

S6 Biomass Energy

What is biomass energy?

Biomass is renewable organic material that comes from plants and animals. Biomass energy is considered a renewable energy source because we can always grow more plants and trees. It is not an infinite resource, however, as there is only so much land and water to grow plants. Biomass contains stored chemical energy from the sun. Plants produce biomass through photosynthesis. Biomass can be burned directly for heat or converted to renewable liquid and gaseous fuels in different ways.

Biomass sources for energy include:

- Wood and wood processing wastes
- Agricultural crops and waste materials – corn, soybeans, sugar cane
- Biogenic materials in municipal solid waste – paper, cotton, and wool products, and food, yard, and wood wastes
- Animal manure and human sewage

How is biomass converted to energy?

Biomass is converted to energy in a variety of ways:

- Direct combustion (burning) to produce heat – this is the most common way to produce energy from biomass.

- Thermochemical conversion to produce solid, gaseous, and liquid fuels. One example of thermochemical conversion is pyrolysis, which is the process of heating organic materials to 400–500°C in the near complete absence of oxygen. Biomass pyrolysis produces fuels such as charcoal, bio-oil, renewable diesel, methane, and hydrogen.
- Chemical conversion to produce liquid fuels. Transesterification is a chemical conversion process used to convert vegetable and animal fats into fatty acid methyl esters (FAME), which are used to produce biodiesel.
- Biological conversion to produce liquid and gaseous fuels. This includes fermentation to convert biomass into ethanol and anaerobic digestion to produce renewable natural gas.

Biomass energy through the years

Biomass has been used as a source of heat energy since fire was first discovered. It is still very common for people around the world to burn wood as a primary source of heat. Biofuels such as ethanol was used as lamp fuel in the United States in the 1800s. The first Model-T Fords used ethanol for fuel until 1908. Recently, biomass and biofuels have become popular as an alternative to fossil fuels such as gasoline.

What are the disadvantages of using biomass energy?

- Burning causes air pollution.
- Greenhouse gases such as carbon dioxide are released into the atmosphere.

- Clearing land to grow corn and sugar cane destroys natural habitats.
- Land used for growing biomass could be used to grow other types of food.
- Chemicals and fertilisers used while growing biomass can cause water pollution.

Despite the negatives associated with biomass energy, many people agree that it is a cleaner alternative to burning fossil fuels such as coal and oil.