

Utilization of Forest Biomass as a Renewable Energy Source

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Background

There are different ways in which the energy around us can be stored, converted and/or utilized for human benefit. The energy sources we use today for electricity, heat and transportation can be broken down into two main categories: Renewable resources such as wind, solar, geothermal, biomass, or hydropower; and, nonrenewable resources including coal, natural gas, petroleum and uranium (nuclear).^[1] Rising concerns regarding climate change, greenhouse gas emissions, energy costs and depletion of nonrenewable resources have increased the need to use more renewable and alternative sources of energy.^[2] In response, the California Clean Energy and Pollution Reduction Act of 2015^[3] requires energy retail sellers and publicly owned utility companies to generate 50 percent of their electricity from eligible renewable energy resources by the year 2030.^[4]

One of these eligible renewable resources include biomass. Biomass is a relatively broad term for all organic material derived from plants and animals.^[5] Energy created from biomass may be used to meet a wide variety of energy needs, and has great potential to yield environmental and social benefits including reduced greenhouse gas emissions.^[6] In the realm of forestry, this presents an opportunity to utilize renewable forest biomass wastes such as logging slash, scrap lumber/residues, or forest debris that would otherwise be dumped in landfills, openly burned, or left as hazardous fuel for subsequent forest fires.^[7]

Advantages

Forest biomass utilization not only helps the State meet its renewable mandates, it provides a variety of benefits that other renewables cannot. Some advantages include: 1) It is a steady and reliable resource; 2) it can improve forest health and air quality; 3) and, it reduces greenhouse gas emissions.^[7] Biomass power is dependable because it is not affected by changes in weather or environmental conditions, and is able to produce a steady flow of energy 24/7, unlike energy produced from wind or solar.^[7]

Our forests need to be thinned to maintain health and vigor, and reduce hazardous fire conditions. Thinning operations result in large amounts of residual organic material left behind as slash on the forest floor. Utilizing forest biomass has the potential to improve forest health by diverting millions of tons of slash and utilizing it for green energy. By transporting this waste off-site, we can maintain the ecological integrity of forestlands while improving air quality by reducing the likelihood of wildfires.^[8]

Biomass power is carbon neutral electricity. Biomass takes carbon out of the atmosphere through photosynthetic processes, and returns it as it is burned. This maintains a closed carbon

cycle with no net increase in atmospheric CO₂ levels.^[9] Biomass utilization can affect atmospheric greenhouse-gas concentrations by replacing fossil fuels and preventing the release of greenhouse gases from decomposition of organic material.^[7]

Obstacles

Although we have discussed a few of the advantages of biomass utilization, the industry is faced with many obstacles that act as impedances to the overall success of biomass utilization. Thus, biomass has had a difficult time gaining precedence over other types of renewable energy resources. Three obstacles facing biomass utilization are the lack of subsidies and the larger associated costs compared to solar or wind energy; visual aesthetics; and, the mechanical operations of a power plant.

The lack of Federal subsidies is a major hindrance to the utilization of biomass. Investors are not able to offset the higher investment expenditures associated with biomass,^[10] such as with wind and solar, and therefore investing in biomass is not economically appealing. Power companies would have to spend more money to utilize biomass in lieu of other energy producing methods. Transportation and resource gathering expenses are high and will be continually needed every day. The need to transport the fuel to the energy plant and the carbon emissions that are made in doing so transforms a renewable resource into a type of energy that is dependent on fossil fuels.^[11]

The cities located around Humboldt Bay do have the option of utilizing biomass energy from the Fairhaven plant. However, the plant is located adjacent to the beach, and when the plant is operational large plumes of steam billow out of tall stacks. The discharge can be seen for miles around and is not visually appealing. It is therefore thought of as a pollutant, however most people are unaware that biomass energy generates far less air emissions than fossil fuels, reduces the amount of waste sent to landfills and decreases our dependence on foreign oil.^[5] Even though the advantages are outlined, selling the idea of biomass utilization to the public is difficult.

Besides aesthetics, the work force required to keep a power plant operational is larger than that of wind and solar. Biomass plants have many mechanical parts and the upkeep requires a great deal of resources. Wind turbines and solar panels are much more simple in design and do not require the same maintenance of a biomass plant.



The Fairhaven biomass plant is an 18 MW generation facility located in northern California.

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