

# The Bioeconomy in the European Union in numbers

## Facts and figures on biomass, turnover and employment

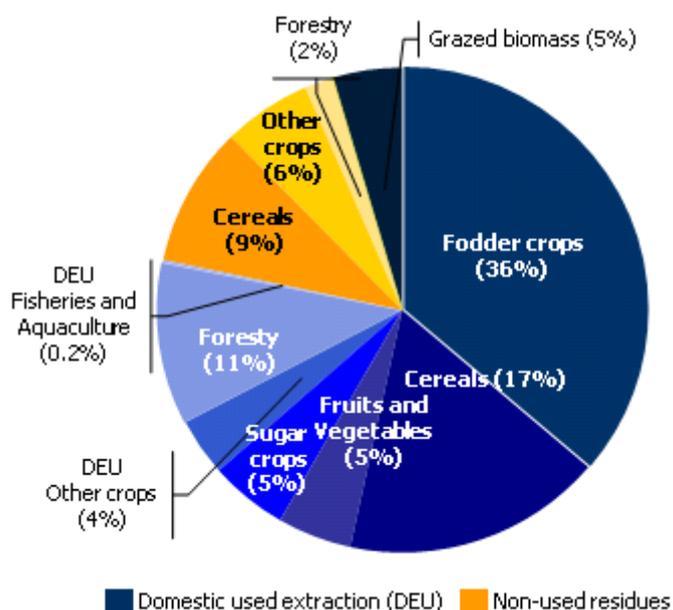
**The bioeconomy is the production of biomass and the conversion of biomass into value added products,** such as food, feed, bio-based products and bioenergy.

It includes the sectors of agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnological and energy industries<sup>1</sup>. The definition used in this document includes also manufacturing of bio-based textiles. It is important to note that these figures do not take account of the full potential of the marine bioeconomy and figures provide only a partial picture of its value.

**Documenting the bioeconomy is a challenge for science and research** because official statistics only report on traditional sectors with no distinction between synthetic and bio-based production (e.g. manufacture of synthetic textile vs bio-based textile). Therefore, indicators for the bioeconomy are estimated based on a combination of multiple sources.

The overview presented here is a compilation of different estimations circulating in the scientific community, using the JRC data management tool DataM<sup>2</sup>. It reflects the current quantitative description of the bioeconomy. Considering that the bioeconomy is still an area of research, such estimations are to evolve according to future advances in research.

**Figure 1. Estimation of domestic extraction of biomass in the European Union (% of total volume of dry matter, 2013)**



DEU: Domestic Extraction Used = harvested production + used residues

Source: Based on DataM – Biomass estimates, database elaborated by the European Commission/Joint Research Centre IPTS and nova Institut

### The bioeconomy in the European Union,

- **uses** 1600 to 2200 million tonnes of biomass produced within Europe yearly<sup>3</sup> ...

... while 450 to 680 million tonnes of biomass produced remain unused.

One part of it needs to remain unused to maintain soil fertility. The conditions needed to take advantage of the rest remains a key question to be addressed.

- **uses** agricultural biomass as the first source of supply.

- **imports** approximately 15% of all biomass consumed, including processed products.

- and **exports** almost the same amount of biomass.

<sup>1</sup> Definition of the European Commission COM(2012) 60 final

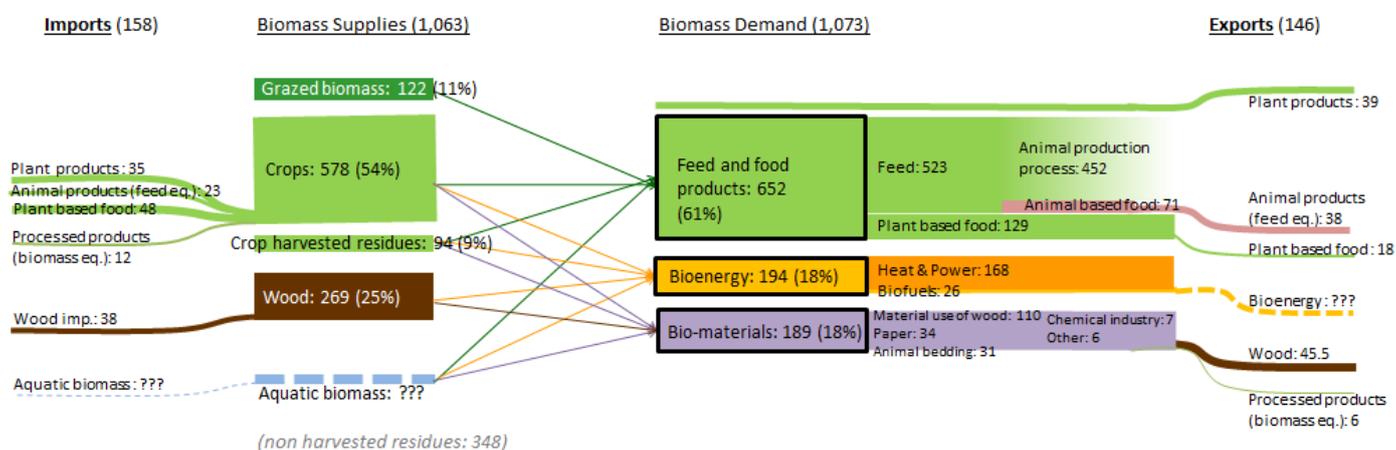
<sup>2</sup> <https://ec.europa.eu/irc/en/scientific-tool/datam-data-agriculture-trade-and-models>

<sup>3</sup> This range reflects diverging estimations across sources, taking into account the latest data available (2011 to 2013)

In the European Union the biomass is mainly consumed for **food and animal feed** purposes, which represents 61% of the whole biomass consumption. Animal feed use alone represents 48% of the total use of biomass.

The sectors of **bio-energy** and **bio-materials** are similar in terms of the quantity of biomass they consume. Each of them consumes around 18% of the whole biomass. Within bio-energy, **biofuels** represents around 2% of the biomass consumed in the European Union.

**Figure 2. Preliminary biomass balance in the European Union (million tonnes of dry matter, EU-28, 2013)**



N.B. This preliminary flow charts represent the current ability to quantify biomass flows. The question marks indicate data gaps or methodological challenges for the quantification. The demand part of the diagram double-counts the biomass at each stage of its cascading use, except for the last stage which is waste. Biomass waste is then not included.

Source: Based on DataM – Biomass estimates, database elaborated by the European Commission / Joint Research Centre IPTS and nova Institut

The EU bioeconomy is mainly based on the production and consumption of carbohydrates, including cellulose, sugars and starch (70% of the biomass consumed). The remaining biomass is almost equally used for its oils and fats, protein or lignin content (6% to 9% each).

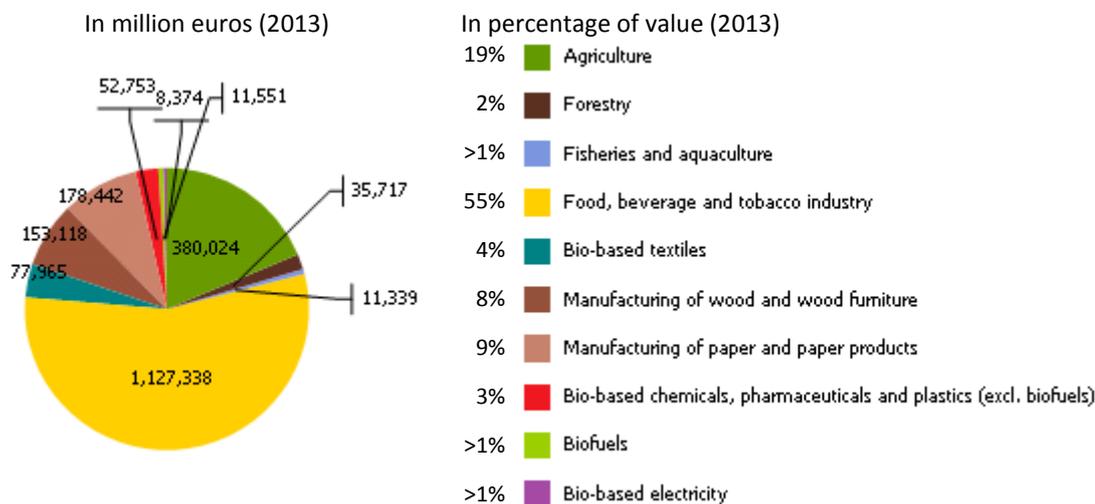
## The European bioeconomy generates a turnover estimated at around 2 trillion euros and employs more than 17 million of persons<sup>4</sup>

The **agricultural** and the **“food, beverage and tobacco”** sectors are leading the European bioeconomy in terms of turnover and employment, followed by the **wood and paper industry**.

Slightly more than a half of the European bioeconomy turnover comes from the “food, beverage and tobacco” sector, 19% comes from Agriculture, followed by the “manufacturing of wood and wood furniture” and the “manufacturing of paper” with 9% and 8% respectively.

<sup>4</sup> According to the sources, estimations vary between 17 and 19 million of persons (latest data available from 2012 and 2013)

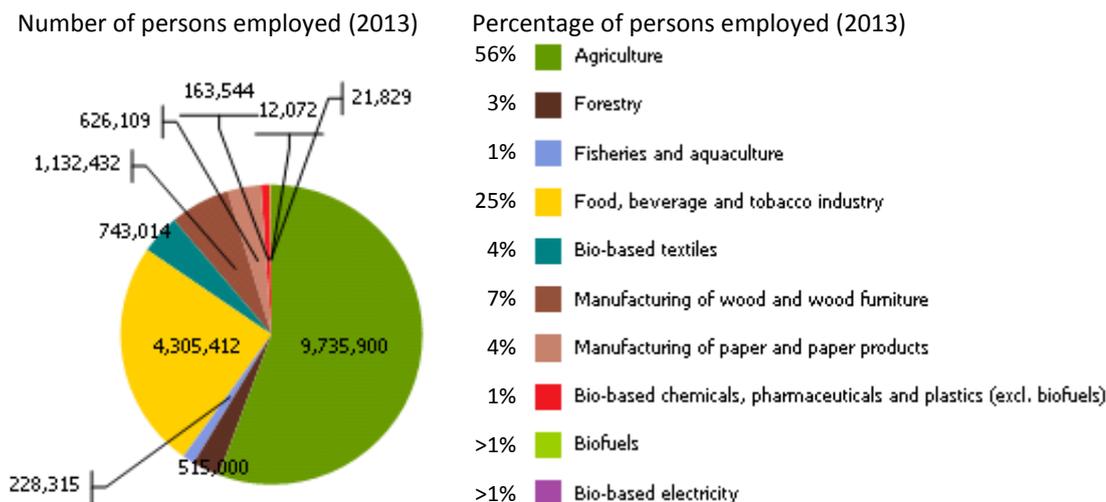
**Figure 3. Turnover in the EU-28 by bioeconomy sector**



Source: Based on DataM – Bioeconomics, database elaborated by the European Commission / Joint Research Centre IPTS and nova Institut

The overview is different when looking at the employment indicators compared to the turnover indicators. The agricultural sector employs slightly more than half of the people employed in the European bioeconomy, a quarter is employed in the “food, beverage and tobacco” sector and another quarter in the “manufacturing of wood and wood furniture” and the “manufacturing of paper”.

**Figure 4. Employment in the EU-28 by bioeconomy sector**



Source: Based on DataM – Bioeconomics, database elaborated by the European Commission / Joint Research Centre IPTS and nova Institut

The capital intensity of the different sectors of the bio-economy is illustrated in Figure 5. The turnover per person employed in the different bioeconomy sectors shows a broad range.

**The bioeconomy of the 28 Member States of the European Union is reflecting national historical, territorial and economic specificities among others.**

Four main orientations of national bioeconomies can be distinguished across the European Union Member States:

**1. A bioeconomy dominated by Agricultural employment**

In Romania, Greece, Poland, Slovenia, Ireland, Portugal and Croatia, agriculture employs more than 60% of the total people employed in the bioeconomy.

**2. A bioeconomy geared toward the Agro-Food industry and Bio-based chemical industries**

The turnover generated by the “food, beverage and tobacco” sector in the Netherlands, Belgium, France, Denmark, Germany, Italy, the United Kingdom, Spain, Luxembourg and Ireland is above the European Union average.

Additionally, these countries demonstrate a turnover per person employed in bio-chemical industries higher than 260 thousand euros per person. The term “Bio-chemical industries” comprises here of bio-based chemistry, bio-based pharmaceuticals and bio-based plastics.

**3. A turnover of the bioeconomy primarily generated by Forestry and downstream industries**

Finland, Sweden, Latvia and Estonia generates more than 40% of their bioeconomy turnover in forestry, the manufacturing of wood and wood furniture and pulp and paper sectors. Sweden and Finland also show an orientation towards the bio-based chemical industry as described in group 2.

**4. Non-specialised bioeconomies**

Bulgaria, the Czech republic, Hungary, Lithuania, Malta and Slovakia show a more mixed bioeconomy with no strong orientation as described for the other member states. Despite Austria showing an orientation towards bio-chemical industries, it was not classified in group 2 because of a clear absence of orientation towards the agri-food sector, and inversely for Cyprus.

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