



Basic Knowledge Bioethanol

The consumption of fossil fuels (coal, petroleum, natural gas) has risen sharply in recent decades. The outputs required to cover the energy demand are leading to an ever more rapid depletion of deposits. Newly discovered deposits are difficult to extract due to the location and frequent impurities. Therefore alternatives are being sought.

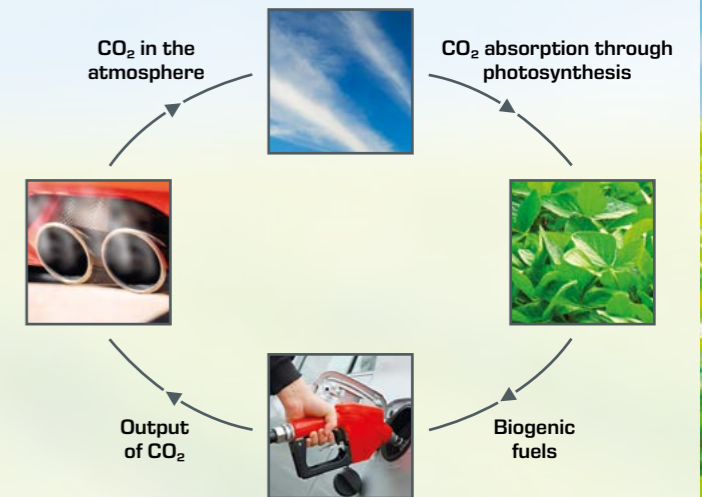
Replenishable biomass can be used to produce storable carbon neutral energy sources. These energy sources play an important role alongside discontinuous sources such as solar and wind in realising a carbon-neutral and renewable energy supply.

Different biological and thermal processes are used to convert the biogenic energy feedstock into a storable energy source.



The CO₂ cycle of bioethanol

Photosynthesis, with the aid of sunlight, enables plant growth. In this process CO₂ from the atmosphere, as well as water and inorganic substances from the plants, are absorbed and converted into energy-rich organic compounds. This biomass can be regarded as the product of a biochemical process, in which a portion of the absorbed sunlight is stored in the form of chemical energy. Being able to use the biomass as an energy source in various technical processes requires special treatment processes. These include simple physical processes as well as more complex thermochemical and biological processes.



Biofuels for carbon-neutral energy

In addition to the simple mechanical processes such as comminution and press agglomeration used to produce solid energy sources (pellets), complex biological processes are used to produce biofuels and biogas.

These methods are applications of natural processes on an industrial scale. Factors such as temperature, pH value, mixing and residence time play an important role in these processes, so as to achieve the greatest yield of energy sources from the biomass.

Biofuels are substitutes for super unleaded and diesel fuels, which are either mixed with fossil fuels or used directly

with appropriate engine technology. The basis of biofuel is ethanol for super unleaded fuel and vegetable oil for diesel fuel.

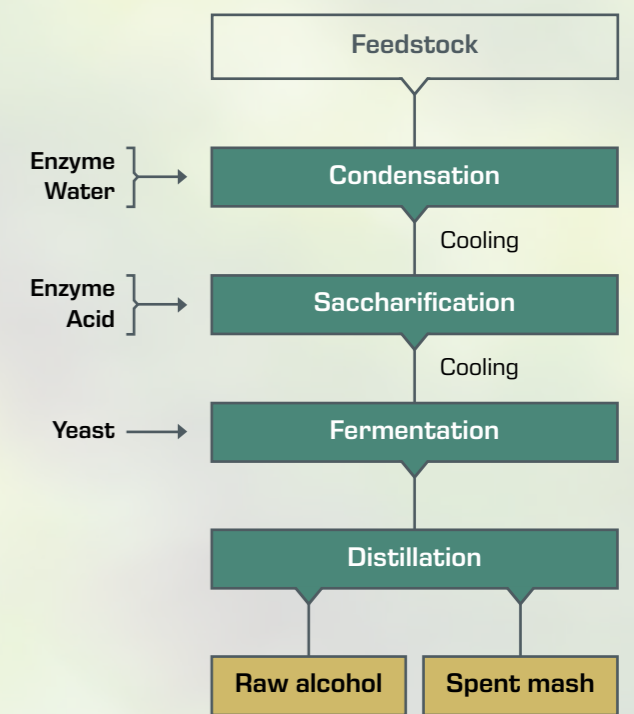
For the field of biofuels, we supply a complete system that uses enzymes and yeasts to convert starch ethanol. The integrated distillation system is used to separate the ethanol from the digestate.

Another system for the conventional production of bio-diesel by means of transesterification is in development.

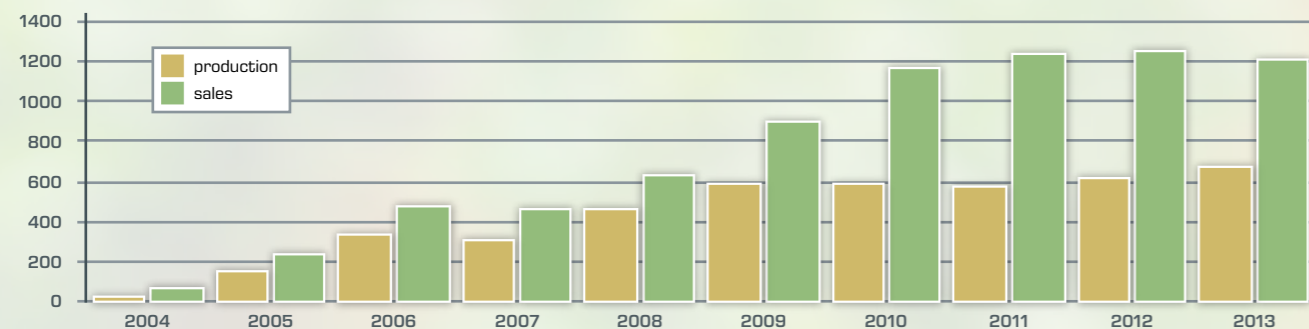
Starting materials for bioethanol are the carbohydrates (sugars) contained in the plants, from which alcohol is created with the aid of enzymes and yeast fungus. While plants containing sugar are fermented directly, in the case of starchy plants it is the actual alcoholic fermentation of the enzymatic digestion of the plant material that comes first.



The fermentation process is completed once either the sugar is consumed or a maximum alcohol concentration is reached. The resulting bioethanol is separated by distillation. The product of distillation is called raw alcohol.



Fundamental principle of bioethanol production



Growth of bioethanol in Germany (in 1000t)

(Source: BDBe/FNR)

