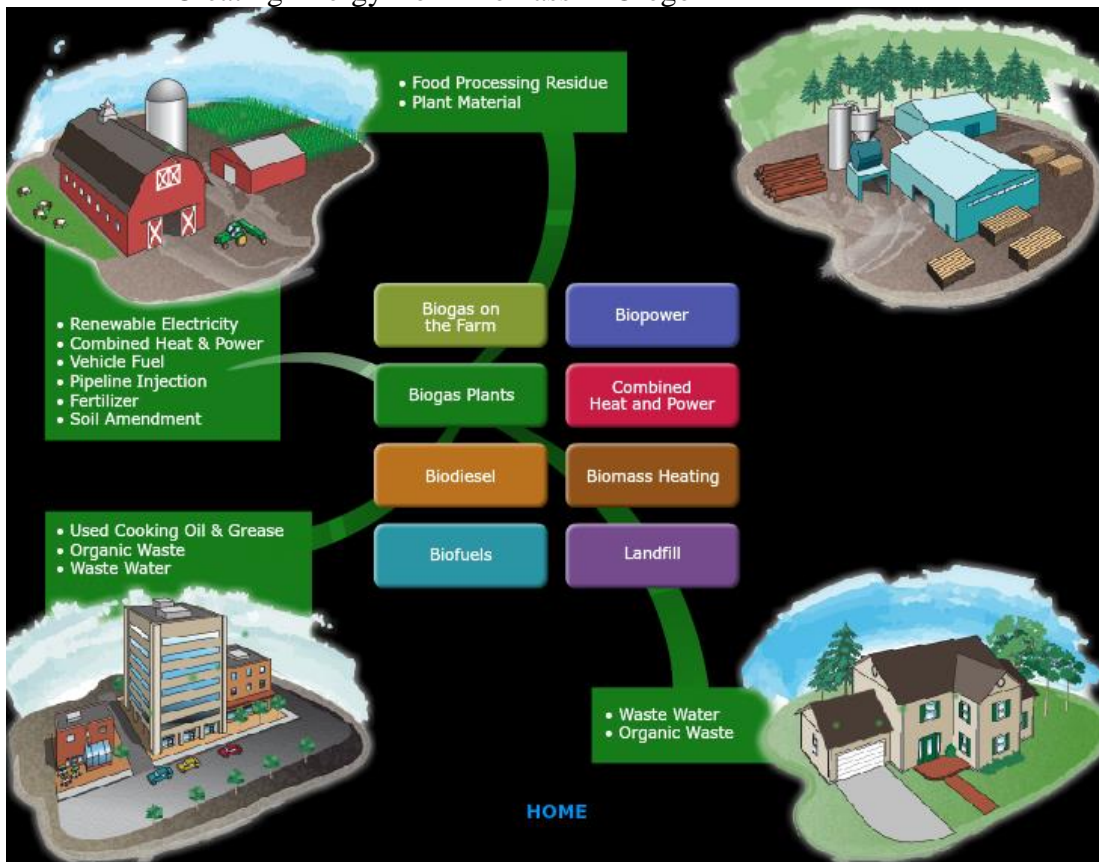


Biomass

“Biomass” refers to organic material that is either grown with the specific purpose of producing energy, or is left over from the production or consumption of food or fiber. While there are some dedicated biomass energy crops in Oregon (e.g., the hybrid poplar farm in Boardman), most biomass resources are secondary products, such as logging slash (from forest restoration treatments or commercial logging) or animal manure. Examples of

biomass resources available in the Northwest include woody biomass (forest products, logging slash, and mill residue), spent pulping liquor (byproduct of pulp and paper making process), agricultural field residue, animal manure, food processing residue, landfill gas, municipal solid waste, and wastewater treatment plant digester gas.

Creating Energy from Biomass in Oregon



The Oregon Department of Energy has an interactive bioenergy website that provides an overview of the various sources of biomass and energy and non-energy products that can be created. The website is available at: http://www.oregon.gov/ENERGY/RENEW/Biomass/Pages/creating_energy_from_biomass.aspx

Table 1. Biomass energy applications

Energy Application	Definition
Biofuel	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
Bioproduct	Converting biomass into chemicals for making plastics and other products that typically are made from petroleum

[Information supplied by National Renewable Energy Laboratory (NREL)]

Biomass energy applications include biofuel, biopower, and bioproducts (Table 1). The U.S. Department of Energy has been encouraging a biorefinery concept for processing woody biomass. A biorefinery produces a range of products including power, fuels, and chemicals, similar to a petroleum refinery or petrochemical facility. For more information on emerging biorefinery technologies, see the National Renewable Energy Laboratory's "[The Biomass Economy](#)" published in 2002.

Biomass for Electricity Generation

The most common source of biomass energy is wood. In 2012, biopower constituted 25 percent of the total non-hydropower renewable electricity generation in the U.S. (about 1.4 percent of total generation). The top five states for biomass energy generation are: California, Florida, Maine, Georgia, and Virginia (NREL 2012 Renewable Energy Data Book).

The most common method of converting biomass to electricity is through direct-fired combustion; a similar process to that used for coal or nuclear fuels. After the biomass has been pre-processed to remove impurities, it is burned in a boiler to generate steam, which turns a turbine and generates electricity. Excess heat is a byproduct of the generating process, and the most efficient facilities (able to utilize up to 85 percent of the energy potential in the fuel, compared to less-efficient operations that reach only 20 percent utilization) are those that are able to capture and utilize this "waste" heat in space heating, kiln drying, and other uses (termed "combined heat and power" or CHP). Biomass power plants are typically less than 50 MW in size, compared to coal plants, which are 100 – 1,500 MW in size. There are 17 woody

biomass power facilities in Oregon, primarily in the wood-products industry. There are 20 facilities in Oregon, such as schools and hospitals, which use woody biomass to provide space heat through small biomass boilers.

Another way to generate biopower is by capturing the output of decomposing biomass (animal manure, human waste, or organic forms of municipal solid waste) in digesters or contained landfills. "Biogas" or "digester gas" is the resultant product consisting primarily of methane, carbon dioxide, and water vapor. Once the biogas has been cleaned to remove water and impurities, it can be used to generate electricity, usually onsite or in a nearby dedicated plant. The higher the methane content, the higher the energy potential (natural gas used by consumers is almost 100 percent methane). Biogas is typically 50 – 75 percent methane. There are currently 11 wastewater treatment plants that produce energy from biogas, nine anaerobic digestion facilities located on farms, and one merchant biogas plant. Six landfills in Oregon capture biogas for electricity generation.

Oregon has seven liquid biofuel production facilities and 10 pellet manufacturing facilities.