

Renewable-Fuels and their Advanced Applications in the Environment

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DESCRIPTION

Renewable fuels are those derived from renewable resources, such as biodiesels derived from animal fats or vegetable oils and bioethanol derived from sugarcane or corn. Depending on how it is produced, hydrogen gas can be considered a renewable fuel. The term "biofuel" refers to the energy derived from the breakdown of organic materials (biomass) derived from animal and plant sources. Almost any biological material, such as grass, wood, crops, trees, animal waste, and agricultural waste, can be used to make biofuel, which is an alternative to fossil fuels.

Renewable fuels offer a long-term compared to conventional, non-renewable resources like petroleum. Depending on the manufacturing process, various renewable fuels can be produced from organic feed stocks such as switch grass. Different methods for producing renewable fuels include hydro treatment, gasification, and trans esterification.

Renewable fuel research is beneficial both economically and environmentally. Renewable fuels may diversify vehicle fuel options while also lowering CO₂ and greenhouse gas emissions. Municipal waste can also be used to make renewable fuels. Methane from municipal waste can be transformed into biogas and natural renewable gas, although the latter could be used in established natural gas pipelines.

Renewable fuels may have the largest impact on the transportation industry. While other renewable energy sources, such as wind and solar energy, are not practical for many types of transportation, renewable fuels are. Hydrogen fuel cell vehicles, airplanes powered by biomass-based sustainable aviation fuels, and biodiesel-powered buses are just a few examples of how sustainable fuels have already affected the transportation industry.

Renewable fuels have the potential to have the greatest impact on the transportation industry. Renewable fuels are more practical than other sustainable energy sources such as wind and

solar energy. Sustainable fuels have already had an impact on the transportation industry, as evidenced by hydrogen fuel cell vehicles, airplanes operated by biomass-based sustainable alternative energy, and biodiesel-powered buses.

One major issue with renewable fuels is the high cost of production. Major manufacturing production of renewable fuels is not financially sustainable unless benefits are increased or markets are expanded. Bio refineries can convert biomass and waste resources into value-added chemicals, but in order to gain industrial support, they must be cost competitive with petroleum refineries. There are two major biofuel fractions derived from the processing of organic materials derived from plants and animals, namely Biodiesel and Ethanol.

The primary distinction between the two biofuels is the method by which they are produced. While biodiesel is produced through the trans-esterification of animal fats and vegetable oils, ethanol is primarily produced through the fermentation of plant-based substrates.

The use of waste as fuel provides a solution to two distinct problems. Researchers are working on converting wastewater sludge into bio crudes that can be refined using traditional petroleum processes. This is accomplished through the use of high pressure and temperature in a process known as hydrothermal liquefaction. This reduces waste in landfills and provides fuel for other purposes.

Biofuels are currently being used to replace traditional fossil fuels in heating and transportation. Bio-fuels can also be combined into gasoline to increase octane and lower harmful emissions. Renewable fuels have increased in popularity due to their sustainable development, low carbon cycle contributions, and, in some cases, lower levels of greenhouse gases.

These fuels geopolitical implications are also of interest, especially to industrialized economies wanting independence from Middle Eastern oil.

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