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Biomass



Biomass Basics

Biomass (organic matter) can be used to provide heat, make fuels, chemicals and other products, and generate electricity. Wood, the largest source of bioenergy, has been used to provide heat for thousands of years. But there are many other types of biomass—such as wood, plants, residue from agriculture or forestry, and the organic component of municipal and industrial wastes— that can now be used to produce fuels, chemicals and power. In the future, biomass resources may be replenished through the cultivation of energy crops, such as fast-growing trees and grasses, called biomass feedstocks.

Unlike other renewable energy sources, biomass can be converted directly into liquid fuels for our transportation needs. The two most common biofuels are ethanol and biodiesel. Ethanol, an alcohol, is made by fermenting any biomass high in carbohydrates, like corn, through a process similar to brewing beer. It is mostly used as a fuel additive to cut down a vehicle's carbon monoxide and other smog-causing emissions. Biodiesel, an ester, is made using vegetable oils, animal fats, algae, or even recycled cooking greases. It can be used as a diesel additive to reduce vehicle emissions or in its pure form to fuel a vehicle.

Heat can be used to chemically convert biomass into a fuel oil, which can be burned like petroleum to generate electricity. Biomass can also be burned directly to produce steam for electricity production or manufacturing processes. In a power plant, a turbine usually captures the steam, and a generator then converts it into electricity. In the lumber and paper industries, wood scraps are sometimes directly fed into boilers to produce steam for their manufacturing processes or to heat their buildings. Some coal-fired power plants use biomass as a supplementary energy source in their efficiency boilers to significantly reduce emissions.

Even gas can be produced from biomass for generating electricity. Gasification systems use high temperatures to convert biomass into a gas (a mixture of hydrogen, carbon monoxide, and methane). The gas fuels a turbine, which is very much like a jet engine, only it turns an electric generator instead of propelling a plane. The decay of biomass in landfills also produces a gas—methane—that can be burned in a boiler to produce steam for electricity generation or for industrial processes.

New technology could lead to using biobased chemicals and materials to make products such as anti-freeze, plastics, and personal care items that are now made from petroleum. In some cases these products may be completely biodegradable. While technology to bring biobased chemicals and materials to market is still under development, the potential benefit of these products is great.

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