®**, **GoodChips®** as well as the latest edition in the certification for sustainable bioenergy: **SURE**.



Networks

Bioenergy Europe is the umbrella organisation of both the **European Pellet Council (EPC)** and the **International Biomass Torrefaction Council (IBTC)**. These networks



have been created thanks to the dynamics of Bioenergy Europe members. Today, these networks bring together bioenergy experts and company representatives from all over Europe and beyond.

The European Pellet Council (EPC), founded in 2010, represents the interests of the European wood pellet sector. Its members are national pellet associations or related organisations from over 18 countries.

EPC is a platform for the pellet sector to discuss issues relating to the transition from a niche product to a major energy commodity. Issues include the standardisation and certification of pellet quality, safety, security of supply, education and training, and the quality of pellet-using devices. EPC manages the ENplus® quality certification.

Launched in 2012, the **International Biomass Torrefaction Council (IBTC)**, aims to build the first platform for companies that have common interests in the development of torrefied Biomass markets. Currently, the IBTC initiative is supported by more than 23 companies 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.

For further information on Bioenergy Europe's Networks & Certification Schemes visit www.bioenergyeurope.org

OUR MEMBERS*

As the common voice of the bioenergy sector, Bioenergy Europe, aims to develop a sustainable bioenergy market based on fair business conditions and does so by bringing together national associations and companies from all over Europe – thus representing more than 4000 indirect members, including companies and research centres.

Associations



Academia



Companies



*Members as of November 2020.

Move forward with a reliable partner in the changing energy markets



Resource efficiency, flexibility and clean solutions are the key for success in changing energy markets. Based on our decades-long experience, we have the know-how to deliver the best solutions based on biomass, waste or on a mixture of different fuels.

Valmet's proven automation solutions help you to optimize your energy production and our network of service professionals is ready to recharge your competitiveness both on-site and remotely.

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1. EU energy system overview

Primary energy production 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 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.

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:

$$\text{primary production} + \text{recovered products} + \text{imports} + \text{stock changes} - \text{exports} - \text{bunkers}$$

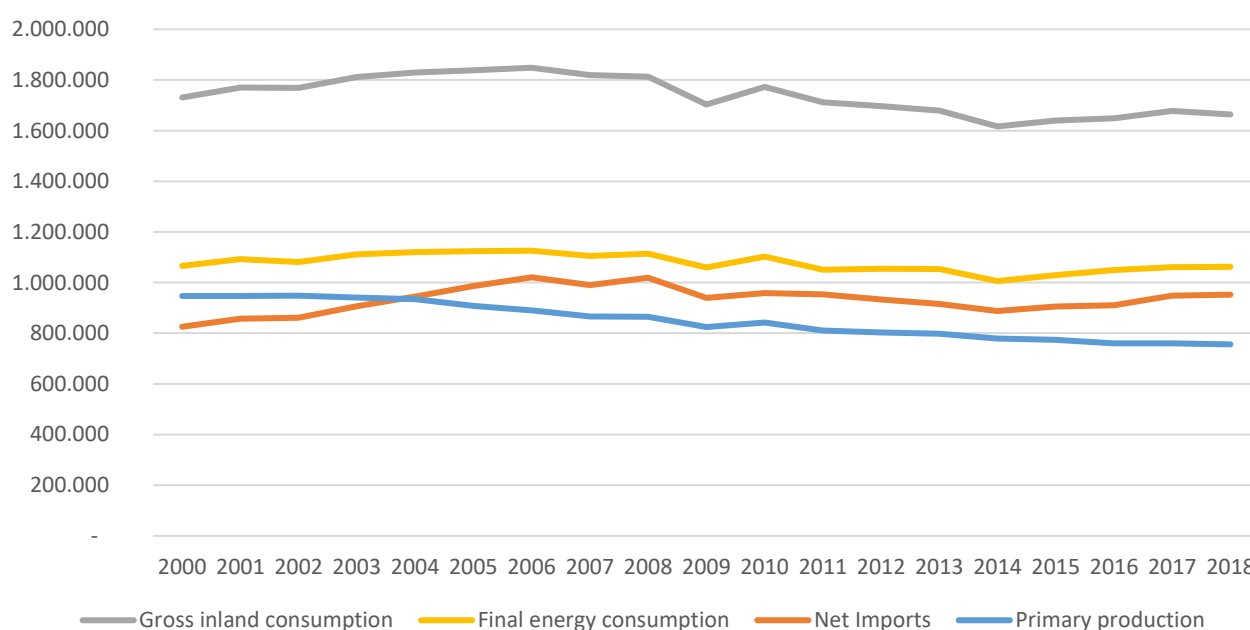
International Marine Bunkers are quantities of fuels delivered to ships of all flags that are engaged in international navigation. International navigation may take place at sea, coastal waters or on inland lakes and waterways.

Final energy consumption is energy supplied to the final consumer's door for all energy usage. It is the sum of the final energy consumed in the transport, industrial, agricultural/forestry, fishing, services, household and other unspecified sectors (excludes deliveries to the energy transformation sector and to the energy industries themselves).

Gross final energy consumption is defined in Directive 2009/28/EC as the sum of:

- 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.

Figure 1 Evolution of the main energy indicators in EU28 (ktoe)

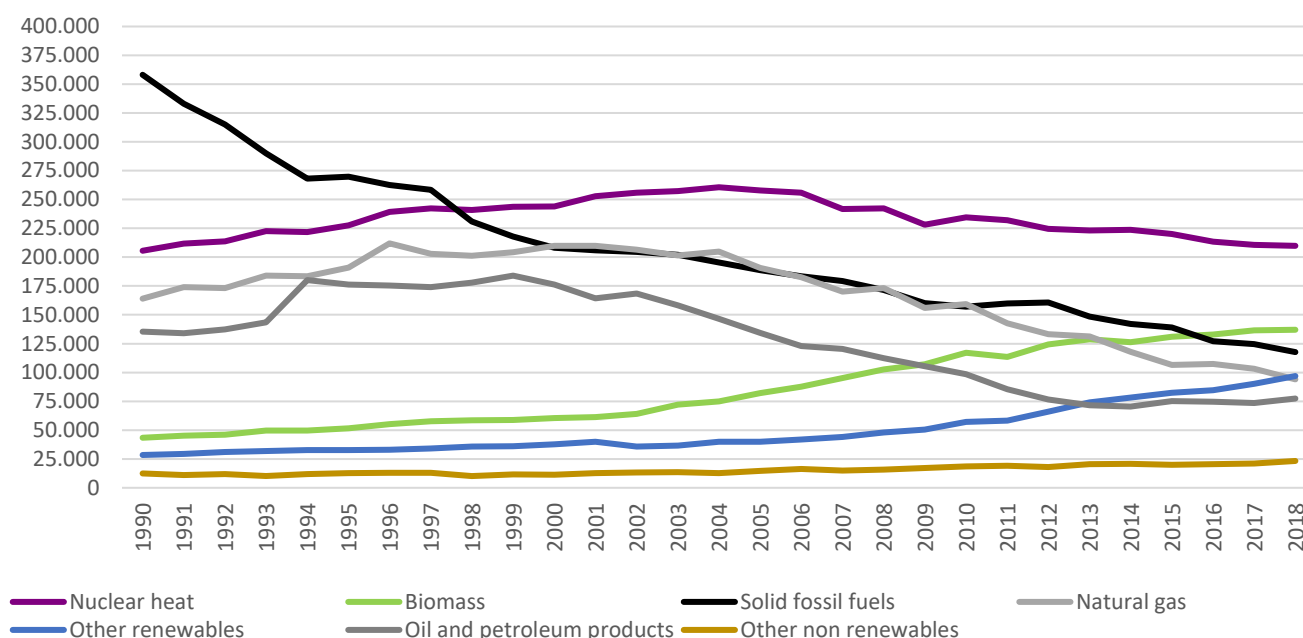


Source: Eurostat

Gross inland [energy] consumption (GIC) has slightly decreased in comparison to that of 2000, although since 2014 figures have reflected a slow increase in consumption. At the same time, the primary [energy] production has never been as low as shown in 2018; with decreasing trends being relatively steady since 2000. Therefore, the net imports are increasing, impacting the European energy dependency and thus the economic balance. Regarding the final energy consumption

(FEC), the 2018 value reflects similarly to that recorded in 2000. The gap between the GIC and FEC represented in 2000 38,4% of the GIC and in 2017 this value has diminished just by 2,2 percentage points reaching 36,2%. Hence no major improvement in terms of usage efficiency of the primary energy has been observed since 2000. However, it can be noted that considering the population increase from 2000 to 2018 within the EU28 (+25 million), the energy per inhabitants has decreased by 8,6%, from 3,6 tonnes of oil equivalent per inhabitant in 2000 to 3,2 in 2018 in EU28 (considering the GIC).

Figure 2 Evolution of primary energy production by main fuel type in EU28 (ktoe)

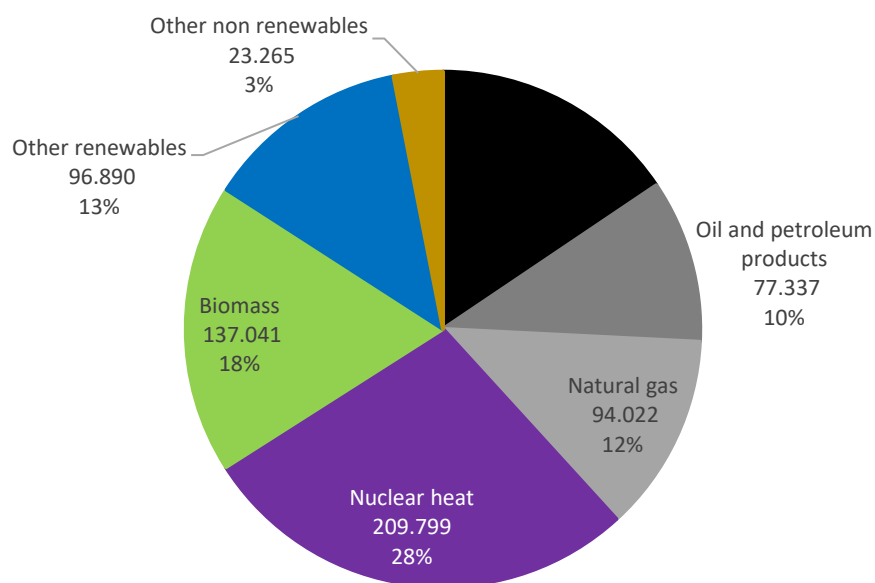


Source: Eurostat

Biomass was most important indigenous energy source in Europe- ahead of fossil fuels, excluding nuclear¹ (considering that nuclear heat is reliant on Uranium imports). The primary energy production of renewables is the only category that is increasing within EU28, being led by both biomass and wind; with biomass continuing to take the lead. Renewables are therefore crucial to lessen the EU energy dependency. Indeed, in the EU28 the primary production of fossil fuels has dramatically reduced by 51,4% in 2018 compared to that of 2000.

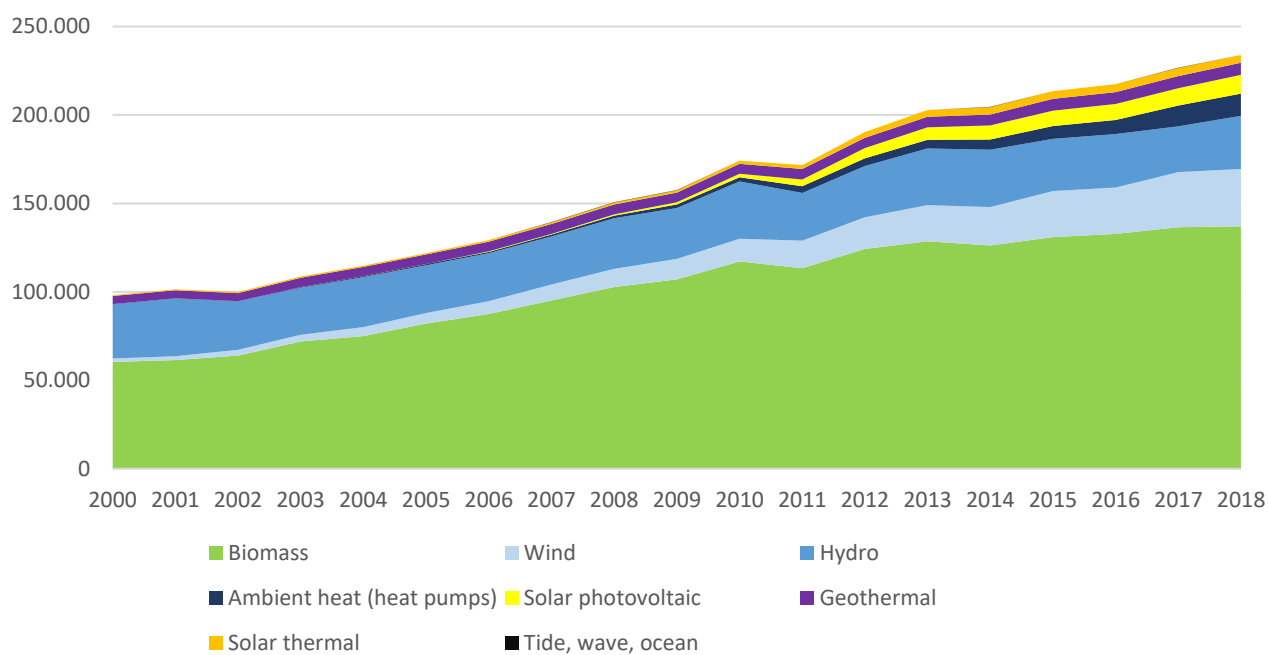
¹ Note: Eurostat's methodology considers heat as the primary energy form for nuclear. In cases where the amount of heat produced in the nuclear reactor is not known, the primary energy equivalent is calculated from the electricity generation by assuming an efficiency of 33%. However, it should be remarked that nuclear is not an indigenous source as most of it is imported.

Figure 3 Primary energy production in EU28 in 2017 (ktoe, %)



Source: Eurostat

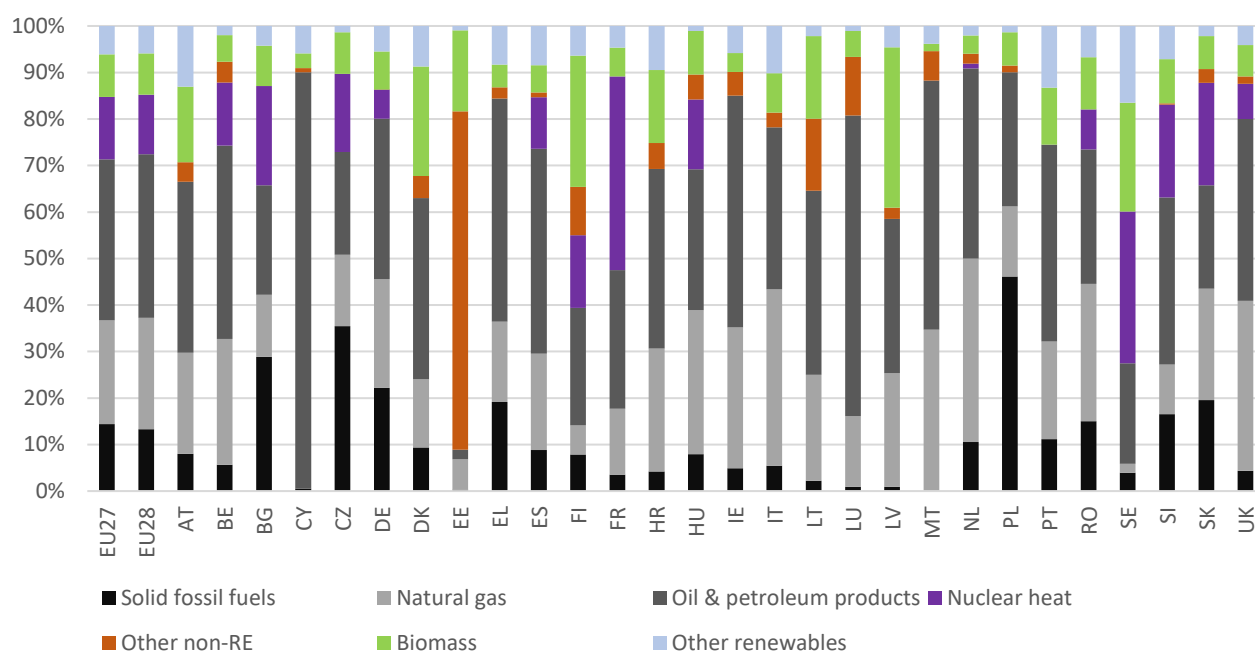
Figure 4 Evolution of primary production of renewable energy in EU28 (ktoe)



Note: Tide, wave, ocean is still marginal therefore (45 ktoe in 2017) not visible in the figure

Source: Eurostat

Figure 5 Share of fuels in gross inland consumption in EU Member States in 2018 (%)

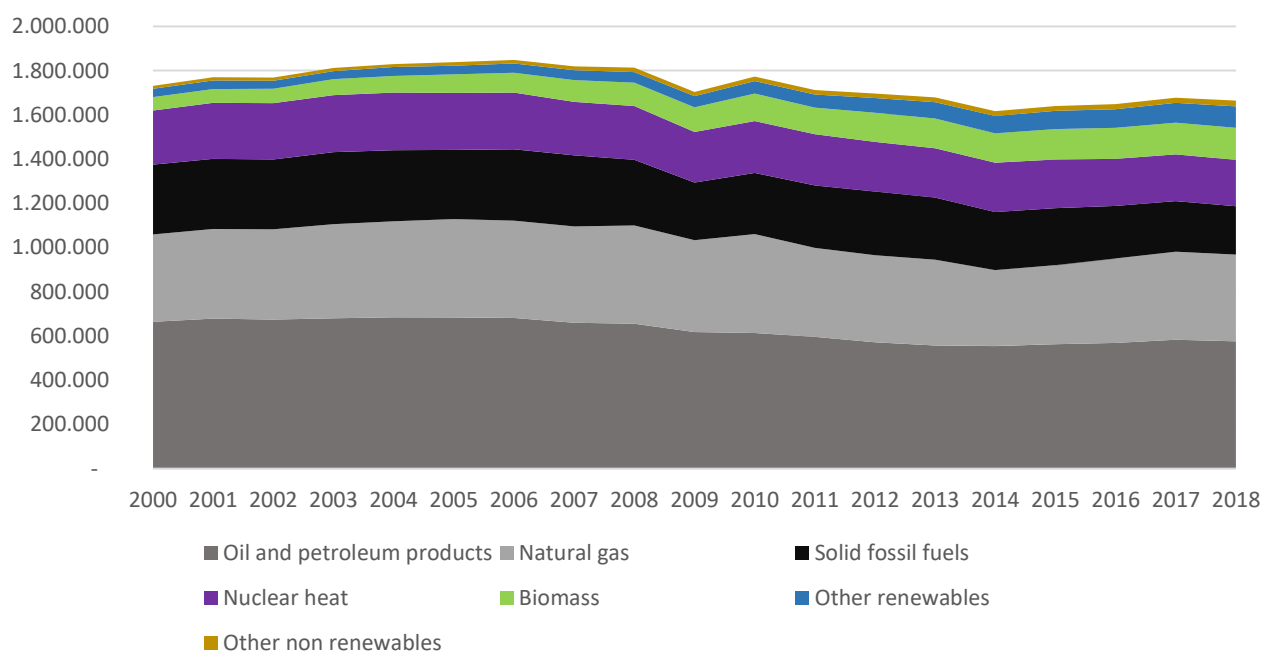


Note: Other non-RE includes oil shale and oil sands, non-renewable waste, peat products.

Source: Eurostat

For Estonia, other non-RE is mainly shale oil. Fossils fuels are dominating in every EU Member States with the exceptions of Sweden, Finland and France where biomass and nuclear play a significant role (SE:24% & 33%, FI: 28% & 16%, FR: 6% & 42% respectively).

Figure 6 Evolution of the gross inland consumption by main fuel type in EU28 (ktoe)



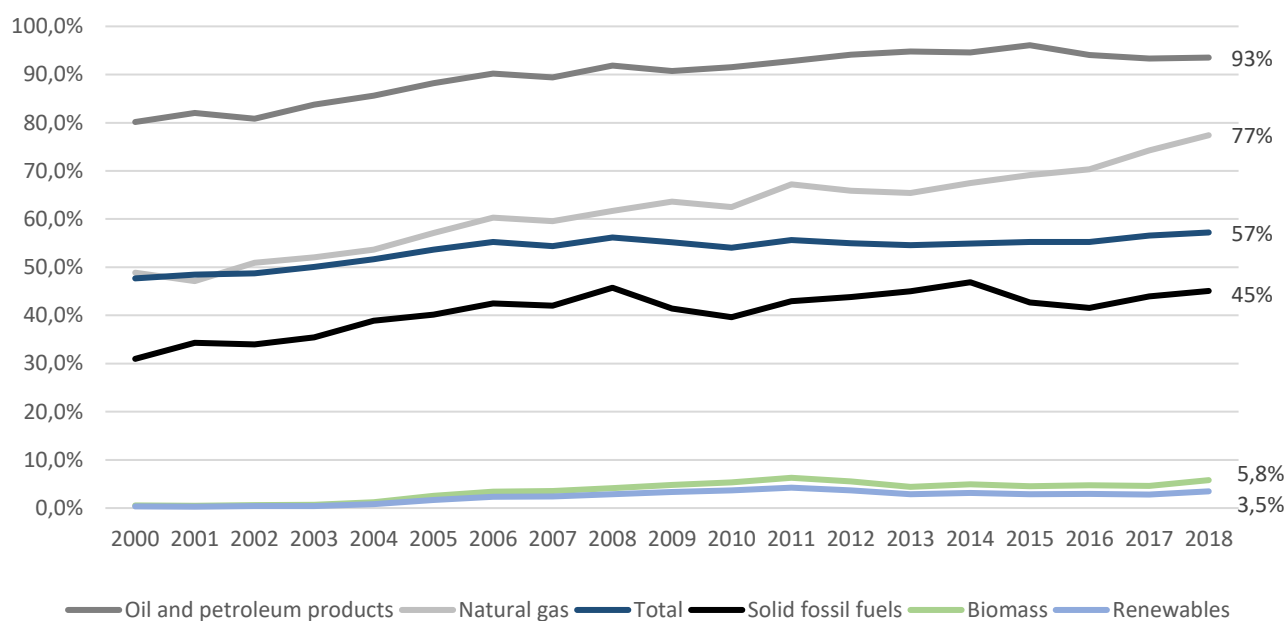
Source: Eurostat

Fossil fuels are still today the main source of energy in the EU. Since 2014, oil and natural gas shares have increased after several years of decline with 2018 showing again a small decrease. This highlights the real challenge that is being faced in eradicating fossil fuels and the large energy supply they represent. The current low prices of fossil fuels are the main driver of fossil domination in the energy market. More actions are needed to effectively reduce the energy demand, whilst also increasing the efficiency of said energy and making the energy mix 100% renewable.

caused by a decrease in local production. Biomass imports increased by 27,9%; however, it only represented an addition of 1,8Mtoe. In 2018, net imports represent just 5,6% of the total biomass gross inland consumption.

As shown in figure 7, 57% of the EU28 energy is imported; an increase of 9,5 percentage points since 2000. Additionally, this proportion is actually higher (~66%) as nuclear energy according to Eurostat, is considered as 'being produced domestically'. The energy dependency of the three main fossil fuels has also risen since 2000, mainly due to a decrease in local production. Concerning the dependency in biomass the EU28 have a very low and stable rate indicating the application of best practices in using the local sources. This percentage is even lower (3,7%) when considering the EU27.

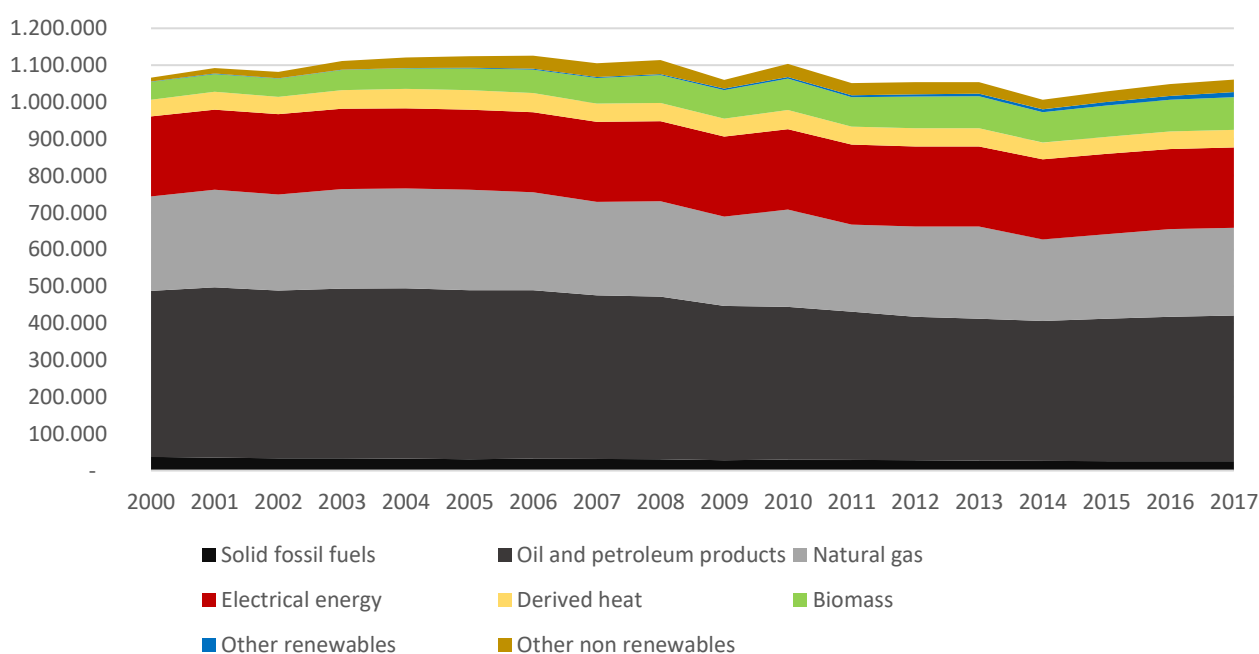
Figure 7 Evolution of the energy dependency* by fuel type in EU28 (%)



Note: the energy dependency is the ratio between the net imports and the gross inland consumption of the product.

Source: Eurostat

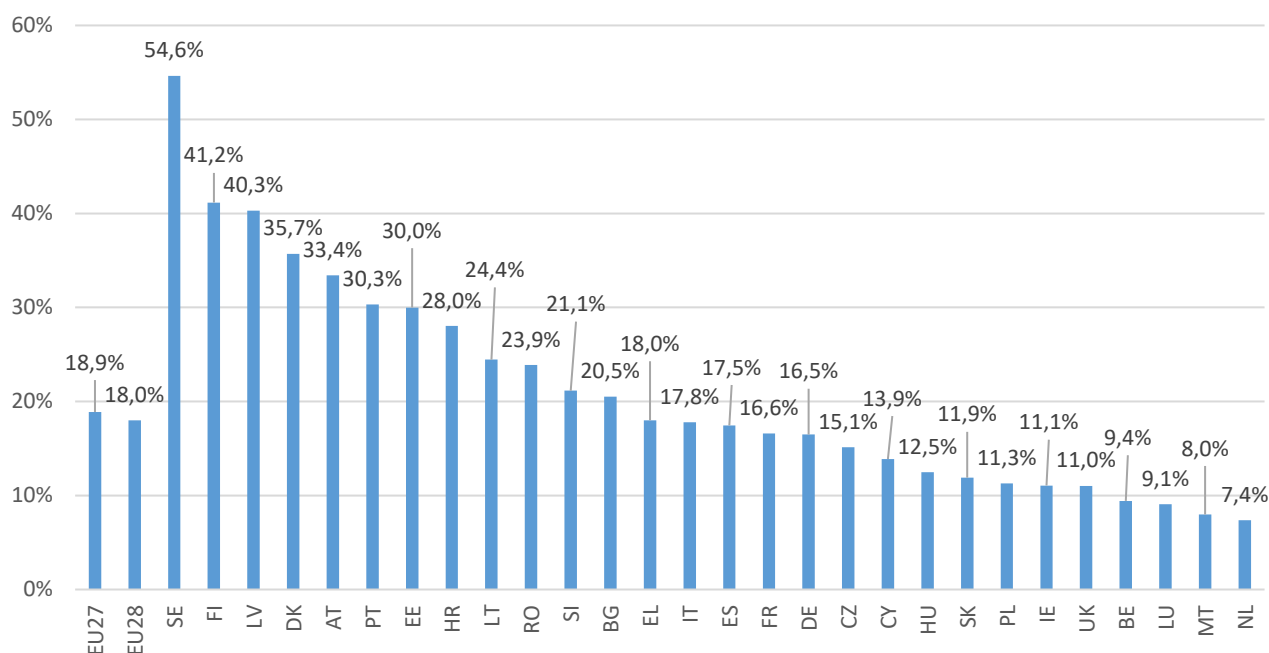
Figure 8 Evolution of the final energy consumption by fuel type in EU28 (ktoe)



Source: Eurostat

Biomass is also embedded in electrical energy (bioelectricity – 16.198 ktoe) and in derived heat (bioheat in derived heat -14.807 ktoe) - cf. [Bioenergy Europe's statistical reports](#) on those topics.

Figure 9 Share of renewable energy in gross final energy consumption in EU28 Member States in 2018 (%)



Note: Calculated in accordance with the methodology established in Directive 2009/28/EC and Regulation (EC) No 1099/2008.

Source: SHARES 2018, Eurostat

	EU-28	EU-27	EU-26	EU-25
2010	10.1	10.1	10.1	10.1
2011	10.2	10.2	10.2	10.2
2012	10.3	10.3	10.3	10.3
2013	10.4	10.4	10.4	10.4
2014	10.5	10.5	10.5	10.5
2015	10.6	10.6	10.6	10.6
2016	10.7	10.7	10.7	10.7
2017	10.8	10.8	10.8	10.8
2018	10.9	10.9	10.9	10.9
2019	11.0	11.0	11.0	11.0

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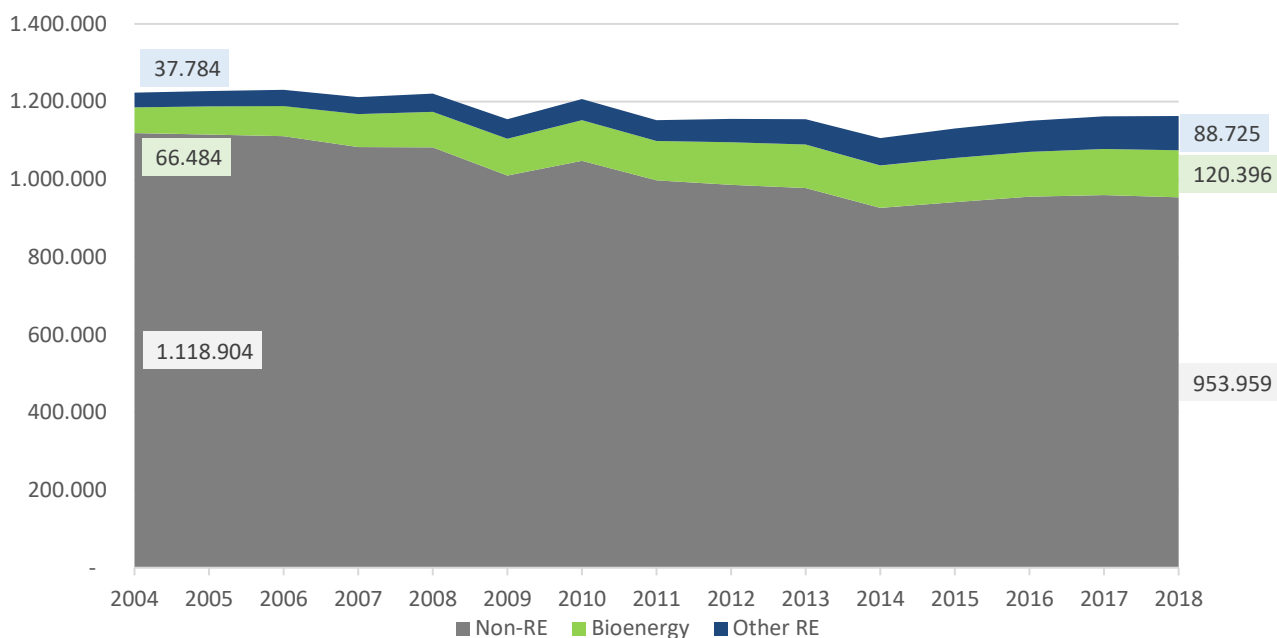
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EUROPE

	EU-28	EU-27	EU-26	EU-25
2010	10.1	10.1	10.1	10.1
2011	10.2	10.2	10.2	10.2
2012	10.3	10.3	10.3	10.3
2013	10.4	10.4	10.4	10.4
2014	10.5	10.5	10.5	10.5
2015	10.6	10.6	10.6	10.6
2016	10.7	10.7	10.7	10.7
2017	10.8	10.8	10.8	10.8
2018	10.9	10.9	10.9	10.9
2019	11.0	11.0	11.0	11.0

	EU-28	EU-27	EU-26	EU-25
2010	10.1	10.1	10.1	10.1
2011	10.2	10.2	10.2	10.2
2012	10.3	10.3	10.3	10.3
2013	10.4	10.4	10.4	10.4
2014	10.5	10.5	10.5	10.5
2015	10.6	10.6	10.6	10.6
2016	10.7	10.7	10.7	10.7
2017	10.8	10.8	10.8	10.8
2018	10.9	10.9	10.9	10.9
2019	11.0	11.0	11.0	11.0

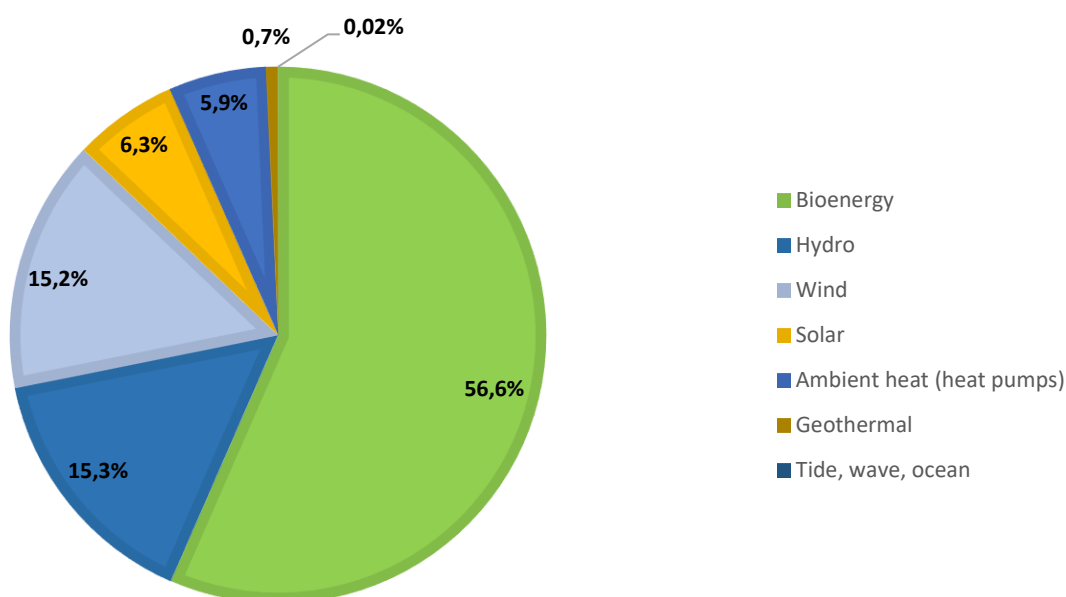
Biomass is by far the main renewable energy source within the EU28 accounting for more than 10% of the gross final energy consumption in 2018. Biomass is an essential renewable energy source and is a key factor in contributing towards reaching the European climate targets. It provides significant benefits to the energy mix. Bioenergy contributes to all the final usage forms of energy i.e. heat, transport and electricity. It is a storable, dispatchable and locally sourced and Europe is the leader in bioenergy technologies.

Figure 10 Evolution of the gross final energy consumption by fuel type in EU28 (ktoe)



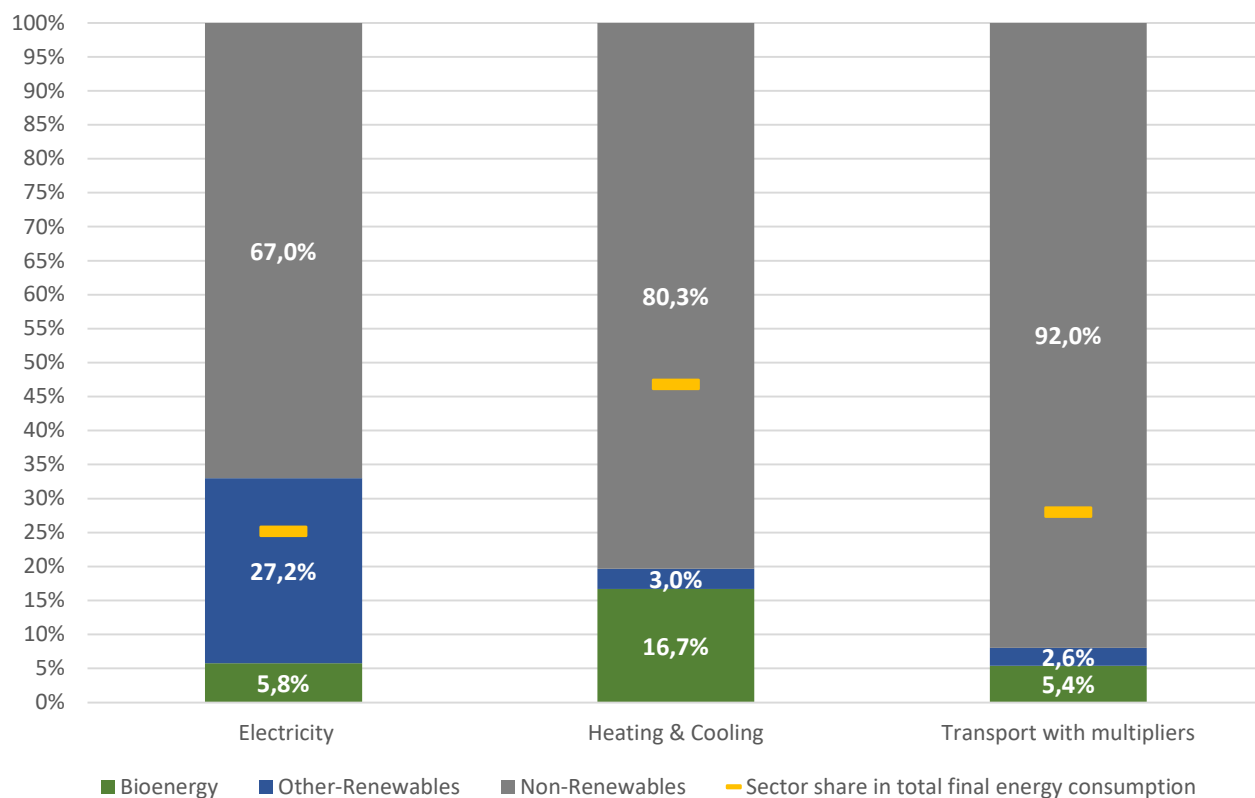
Source: SHARES 2017, Eurostat

Figure 11 Distribution of renewable gross final energy consumption in the EU28 in 2018 (%)



Source: SHARES 2018, Eurostat

Figure 12 Repartition by energy source for the different final usages in the EU28 in 2018 and their relative importance in the total final energy consumption (%)



Note: Calculated in accordance to the methodology established in Directive 2009/28/EC and Regulation (EC) No 1099/2008.

* For the energy source repartition in transport 'Other renewables' represents RES electricity used in transport which also counts towards the RES for electricity (not for the sector share in total final energy consumption). Multipliers included.

Source: SHARES 2018, Eurostat



Founded 30 years ago, APPA represents more than 300 producers, businesses and other associations in the Spanish renewable energy sector.

APPA is the largest and most representative organisation in the field of renewable energies in Spain. APPA is lobbying activities to create the conditions for development of renewables dialoguing with public and private entities (national and regional government, energy agencies, etc.) APPA BIOMASS.

APPA Biomass groups Spanish agents in the biomass industry. It represents the electricity and thermal biomass companies in Spain, and has constant presence in the national and regional administrations, as well as European institutions. APPA Biomass is recognized as the spokes group for biomass in Spain.

www.appa.es



European Energy Exchange (EEX) is the leading energy exchange which develops, operates and connects secure, liquid and transparent markets for energy and commodity products around the globe. As part of EEX Group, a group of companies serving international commodity markets, it offers contracts on Power, Natural Gas and Emission Allowances as well as Freight, Biomass and Agricultural Products.

www.eex.com



The World Bioenergy Association promotes international cooperation in the field of bioenergy. It communicates the opportunities and benefits of bioenergy to policy makers and aims at establishing constructive relationships with NGOs based on the common goals of climate protection and sustainable development. export or import.

www.worldbioenergy.org



DI Bioenergy is a professional network with members representing the entire value chain of bioenergy including production, distribution, trade, consumption and consultancy within sustainable biomass and biogas.

DI Bioenergy is working to improve Danish bioenergy companies' framework conditions at both national and EU level.

www.energi.di.dk



Elettricità Futura is the leading Association in Italy representing the broad electricity sector and bringing together large, medium and small enterprises involved in the entire supply chain (traditional and RES generation, retail, distribution, services, trading). Elettricità Futura has 500+ members representing 70% of electricity consumed in Italy. It is part of Confindustria as well as being member of the main European associations of the power sector. The Association, with a total of 50 members dealing with bioenergy, supports the role of sustainable bioliquids, biofuels, solid biomass, biogas and biomethane, recognising their valuable contribution to the energy system and its decarbonisation.

www.elettricitafutura.it



Figure 1: A Summary of the Main Findings of the Study

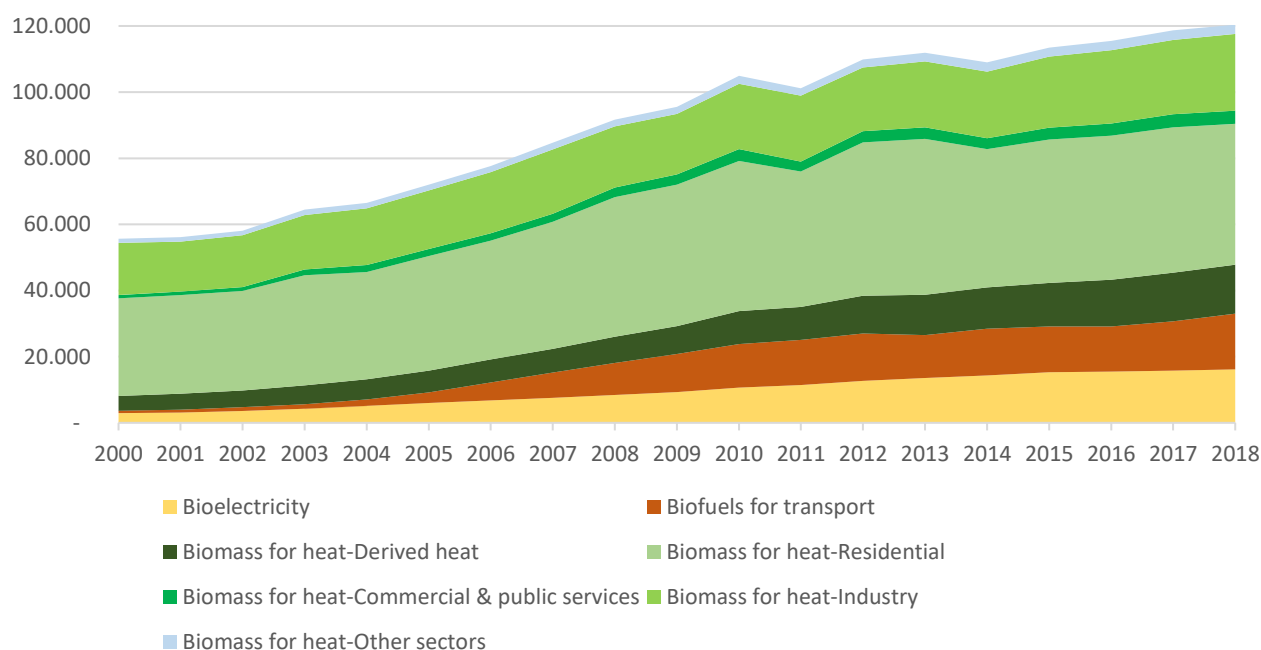


The following table summarizes the main findings of the study, which are presented in a more detailed manner in the main text of the report.

Figure 1: A Summary of the Main Findings of the Study. The following table summarizes the main findings of the study, which are presented in a more detailed manner in the main text of the report.

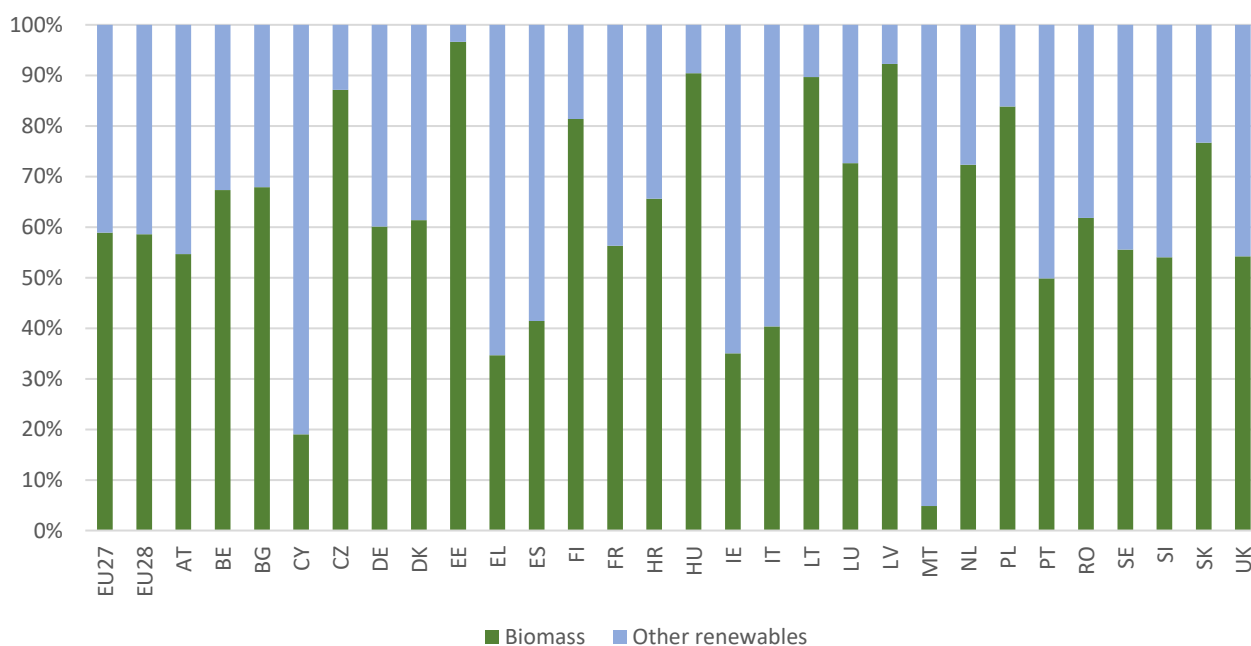
The following table summarizes the main findings of the study, which are presented in a more detailed manner in the main text of the report.

Figure 14 Evolution of bioenergy in gross final energy consumption by end-use in EU28 since 2000 (in ktoe)



Source: Eurostat

Figure 15 Contribution of biomass to the primary renewable energy production in 2017 in EU28 Member States (%)



Source: Eurostat

	2020	2021	2022	2023	2024
2020	1000000	1000000	1000000	1000000	1000000
2021	1000000	1000000	1000000	1000000	1000000
2022	1000000	1000000	1000000	1000000	1000000
2023	1000000	1000000	1000000	1000000	1000000
2024	1000000	1000000	1000000	1000000	1000000

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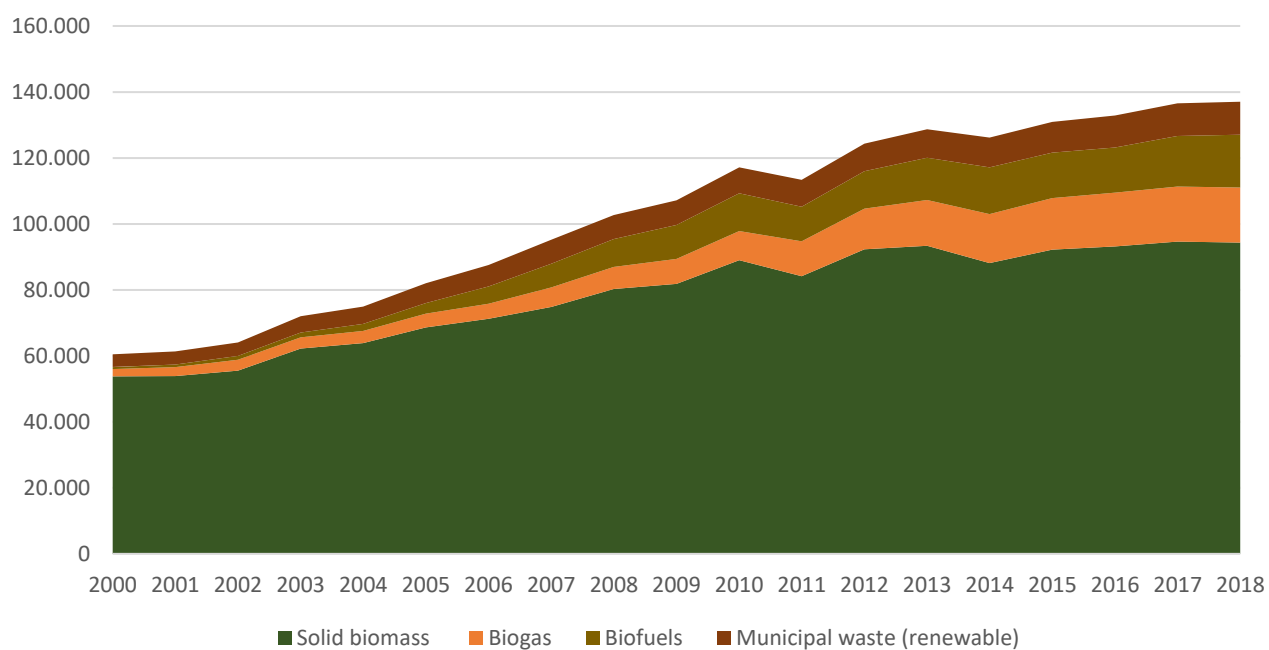
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Figure 16 Evolution of primary energy production of biomass by type (ktoe) in EU28



Source: Eurostat

	Product Name	Product ID	Category	Product Price	Product Stock
Product 1	Product 1 Name	Product 1 ID	Category 1	Product 1 Price	Product 1 Stock
Product 2	Product 2 Name	Product 2 ID	Category 2	Product 2 Price	Product 2 Stock
Product 3	Product 3 Name	Product 3 ID	Category 3	Product 3 Price	Product 3 Stock
Product 4	Product 4 Name	Product 4 ID	Category 4	Product 4 Price	Product 4 Stock
Product 5	Product 5 Name	Product 5 ID	Category 5	Product 5 Price	Product 5 Stock
Product 6	Product 6 Name	Product 6 ID	Category 6	Product 6 Price	Product 6 Stock
Product 7	Product 7 Name	Product 7 ID	Category 7	Product 7 Price	Product 7 Stock
Product 8	Product 8 Name	Product 8 ID	Category 8	Product 8 Price	Product 8 Stock
Product 9	Product 9 Name	Product 9 ID	Category 9	Product 9 Price	Product 9 Stock
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The storage capacities of the EU countries, defined as total storage capacity divided by gross inland consumption, is presented in table 1 below. Reported figures include the total capacity available in storage as well as the storage capacities of dedicated plants and dedicated storage vessels. For the aggregation, the total capacity is presented without the dedicated vessels.

Table 1: Storage capacities of the EU countries (2019) (Source: Eurostat, 2020)

	Total storage	Dedicated storage	Total storage	Dedicated storage (excluding)	Storage
2019	100%	100%	100%	100%	100%
2018	100%	100%	100%	100%	100%
2017	100%	100%	100%	100%	100%
2016	100%	100%	100%	100%	100%
2015	100%	100%	100%	100%	100%
2014	100%	100%	100%	100%	100%
2013	100%	100%	100%	100%	100%
2012	100%	100%	100%	100%	100%
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1930	100%	100%	100%	100%	100%
1929	100%	100%	100%	100%	100%
1928	100%	100%	100%	100%	100%
1927	100%	100%	100%	100%	100%
1926	100%	100%	100%	100%	100%
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1923	100%	100%	100%	100%	100%
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1921	100%	100%	100%	100%	100%
1920	100%	100%	100%	100%	100%
1919	100%	100%	100%	100%	100%
1918	100%	100%	100%	100%	100%
1917	100%	100%	100%	100%	100%
1916	100%	100%	100%	100%	100%
1915	100%	100%	100%	100%	100%
1914	100%	100%	100%	100%	100%
1913	100%	100%	100%	100%	100%
1912	100%	100%	100%	100%	100%
1911	100%	100%	100%	100%	100%
1910	100%	100%	100%	100%	100%
1909	100%	100%	100%	100%	100%
1908	100%	100%	100%	100%	100%
1907	100%	100%	100%	100%	100%
1906	100%	100%	100%	100%	100%
1905	100%	100%	100%	100%	100%
1904	100%	100%	100%	100%	100%
1903	100%	100%	100%	100%	100%
1902	100%	100%	100%	100%	100%
1901	100%	100%	100%	100%	100%
1900	100%	100%	100%	100%	100%

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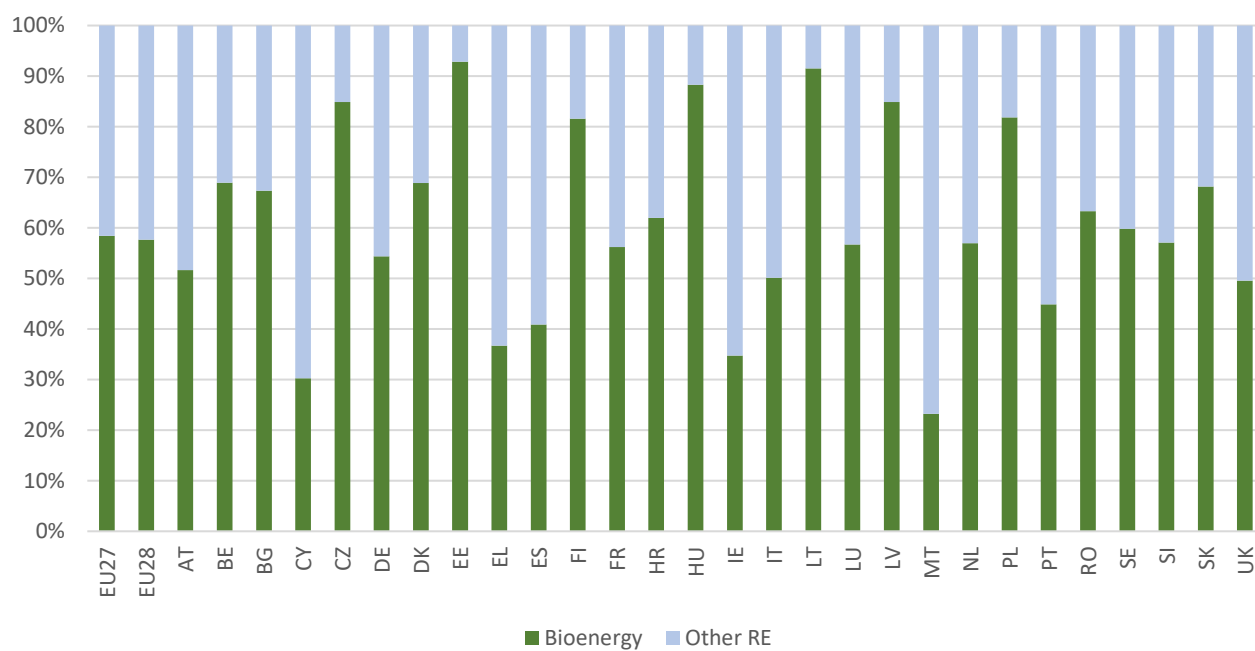
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Notes on the data and methodology

The report illustrates the EU's energy system, defined as total energy capacity divided by gross inland consumption, is presented in table 1 below. Reported figures include the total capacity available in storage as well as the storage capacities of dedicated plants and dedicated storage vessels. For the aggregation, the total capacity is presented without the dedicated vessels. The production of agricultural commodities, either as a primary product or as a by-product, is presented in table 2 below. The production of agricultural commodities, either as a primary product or as a by-product, is presented in table 2 below. The production of agricultural commodities, either as a primary product or as a by-product, is presented in table 2 below.

Figure 18 Contribution of biomass to the final renewable energy consumption in 2018 in EU28 Member States (%)

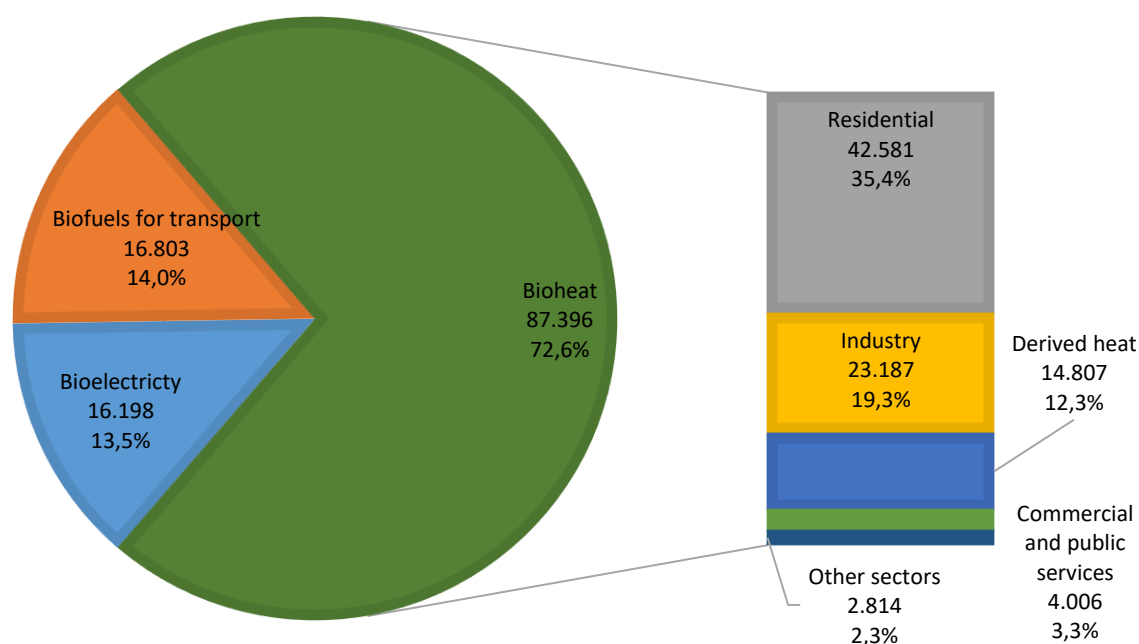


Source: Eurostat, Bioenergy Europe calculations

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Figure 19 Gross final energy consumption of biomass in heat, electricity and transport in EU28 Member States in 2018 (ktoe)



Note: The bioheat consumed in the industry, residential and commercial sectors refers only to the biomass directly used to produce heat for their own consumption. Besides this amount, those sectors also consumed biomass, albeit indirectly, through bioelectricity and derived heat.

Source: Eurostat, Bioenergy Europe

Bioenergy solutions are manifold, with each of them having a role to play in the decarbonisation of our economies. In 2018, 72,6 % of the final energy consumption of bioenergy came as heat production as highlighted in figure 19; with the main consumption being used in both residential and industrial applications. Bioenergy is a significant source in decarbonising the heating & cooling sector which represents nearly half of the final energy consumption within the EU in 2018. The same year, the direct use of biomass for heating that was consumed by the residential sector accounted for around 15% of its heating energy demand within the EU28. This shows that the consumption of bioenergy is mainly local and decentralised. Public debate tends to focus on imported biomass used in dedicated power plants, rather than looking at the whole picture and as statistics reflect, three quarters of all bioenergy consumed is as heat energy with only 4,6% of bioenergy being imported. Statistics play a key role in painting the real picture of the EU's bioenergy consumption.

Solid biomass is the main biomass fuel that is represented in the final energy consumption (78%) and is mainly used for bioheat production. Liquid biofuels are almost exclusively used for transports.

Figure 10: Distribution of the total energy use of business (GWh) in 2010 to 2019 (GWh)



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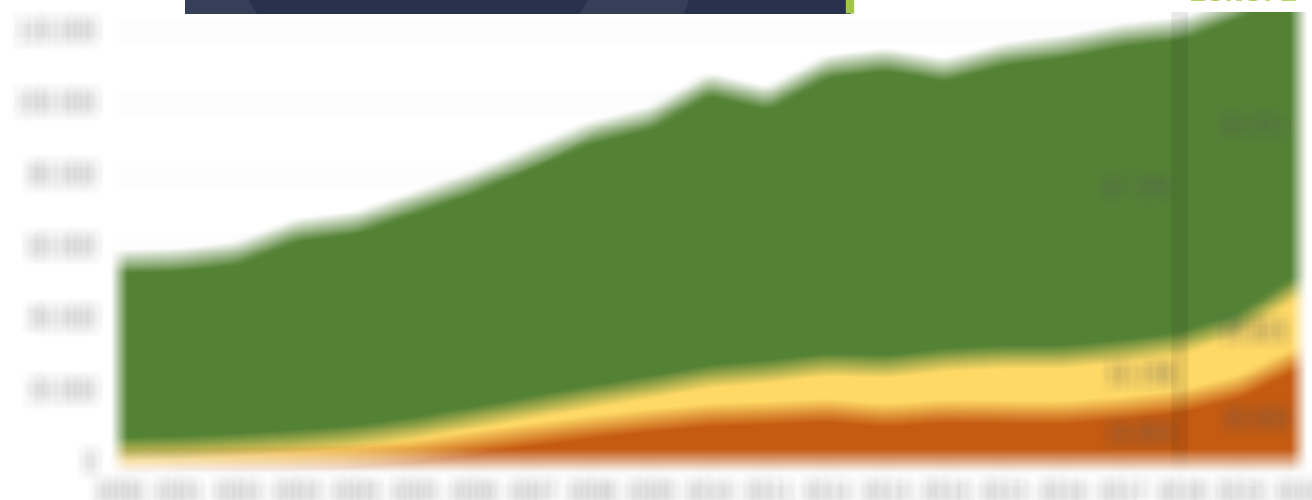
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Source: Eurostat, Bioenergy Europe calculations

VALMET

EXPERT REVIEW

One of the most comprehensive European set of policy initiatives in this century is the European Green Deal, striving EU to be climate-neutral by 2050. As almost 80% of total greenhouse gas emission in the EU28 come from energy production and consumption, it is also clear the energy sector plays a key role in meeting the Green Deal targets.

Time to time, I see or hear experts pitting one renewable energy form against another. I don't see our energy renewal as a game between the different renewable forms of energy production, but between renewable and fossil energy forms – as over 2/3 of EU primary energy production is still based on non-renewable energy sources. Biomass as well as other renewable energy forms, such as wind and solar, all have their role and room in making our energy system climate neutral and at the same time meeting other energy policy goals such as security of supply.

Biomass represents currently almost 60% of primary renewable energy production in EU. In addition to being suitable for producing electricity and heat biomass can also be used as a raw material for liquid biofuels. Biomass energy sector also has significant socio-economic impacts by offering about 700,000 direct and indirect jobs in the EU with a turnover of almost EUR 60 billion.

Biomass use in energy production not only provides clean, affordable and secure energy but also promotes resource efficiency, provides local employment and fosters European innovation that can be exported globally. This is a combination that meets the needs of current and future generations

- Kai Janhunen

Vice President, Energy Business, Valmet
Vice President, Energy Technologies Europe

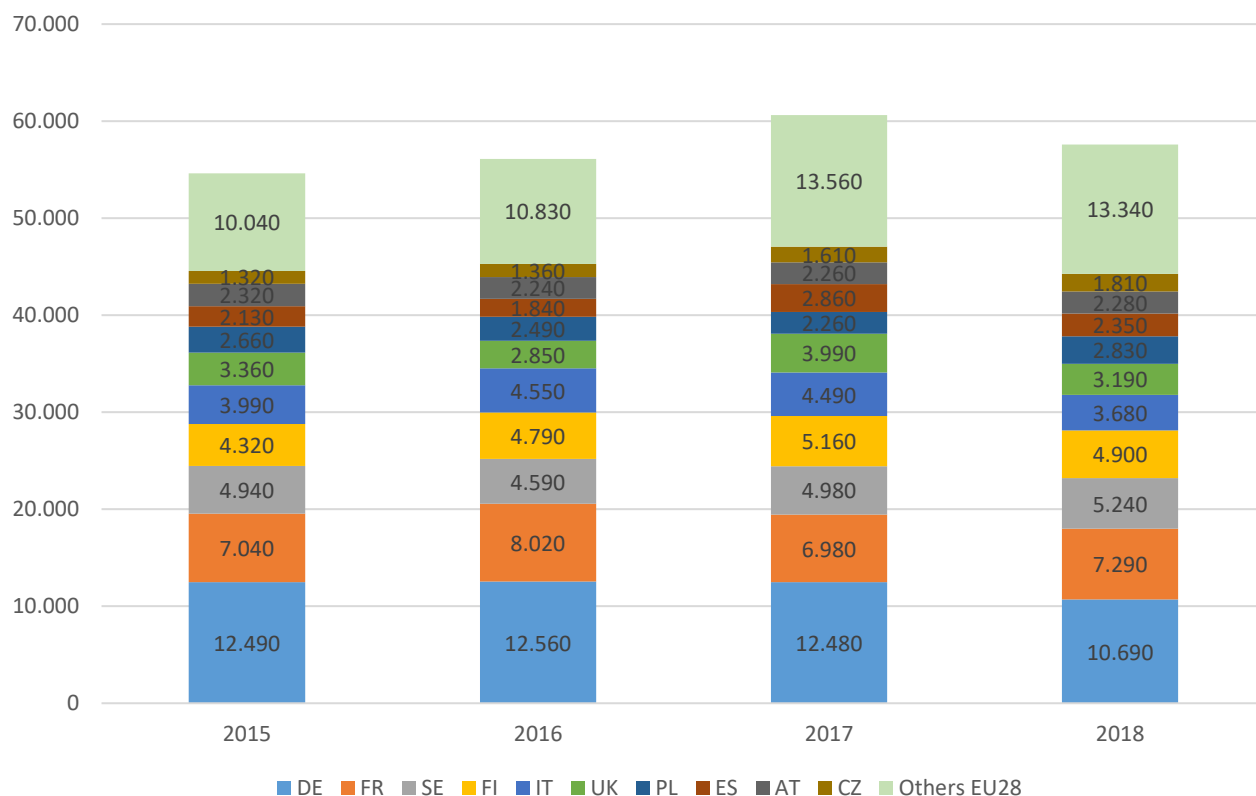


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Microarray is the largest technology-based source of data of large-scale biological information processing. The data sets are in the order of millions of genes, which are represented by thousands of probes. The microarray data are in the form of a matrix, where the rows represent genes and the columns represent probes. The data are often represented as a matrix of binary values (0 or 1) indicating the presence or absence of a gene in a probe. The data are often represented as a matrix of binary values (0 or 1) indicating the presence or absence of a gene in a probe.

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Figure 22 Evolution from 2015 to 2018 and repartition among top 10 countries (of 2018) of the turnover in bioenergy (million €)



Source: EurObserv'er online database

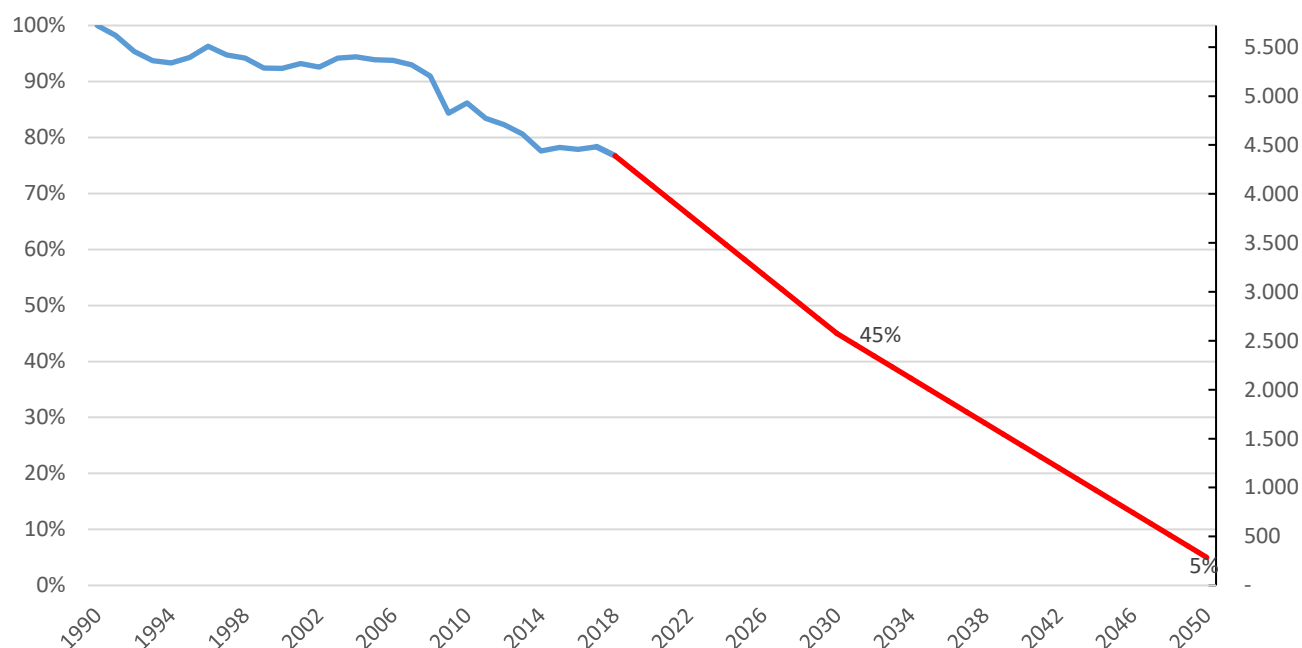
4. Greenhouse gas emissions

In the framework of the Clean Energy for all Europeans Package, the EU institutions agreed in 2018 on an objective of 40% GHG emissions reductions for the EU by 2030.

Since then, most EU Member States have engaged in a path towards carbon neutrality in 2050. In view of this, the newly elected European Commission has proposed an upward revision of this target, to 55%.

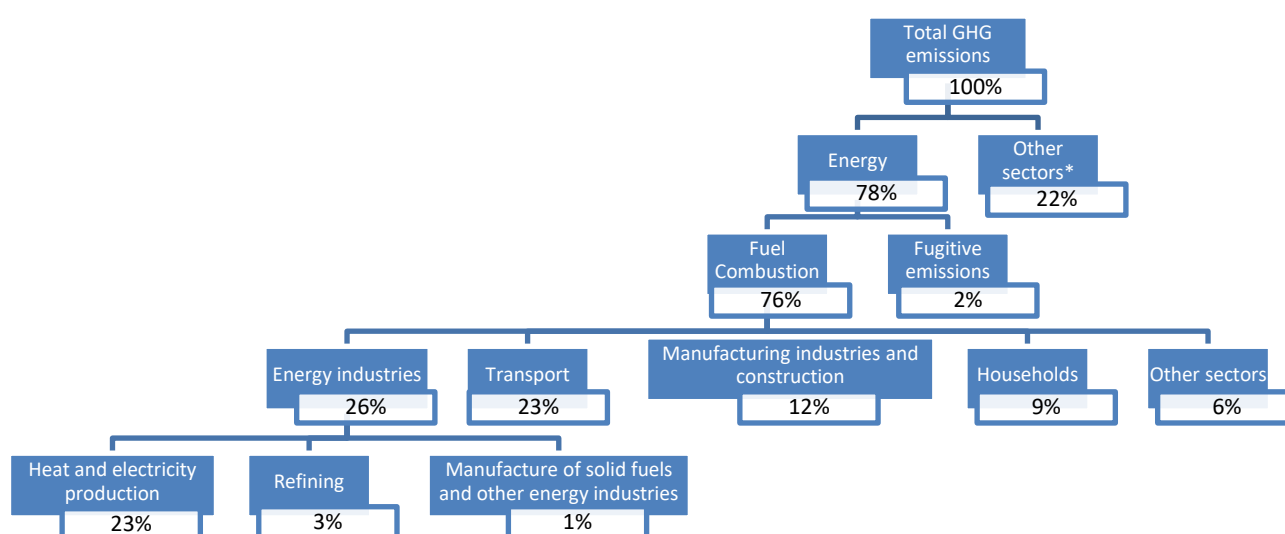
To achieve a higher GHG emissions savings target, in 2021 all the climate energy related EU legislations will be reviewed. Bioenergy Europe is supportive of a higher GHG emissions reduction target, achievable with a greater penetration of renewables in the market. A higher renewable energy objective for 2030 in this sense would give the right signal to investors.

Figure 23 GHG emissions development 1990-2018 with the 2030 and 2050 projection objectives in EU28 (Including international aviation and excluding LULUCF) in % with base year (1990) =100, and MtCO₂eq (right axis)



Source: European Environment Agency

Figure 24 Overview of total GHG emissions of EU28 in 2018 (million tonnes of CO₂eq)

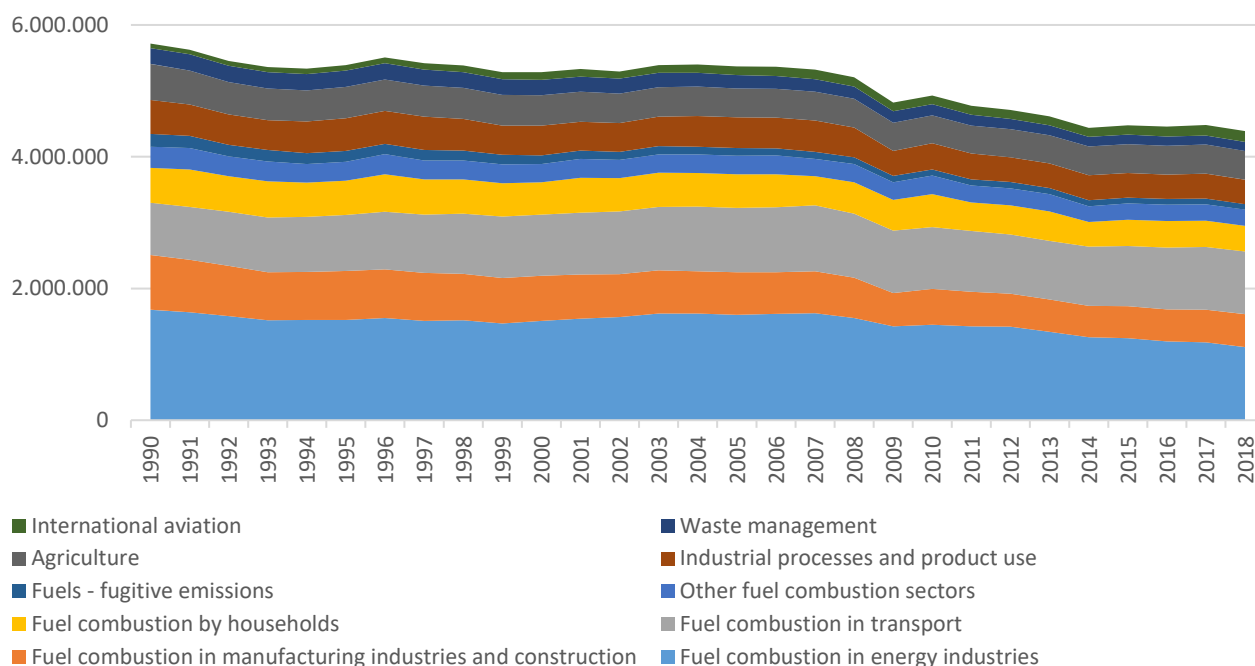


*Other sectors: Industrial processes, Agriculture, LULUCF, Waste management, other

Source: European Environment Agency.

Energy is the main cause of annual GHG emissions (78%), through fossil fuel combustion. Transport and heat & electricity production are responsible for 45% the annual GHG emissions in EU28. We can see by looking at Figure 23& Figure 25, that the total amount of emissions has not decreased in the last few years; with the transport sector even witnessing an increase in emissions compared to 1990 (+20% and + 140% for international aviation). However, energy and manufacturing & construction industries, show a large decrease since 1990, -34% (565 MtCO₂eq) and -40% (331 MtCO₂eq) respectively. This decrease could be linked with energy efficiency measures, fuel switch and/or decreasing activities (relocations).

Figure 25 The evolution of GHG emissions in EU28 for different sectors since 1990 (thousand tonnes of CO₂ eq)

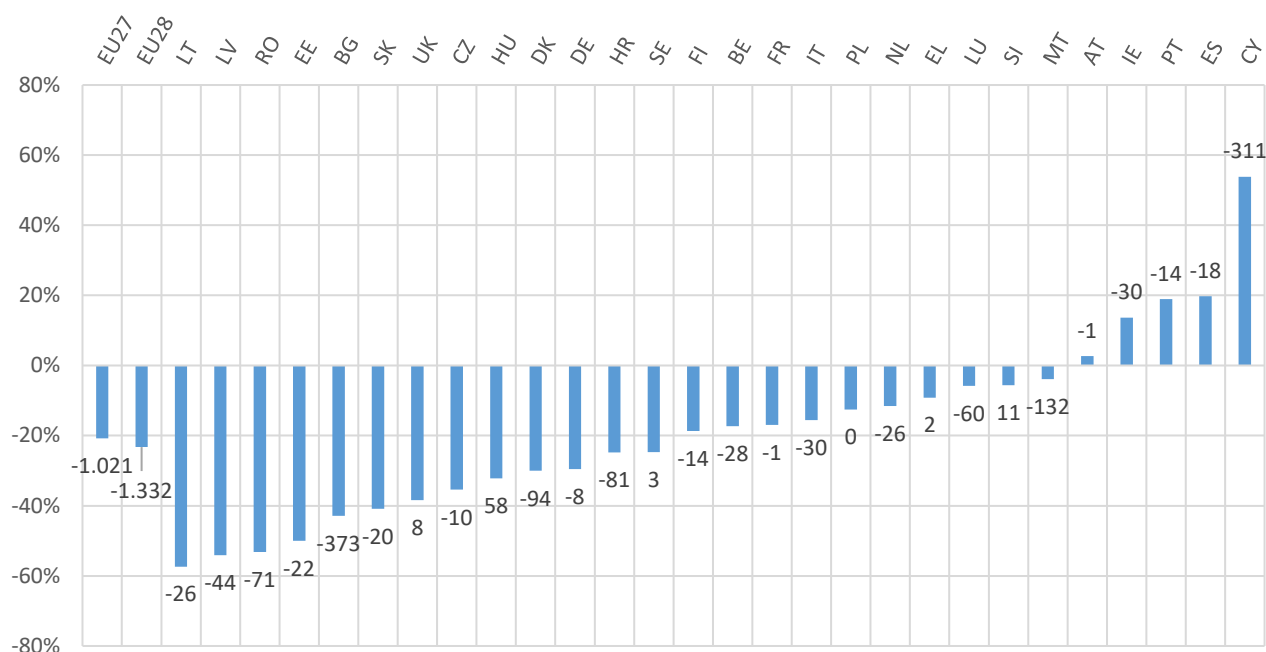


Source: European Environment Agency

If we are to reach a 95% drop in emissions by 2050 (compared to that of 1990), we must divide our emissions of 2018 by 15-fold. This means that by 2050, the EU28 must emit less than one quarter of its current emissions from the energy sector alone. The above figures highlight the difficult journey that lies ahead in order for us to reach climate neutrality. To achieve climate neutrality in the best way possible we cannot afford to wait, we must act now; with strong policies guiding us in the right direction. Significant changes are needed in the way in which the global energy mix is operated. We need to not only reduce the energy demand but simultaneously improve the primary energy usage efficiency; ultimately using renewable energy sources in all different sectors.

Bioenergy Europe reflects this ideal and is part of its vision, being the evolution of the gross final energy consumption within the EU28. This is illustrated in Figure 26.

Figure 26 Total GHG emissions changes in EU28 Member States, 2018 as compared to 1990 (in % and absolute number given in MtCO₂eq)



Source: European Environment Agency

Figure 27 GHG emissions from different types of fuels with LCA approach (g CO₂ eq/MJ)



Note: **Case 1** refers to processes in which a natural gas boiler is used to provide the process heat to the pellet mill. Electricity for the pellet mill is supplied from the grid; **Case 2a** refers to processes in which a woodchips boiler, fed with pre-dried chips, is used to provide process heat. Electricity for the pellet mill is supplied from the grid; **Case 3a** refers to processes in which a CHP, fed with pre-dried woodchips, is used to provide electricity and heat to the pellet mill. Here **SRC** are related to poplar (fertilised).

Source: RED II default values reflect the biomass figures with the fossil fuel figures having been sourced from - Giuntoli J, Agostini A, Edwards R, Marelli L, Solid and gaseous bioenergy pathways: input values and GHG emissions. Calculated according to the methodology set in COM(2016) 767, EUR 27215 EN.

The contribution of sustainable tourism to the development of tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience. The contribution of sustainable tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience. The contribution of sustainable tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience.

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Table 1: The contribution of sustainable tourism to the development of tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience.

			2019			2020		
			Visitors	Revenue	Employment	Visitors	Revenue	Employment
Total			100.0	100.0	100.0	100.0	100.0	100.0
Domestic			75.0	75.0	75.0	75.0	75.0	75.0
Foreign			25.0	25.0	25.0	25.0	25.0	25.0
Sustainable			10.0	10.0	10.0	10.0	10.0	10.0
Non-sustainable			90.0	90.0	90.0	90.0	90.0	90.0
Domestic	Visitors	2020-1	10.0	10.0	10.0	10.0	10.0	10.0
		2020-2	10.0	10.0	10.0	10.0	10.0	10.0
		2020-3	10.0	10.0	10.0	10.0	10.0	10.0
	Revenue	2020-1	10.0	10.0	10.0	10.0	10.0	10.0
		2020-2	10.0	10.0	10.0	10.0	10.0	10.0
		2020-3	10.0	10.0	10.0	10.0	10.0	10.0
	Employment	2020-1	10.0	10.0	10.0	10.0	10.0	10.0
		2020-2	10.0	10.0	10.0	10.0	10.0	10.0
		2020-3	10.0	10.0	10.0	10.0	10.0	10.0
	Sustainable	2020-1	10.0	10.0	10.0	10.0	10.0	10.0
		2020-2	10.0	10.0	10.0	10.0	10.0	10.0
		2020-3	10.0	10.0	10.0	10.0	10.0	10.0

Table 1: The contribution of sustainable tourism to the development of tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience. The contribution of sustainable tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience. The contribution of sustainable tourism is not only in terms of the number of visitors, but also in terms of the quality of the tourism experience.

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Category	Business	Hydrocarbon processing / Refin.
1	~40	~200
2	~10	~150
3	~20	~80

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Whispering is a form of speech in which the vocal cords are not used to produce the sound. Instead, the sound is produced by the air passing through the vocal tract, which is partially closed. This is done by the tongue touching the roof of the mouth, or the lips being pressed together. The sound is then produced by the air passing through the narrow opening. This type of speech is often used in secret conversations, or when the speaker wants to be discreet. It is also used in some forms of music, such as the flute and the violin.

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