Biofuel meaning

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Biofuel is any liquid fuel made from "biomass"--that is, plants and other biological matter like animal waste and leftover cooking fat. Biofuels can be used as replacements for petroleum-based fuels like gasoline and diesel.

As we search for fuels that won"t contribute to the greenhouse effect and climate change, biofuels are a promising option because the carbon dioxide (CO2) they emit is recycled through the atmosphere. When the plants used to make biofuels grow, they absorb CO2 from the air, and it"s that same CO2 that goes back into the atmosphere when the fuels are burned. In theory, biofuels can be a "carbon-neutral" or even "carbon-negative" way to power cars, trucks and planes, meaning they take at least as much CO2 out of the atmosphere as they put back in.

A major promise of biofuels is that they can lower overall CO2 emissions without changing a lot of our infrastructure. They can work with existing vehicles, and they can be mass-produced from biomass in the same way as other biotechnology products, like chemicals and pharmaceuticals, which are already made on a large scale. In the future, we may also be able to move large amounts of biofuels through existing pipelines.

Today, many different biofuels are in production, made in many different ways. The most common process is to use bacteria and yeast to ferment starchy foods like corn into ethanol, a partial replacement for gasoline. Most gasoline sold in the U.S. is mixed with 10% ethanol.

Newer research in biofuels aims to produce higher-grade fuels like jet fuel; to create cleaner-burning fuels that are better for the environment and human health; or to use less valuable biomass like algae, grasses, woody shrubs, or waste from cooking, logging and farming. While some of these "advanced biofuels" are already in production, none are being used in nearly the amounts of "first-generation" ethanol and biodiesel.

There are many challenges to making biofuels that are truly carbon neutral. That"s because many steps used to create biofuels--fermentation, the energy for processing, transportation, even the fertilizers used to grow plants--may emit CO2 and other greenhouse gases even before the fuels are burned. The farmland used to grow biomass can also have its own climate impacts, especially if it takes the place of CO2-storing forests. This means that the details of how biofuels are made and used are very important for their potential as a climate solution.

Overall, bioenergy covers approximately 10% of the total worldenergy demand. Traditional unprocessedbiomass such asfuelwood, charcoal andanimal dung accounts for most of this and represents the mainsource of energy for a large number of people in developingcountries who use it mainly for cooking and heating.

More advanced and efficient conversion technologies now allowthe extraction ofbiofuelsfrom materials such as wood, crops and waste material. Biofuelscan be solid, gaseous or liquid, even though the term is oftenused in the literature in a narrow sense to refer only to liquidbiofuels for transport.

Biofuels may be derivedfrom agricultural crops, including conventional food plants orfrom special energy crops. Biofuels may also be derived fromforestry, agricultural or fishery products or municipal wastes,as well as from agro-industry, food industry and food serviceby-products and wastes.

A distinction is made between primary and secondarybiofuels. In the case ofprimary biofuels, such asfuelwood, wood chips andpellets, organic materials are used in an unprocessed form,primarily for heating, cooking or electricity production.Secondary biofuels result from processing ofbiomass and include liquidbiofuels such as ethanoland biodiesel that can beused in vehicles and industrial processes.

Even though the production of liquidbiofuels for transport hasgrown rapidly in recent years it currently represents only 1% oftotal transport fuel consumption and only 0.2 to 0.3% of totalenergy consumption worldwide. More...

Ethanolis a type of alcohol thatcan be produced using anyfeedstock containingsignificant amounts of sugar, such as sugar cane or sugar beet,or starch, such as maizeand wheat. Sugar can be directly fermented to alcohol, whilestarch first needs to be converted to sugar. Thefermentation process issimilar to that used to make wine or beer, and pure ethanol isobtained by distillation. The main producers are Brazil and theUSA.