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Biomass Energy Basics

We have used biomass energy, or "bioenergy"—the energy from plants and plant-derived materials—since people began burning wood to cook food and keep warm. Wood is still the largest biomass energy resource today, but other sources of biomass can also be used. These include food crops, grassy and woody plants, residues from agriculture or forestry, oil-rich algae, and the organic component of municipal and industrial wastes. Even the fumes from landfills (which are methane, a natural gas) can be used as a biomass energy source.

Benefits of Using Biomass

Biomass can be used for [fuels](#), [power production](#), and [products](#) that would otherwise be made from fossil fuels. In such scenarios, biomass can provide an array of benefits. For example:

- The use of biomass energy has the potential to greatly reduce greenhouse gas emissions. Burning biomass releases about the same amount of carbon dioxide as burning fossil fuels. However, fossil fuels release carbon dioxide captured by photosynthesis millions of years ago—an essentially "new" greenhouse gas. Biomass, on the other hand, releases carbon dioxide that is largely balanced by the carbon dioxide captured in its own growth (depending how much energy was used to grow, harvest, and process the fuel).
- The use of biomass can reduce dependence on foreign oil because biofuels are the only renewable liquid transportation fuels available.
- Biomass energy supports U.S. agricultural and forest-product industries. The main biomass feedstocks for power are paper mill residue, lumber mill scrap, and municipal waste. For biomass fuels, the most common feedstocks used today are corn grain (for ethanol) and soybeans (for biodiesel). In the near future—and with NREL-developed technology—agricultural residues such as corn stover (the stalks, leaves, and husks of the plant) and wheat straw will also be used. Long-term plans include growing and using dedicated energy crops, such as fast-growing trees and grasses, and algae. These feedstocks can grow sustainably on land that will not support intensive food crops.

NREL's vision is to develop technology for [biorefineries](#) that will convert biomass into a range of valuable fuels, chemicals, materials, and products—much like oil refineries and petrochemical plants do. ([PDF 664 KB](#)) [Download Adobe Reader](#).

NREL performs research to develop and advance technologies for the following biomass energy applications:

- [Biofuels](#) — Converting biomass into liquid fuels for transportation
- [Biopower](#) — Burning biomass directly, or converting it into gaseous or liquid fuels that burn more efficiently, to generate electricity
- [Bioproducts](#) — Converting biomass into chemicals for making plastics and other products that typically are made from petroleum

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Other Resources

[Exploring Ways to Use Biomass Energy](#)
 U.S. Department of Energy Consumer Guide

[Biomass Program](#)

U.S. Department of Energy

[Alternative Fuels Data Center](#)

U.S. Department of Energy

[U.S. Department of Energy Bioenergy](#)
[Feedstock Information Network](#)
[Glossary of Biomass Terms](#)

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

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