

Bioeconomy

Its development likely to cause higher food prices

What is bioeconomy?

The environmental crisis - and its most frequently presented dimension in the news, climate change - questions the way the world economy operates. It signals the need to improve radically the environmental sustainability of human activities.

One of the directions in which this improvement can be achieved is to limit the reliance of the economy on non-renewable resources such as fossil minerals and energy, and orient it towards activities based on the use of renewable resources of biological origin ([biomass](#)). It is this type of economy that called **bioeconomy**.



The European Union (EU) defines it as encompassing “the production of renewable biological resources and the conversion of these resources and waste streams into value-added products, such as food, feed, bio-based products and bioenergy” [\[read\]](#).

As can be seen from this definition, bioeconomy has for long been part of the economy. In fact, it has been its main component until the 19th century industrial revolution that coincided with a strong acceleration of the extraction of minerals and fossil fuels.

Over the years, a certain number of stages (The Meadows Report - The Limits to Growth¹ - sponsored by the [Club of Rome](#) in 1972, the [Rio Conference](#) in 1992, and successive reports by the [IPCC](#) and various research panels and groups) have generated an awareness of the multiplicity of negative impacts human activities have on the environment [[read](#)]. It is this revelation that has put the development of bioeconomy on the agenda, particularly during the second decade of this century.

Three visions of bioeconomy

There are three major visions of what bioeconomy is [[read](#)]:

- The first is a **biotechnology vision** of bioeconomy. It is science-centred and gives preeminence to “biotechnology research and application and commercialization of biotechnology in different sectors”. This vision prioritizes economic growth over sustainability, ethical considerations or risk prevention. In this scientific vision, grounded on a strong link between research organizations and universities, on the one hand, and industry on the other, the resource scarcity is not a matter of concern, as technological development is supposed to improve the efficiency of industries and reduce losses.
- The second gives prominence to **bio-resources**, understood as “biological raw materials in sectors such as agriculture, marine, forestry, and bioenergy, as well as on the establishment of new value chains”. It deals with the upgrading and conversion of biological raw materials. The emphasis is more on land productivity to increase biomass availability and develop novel products of biological origin as technological innovations occur, rather than on protection of the environment. This vision is therefore likely to have a negative impact on natural resources (land, water, forests and biodiversity) and climate change. Reduction of wastage and losses is central, particularly through the successive reuse of the same materials (recycling), their final use being the production of fertilizer and bioenergy.
- The third vision is **bioecological**. It prioritizes ecological processes over economic growth at any cost, through optimization of energy and nutrient use, preservation of ecosystem services (water and carbon cycles, pollination, etc.) and protection of biodiversity and soils. Cyclic economy and waste management are among its salient elements.

It is clear that there is no unique definition for understanding what bioeconomy is about, as this concept includes three very different visions: centred on biotechnologies, based on the use of biological resources or relying on optimizing and protecting ecological processes. Evidently, the potential consequences of the development of these three models are not the same.

A recent study by a German researcher [[read](#)] on demand for biomass by the industry (food, wood, construction, paper, garment, energy, chemical, etc.) and its availability emphasizes that a total transition from conventional economy (dependent on the exploitation of fossil energy and minerals) towards bioeconomy would require an amount of carbon and energy almost double from what agriculture and forestry are currently producing every year. Such a transition would exert an unbearable pressure on biomass. This finding sets limits of the development of bioeconomy and necessitates, according to the author, a prioritization of its domains and more sustained efforts to promote recycling.

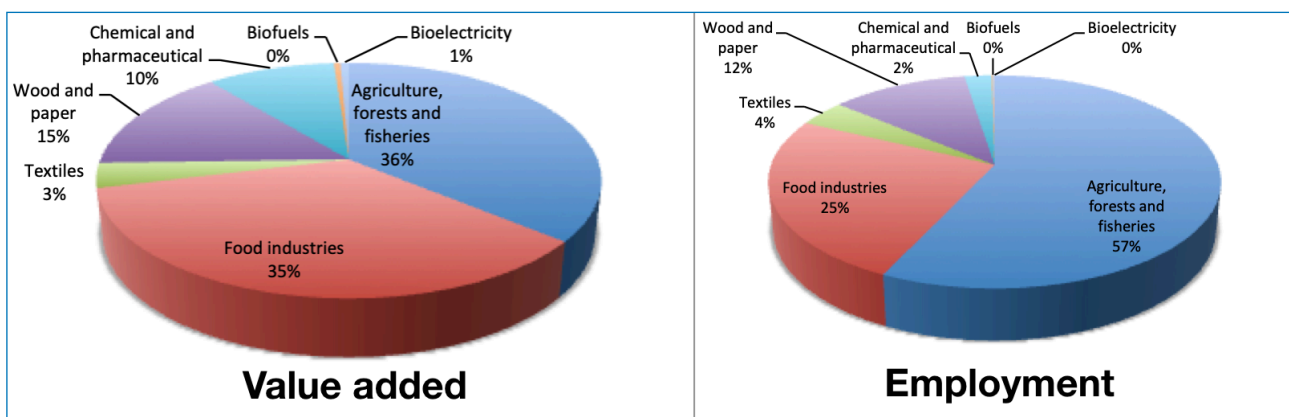
¹ Meadows, D. et al.. [The Limits to Growth - A Report for The Club Of Rome's Project on the Predicament of Mankind](#), 1972, A Potomac Associates Book, Universe Books, New York.

The example of bioeconomy in Europe

In 2017, bioeconomy represented a little less than 5% of GDP (600 billion euros) in the 28 countries of the European Union (EU/28) and a turn over of 2,200 billion euros that grows at a relatively fast rhythm (around 10% between 2017 and 2018), demonstrating that bioeconomy is thriving.

Using available statistics, the above-mentioned researcher shows that bioeconomy, in 2017, was largely dominated by agriculture and food industries from the point of view of value added (71% of the total) as well as labour (82%). Sectors such as chemical, pharmaceutical, biofuel and bioelectric industries remain marginal (11% of value added and 2% of employment) (Fig.1), as they are still overwhelmingly depending on fossil resources.

Fig.1 Relative importance of various components of bioeconomy in the EU/27 countries, from the point of view of value added and employment (2017)



Source: based on data from [Kircher, 2022](#).

Most of the 1313 million tonnes of dry biological matter used annually on average by bioeconomy in the EU/28 over the period 2006-2015 originates from agriculture and forestry. This mass was made 2/3 of products and 1/3 of residues. It contained 560 million tonnes carbon and 23.5 EJ² energy, to be compared with the 1043 million tonnes of carbon and the 57.3 EJ consumed every year for primary energy in the EU/28 during the same period.

What perspectives for bioeconomy in Europe?

Table 1 shows a very fast growth of the use of biomass by industry in the EU/28, particularly for road transport and power.

Table 1 Growth in consumption of biomass for industrial purposes in the EU/28 over the 2000–2019 period

Bioenergy			Biomaterials	
Road Transport	Power	Heating	Industrial Processing	Materials
2500 %	470 %	190 %	150 %	10-20%

² EJ is the symbol of the exajoule = 10¹⁸ Joules.

Source: [Kircher, 2022](#).

According to all forecasts, this growth should continue. The European Commission expects that biomass demand for power should roughly double in 2050 compared to 2019, while total demand of biomass for food, energy and biomaterials is projected to reach between 33.5 and 39.5 EJ, increasing by 38 to 63% relatively to the current level, in order to achieve by 2050 the EU's objective of transition to zero net emissions of greenhouse gases (GHG). This projected demand will considerably exceed the biomass that seems to be producible sustainably. It will require to reconsider priorities and especially to develop strongly renewable energies other than those based on the use of biomass [\[read\]](#).

Indeed, realizing such a biomass production objective would necessitate an increase of cultivated areas in the EU, while the Union's strategy envisages its reduction and a decrease of cultivation intensity [\[read\]](#).

Conclusion

The example of the European Union shows that the development of bioeconomy that is likely to occur as a result of efforts made to reduce GHG emissions required to combat climate change will result in a strong pressure on available biomass.

One of the consequences of this, will be a more intense competition among various possible uses of biomass (food, feed, energy, textiles, wood and paper, chemicals, medicine, etc.).

This conclusion, quite obvious in the case of the EU, is probably also valid for the whole world, in the future.

More competition among different uses of biomass carries the risk of causing food prices to rise and greater pressure on the environment, particularly on land and water resources, and this whichever combination of the three visions of bioeconomy will turn out in reality.

It will therefore be essential, for the future, to define clear priorities for the development and exploitation of biomass, to limit its use for energy and to develop more vigorously other methods of producing renewable energy.

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To know more :

- Kircher, M., [Economic Trends in the Transition into a Circular Bioeconomy](#), Journal of Risk and Financial Management, 2022.
- Bugge MM, Hansen T et Klitkou A. [What Is the Bioeconomy? A Review of the Literature](#). Sustainability, 2016.

Selection of past articles on hungerexplained.org related to the topic:

- [Biogas, source of energy for small farmers in Asia, in the 1980s, has become a profitable commercial industry generating multiple risks](#), 2022.

- [Plants and bacteria largely dominate world biomass](#), 2022.
- [Natural Resources](#), 2022.
- [Climate is changing,... food and agriculture too](#), 2021.