

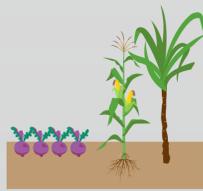
Biofuels

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Origin and generations

Depending on the origin of their feedstock, there are two different generations of biofuels:

First generation



They come from agricultural crops such as sugar cane, beetroot, or molasses; cereals such as wheat, barley, or corn; or oils such as rapeseed or soybean.

Second generation



Manufactured from organic waste, such as used cooking oils, agricultural or livestock waste, or forest biomass, among others.

2

Applications and types

Transport decarbonization

Depending on the raw material used, biofuels can reduce CO₂ emissions by up to 90%.

Air transport

SAF (Sustainable Aviation Fuel)

The most common SAF is HEFA (hydroprocessed esters and fatty acids), which is obtained by hydrotreating and cracking/isomerization of vegetable oils or fats. It is the sustainable substitute for traditional aviation kerosene¹.

Sea and land transport

Renewable diesel

It is obtained by hydrotreating oils or fats (in the case of HVO²) or through transesterification (in the case of FAME³). This fuel can replace part, if it is FAME, or up to 100%, if it is HVO, of the traditional diesel used for **maritime and road transport**.

Bioethanol

It is obtained by fermenting plant-derived sugars, such as sugar cane or sugar beet. Different percentages of it are blended with gasoline, as a direct addition or in the form of derivatives (ETBE-ethyl tertiary-butyl ether), and it is used as a component of biofuels for **road transport**.

¹The maximum blend percentage currently approved by technical standards and agencies is 50%

²HVO: Hydrotreated vegetable oil

³FAME: Fatty acid methyl ester

Decarbonization of the industry

Biogas

Produced from agricultural waste, sewage, and urban waste. It is used, mainly in the form of biomethane or bioLPG, in the decarbonization of some industrial processes to replace natural gas from fossil fuels or propane.

As a bioautogas, it can also be used as a substitute for traditional autogas in vehicles using this type of fuel.

3

Benefits

Biofuels are a solution to accelerate the energy transition.



They are renewable and **generate significantly lower net CO₂ emissions** during their life cycle **than fossil fuels** (up to 90% less), as they come from biomass that has absorbed CO₂ from the atmosphere as it has grown.



They are chemically analogous to the fossil fuels used in today's engines, which **allows their partial or total substitution without the need for modifications in the supply system or in the engines**.



This direct substitution capability, which can be implemented immediately, **contributes to rapid decarbonization** in all sectors it is applied in, especially in those with complex electrification, such as aviation, heavy land transport, or maritime transport.



Mature technologies exist to carry out their production and, in certain cases, existing industrial facilities can be used, with certain modifications, for their manufacture.



Second-generation biofuels promote the circular economy by using waste for their production that would otherwise be discarded or end up in landfills.