

BEYOND CARBON NEUTRAL -

GREENHOUSE GAS BENEFITS OF BIOMASS POWER GENERATION

Biomass used in the production of electricity provides significant greenhouse gas benefits. Because biomass power is “carbon neutral,” it displaces fossil fuel generation and reduces GHG emissions. Biomass power further reduces GHG emissions by avoiding alternative means of disposal of biomass fuel, which generate significant quantities of methane.



It is well known that energy produced from fossil fuels (coal, oil and natural gas) removes carbon from permanent geological storage and adds that new carbon to the carbon already present in the atmosphere, resulting in ever increasing carbon dioxide levels. In contrast, energy generated from biomass is recognized as carbon neutral by the environmental community, including regulators in the European Union and the U.S. This is because the carbon released by biomass power generation is already a part of the carbon circulating between the atmosphere and the biosphere (i.e., trees and plants). Thus, like other types of renewable energy, including wind, solar, geothermal and hydro, biomass energy production displaces greenhouse gas (GHG) emissions that would have been emitted had that energy been produced from fossil fuels.

Additionally and uniquely among renewable energy technologies, biomass energy reduces net GHG emissions in a second important way. The use of biomass material for energy generation avoids the higher GHG emissions associated with alternative means of biomass disposal. If not used as fuel, biomass could have several different fates –accumulating as overgrowth material in the forest, where it increases the risks of fires, infestations, and disease, open burning, landfilling, composting, or other means of disposal. Each of these alternatives has a greater greenhouse effect than does biomass power generation, because they produce and release significant quantities of methane, a pollutant which is 25 times more potent as a GHG than carbon dioxide on an instantaneous, per-carbon basis. The controlled combustion of biomass for electrical power generation essentially converts all of the carbon into carbon dioxide.

Using data from the California biomass power industry, GHG benefits (measured in tons of CO₂ equivalent) from biomass power generation total 1.6 tons per megawatt-hour (MWh) generated. This figure is comprised of two parts – 0.8 tons/MWh from avoided fossil fuel use, and 0.8 tons/MWh avoided from biomass decomposition or open burning. The avoided fossil emissions are greater in many areas of the country where coal is the avoided fuel.

Thus, biomass power generation has roughly twice the GHG benefit as other forms of renewable energy, because it both displaces fossil fuel use, and avoids alternative disposal fates for biomass that have greater GHG emissions than power generation.

Source: Bioenergy and Greenhouse Gases, Gregg Morris, PhD, Pacific Institute, May 2008