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Energy Production from Microalgae Biomass: The Carbon Footprint and Energy Balance

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Abstract

Bioenergy sources are promising alternatives for energy production in a sustainable world. Nevertheless many research and detailed analysis are necessary to measure in which circumstances they can contribute to it. This paper focuses on microalgae biomass combustion to produce heat and compares the use of different electricity sources with respect to Greenhouse Gas (GHG) emissions and Net Energy Ratio (NER). Some fossil sources were used as reference. The methodology was based on ISO 14040/44 standards and most of the data were obtained from scientific publications. The results showed that NER from microalgae combustion is still disadvantageous compared to fossil options. Microalgae GHG emissions were higher than fossil using the United States electricity grid but lower using the Brazilian one. Regardless of the fossil options show slightly better yields related to microalgae in the two categories analyzed, the fossil energy technology is mature and has less space for improvements while microalgae is in its infancy and have many technological solutions being developed.

Keywords: *Microalgae, Life Cycle Analysis, Greenhouse Gas, Net Energy Ratio.*