

FACT SHEET

European Bioplastics

Bio-based plastics – fostering a resource efficient circular economy

Benefits, feedstock types, sustainable sourcing, land use

Bioplastics are an important part of the bioeconomy

The European bioeconomy aims to activate the potential of biobased products and generate new markets and industries while enhancing the sustainability of production and consumption.¹ Bioplastics are an important part of the bioeconomy and will shape the future of the plastics sector.

The global bioplastics industry is growing dynamically.

Bioplastics today still represent around one percent of the approx. 360 million tons of plastics produced annually. In 2019, the global production capacity amounted to around 2.11 million tons. But demand is rising, with more and more sophisticated bioplastic materials and products entering the market. Large brand owners have introduced bioplastic packaging or biobased car elements for prominent brands. By 2024, the production capacity is expected to multiply to 2.42 million tons.

Benefits of using renewable feedstock to produce bioplastics

Reducing the dependency on fossil resources

Crude oil or gas, on which the manufacture of conventional plastics is based, are limited resources, which are predicted to decline over the next few decades, becoming significantly more expensive in the process. Therefore, an early transition to renewable sources is important for the plastics industry. Even though only four percent of the global oil consumption is used to produce plastics, with the energy required for the production process accounting for another four percent, sufficient time is needed to develop the new technologies required for the 'post-oil era'.

Annual regrowth: renewability is key

Unlike conventional plastics, bio-based plastics are derived from renewable resources. These resources are predominantly annual crops such as corn, cereals and sugar beets or perennial cultures such as cassava and sugar cane.

¹ European Commission, strategy paper "Innovation for sustainable growth: A bioeconomy for Europe", 2012.

Reducing GHG emissions

Powered by sunlight, plants absorb atmospheric carbon dioxide, the most abundant greenhouse gas (GHG), and transform it into biomass. This biomass becomes the starting point for the production of bio-based plastics.

Bio-based plastic products act as a carbon sink.

Using renewable resources constitutes a temporary removal of greenhouse gasses (basically CO₂) from the atmosphere. This carbon fixation ('carbon sink') can be extended for a longer period of time if the material is recycled. Especially durable products provide added value in this respect.

Increasing resource efficiency through use cascades

The prerequisite for sustainable existence at a high social and economic level is the decoupling of our society from the excessive consumption of finite resources. The sparing use of resources and an increase of resource efficiency are key concepts in this context.²

Made from (annually) regrowing feedstock and offering the potential to 'close the loop', bio-based plastics fit in exactly with these key-paradigms of a modern bioeconomy.

Their potential to increase resource efficiency can be best realised by establishing use cascades, meaning that renew-

able resources are first used for material/product creation and afterwards to produce energy. Ideally, a product is made from renewable resources, then recycled as often as possible, and eventually the energy is recovered at the end of the product life cycle. In this way bioplastics enable intelligent use of resources and ensure a high added value in a low-carbon economy.

Only bio-based materials can 'close the loop' and enable a truly circular economy.

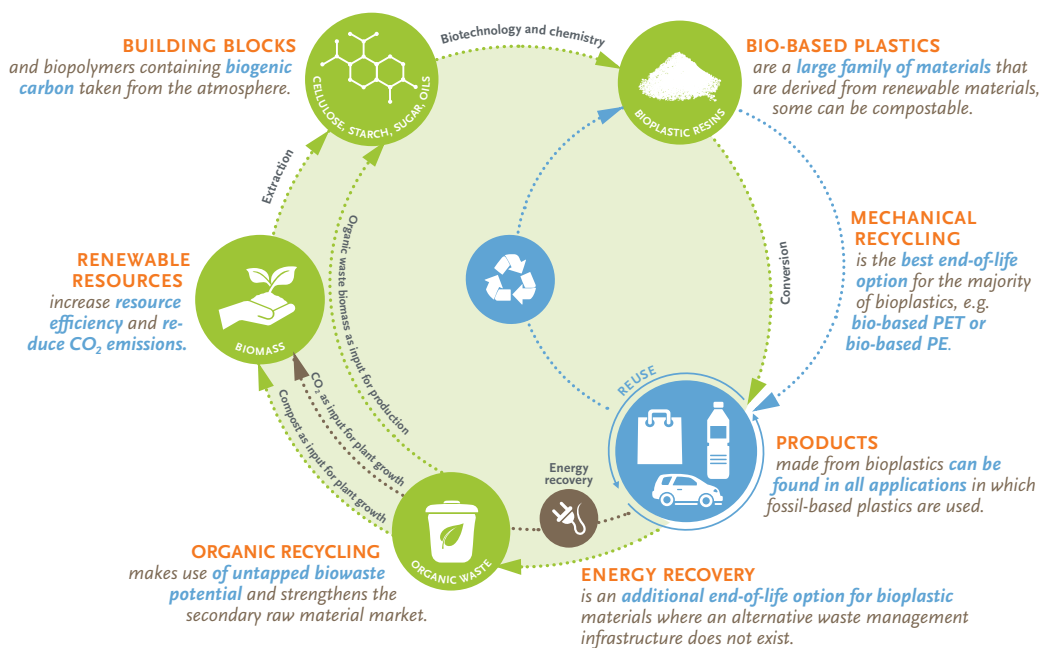
Creating renewable energy

Energy recovery of bio-based packaging at the end of their product life (when recycling is no longer possible) can secure a net benefit for the environment. Bio-based rigid packaging contains valuable energy that can be recovered in combined heat/ power plants. The renewable share of the material releases the same amount of carbon dioxide as the plants had originally taken out of the atmosphere during growth.

Support of the rural economy in Europe

As a growing industrial sector, bioplastic production will provide future European employment growth. The bioplastics industry offers an immense potential for rural development, in particular by helping to improve the economic situation in agricultural areas that might otherwise decline.

Bioplastics – closing the loop



Graph: Life cycle model of bioplastics.

² European Commission, "A resource-efficient Europe – Flagship Initiative of the Europe 2020 Strategy", 2011.



Which feedstock types are used now and in future?

Today, bioplastics are mostly made of carbohydrate-rich plants such as corn or sugar cane, so called agro-based or first generation feedstock. First generation feedstock is currently the most efficient for the production of bioplastics, as it requires the least amount of land to grow and produces the highest yields.³ In order to fulfil its growth potential, it is important that the bioplastics industry has guaranteed access to first generation biomass now and in the future.

The choice of a biomass type for industrial use should only depend on the sustainability and efficiency of the feedstock.

The bioplastics industry is of course also researching the use of non-food crops, such as lingo-cellulosic feedstock or organic waste (second and third generation feedstock), with a view to its further use. Innovative technologies are focussing on non-edible by-products as the source for bioplastics: the production of food crops inevitably generates large amounts of cellulosic by-products such as straw, corn stover or bagasse, which are usually left on the field where they biodegrade at a quantity much higher than necessary to restore the soil carbon pool. In some cases, they are already used to produce energy utilised for the conversion of feedstock. This leaves significant potential for using biotechnological processes to create platform chemicals for industrial purposes – amongst them the production of bioplastics.

First generation feedstock bioplastics represent an enabling technology that will facilitate the transition to higher generations of feedstock. The use of first generation feedstock for industrial applications should therefore not be viewed in a negative light.⁴

Sustainable sourcing of feedstock is key

The sustainable sourcing of feedstock is a prerequisite for more sustainable products. Negative impacts like deforestation of protected areas and environmental damage caused by bad agricultural practice must be avoided. The same applies to social criteria and human rights. The implementation of good agricultural practice, including guidelines for social standards (health protection, etc.), is part of the sourcing strategy of many companies, e.g. by implementing a suppliers' code of conduct.

Certification is an appropriate tool to ensure the sustainable sourcing of biomass

There are several stakeholder initiatives committed to achieving sustainability goals for specific products, such as the Better Sugar Cane Initiative (Bonsucro). The independent certification of sustainability criteria is another approach to help follow the guidelines set by the European Renewable Energy Directive (RED). Corresponding certification schemes have been established in several European countries (e.g. by ISCC or RSB).

Examples - Certifications and initiatives



³ See publications from the nova-Institute 2013: "Food or non-food: Which agricultural feedstocks are best for industrial uses?"; See also calculations from EUBP, IfBB - Institute for Bioplastics and Biocomposites University Hanover, and nova-Institute, 2019: https://www.european-bioplastics.org/wp-content/uploads/2019/11/Land_use_estimation_2019-2024_agri_en.jpg.

⁴ This position is further backed up by a study published by the World Bank in 2015, according to which an increase in food prices is largely influenced by the oil price. Biofuels and bioplastics can help to ease the pressure on oil prices.

Land use for food, feed, and bioplastic production

The discussion about the use of biomass for industrial purposes is often linked to the question about whether the conversion of potential food and feed into materials is ethically justifiable. This emotional debate often lacks empirical research to support claims with actual facts.

No competition between biomass use for food, feed, and for material use. About 0.016 percent of the global agricultural area is needed to grow feedstock for bioplastics.

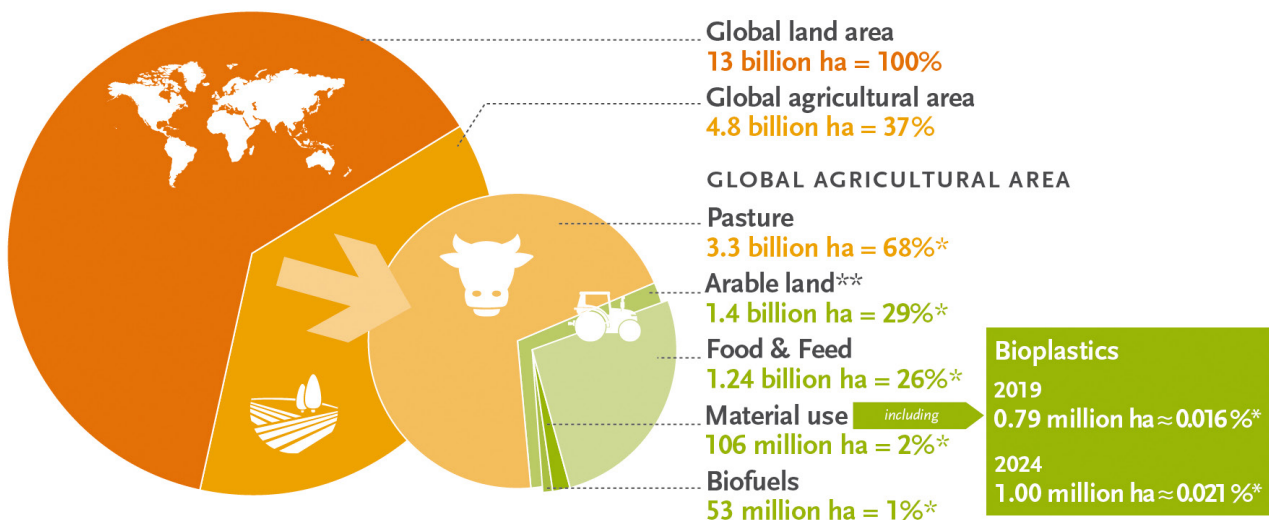
Enough food to feed the world's population is produced, but unfortunately roughly one third of it is wasted each year.⁵

Growing food, feed and pasture use account for about 96 percent of the global agricultural area. Biomass grown for material use only accounts for approximately 2 percent and with only about 0.016 percent being attributable to bioplastics.⁶ The sheer difference in volume shows that there is no competition between biomass use for food and feed, and for material use.

Conclusion

Bio-based plastics show impressive growth figures and have proven benefits compared to fossil-sourced materials. In order to ensure that the European market can best exploit the potential of bio-based plastics, a level playing field for all bio-based industries that use biomass is required in Europe. This will ultimately ensure the highest value creation and the strongest environmental benefits.

Land use estimation for bioplastics 2019 and 2024



Source: European Bioplastics (2019), FAO Stats (2017), nova-Institute (2019), and Institute for Bioplastics and Biocomposites (2019). More information: www.european-bioplastics.org

* In relation to global agricultural area
** Including approx. 1% fallow land

⁵ Food waste harms climate, water, land and biodiversity – new FAO report 2013 <http://www.fao.org/news/story/en/item/196220/code/>.

⁶ Market data by European Bioplastics, and nova-Institute, 2019. For more information on food security see the Economist Intelligence Unit's assessment tool: <http://foodsecurityindex.eiu.com/>.

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