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A Comparative Study of the Effect of CO₂ Emission Reduction by Several Bioenergy Production Systems

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Abstract

Biomass can contribute to sustainable development and globally environmental preservation since it is renewable and carbon neutral. Unused biomass such as oil palm trunk, which is discharged in large quantities when palm trees are cut down, could be converted to useful energy. This paper evaluates the effect of CO₂ emission reduction by four biomass conversion systems within the framework of the Clean Development Mechanism (CDM). These systems are power generation by direct combustion, power generation by the biomass integrated gasification combined cycle (BIGCC), an alternative method of diesel oil production by Fischer-Tropsch synthesis, and an ethanol production by saccharification of cellulose followed by fermentation. Power generation by BIGCC gives the highest CO₂ emission reduction. Taking the maturity of technology into account, however, power generation by direct combustion is the most favorable for the CDM project in the short term. The emission reduction of liquid fuel production is lower than that of power generation. Biomass is the only organic form of renewable energy, so it is important to convert biomass into liquid fuel for displacing fossil liquid fuel.

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