

BIOFUELS AND BIOENERGY

Using of the ecological analysis to justify the environmental feasibility of biohydrogen Production from cassava wastewater biogas

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The use of bioenergy has turned into a good alternative for reducing the emission of pollutant gases. In Brazil, this sort of energy has increased in usage during the last years. Biohydrogen, produced from cassava, appears as an alternative fuel to fossil fuels and, also, becomes economically competitive, since this is a low cost carbon source. The repertoire of results about the ecological impact from the production of bioenergy from cassava wastewater is very limited because, in general, this commodity is more common in underdeveloped countries. This paper evaluates and quantifies the environmental impact of electricity production in a cassava wastewater treatment plant. The ecological efficiency methodology developed by Cardu and Baica [Regarding a new variant methodology to estimate globally the ecologic impact of thermopower plants. *Energy conversion and management* 40, no. 14 (1999): 1569-1575] is used as a benchmark in this study. The methodology mainly assesses the emissions of equivalent carbon dioxide (CO₂, SO_x, CH₄ and particulate matter), pollutant indicators and ecological effects of a cassava wastewater plant utilizing biohydrogen as energetic carrier. As a result some environmental parameters, such as equivalent carbon dioxide emissions, pollutant indicator and ecological efficiency are evaluated due to the fact that they are important to electricity production. In this way, the environmental parameters was calculated to evaluate how interesting is the process from the environmental feasibility point of view. The average values of the environmental parameters among different biogas compositions was calculated, the average pollution indicator was 10.11 kgCO₂e/kgH₂ with an average ecological efficiency of 93.37%. As a conclusion, bioenergy production using biohydrogen from cassava wastewater treatment plant can be justified by the determination of environmental parameters, allowing innovation for producing energy from a cassava wastewater treatment plant, and adding important findings to the energy industry.

Biography

Jonni Guiller Ferreira Madeira is a mathematician with a Master's degree in Nuclear Engineering. He is a researcher and teacher at the Federal Center for Technological Education Celso Suckow da Fonseca (CEFET-Angra dos Reis) and PhD student at Federal Rural University of Rio de Janeiro, both institutions are located in Brazil. His Researcher is related to mathematical modeling, nuclear energy, thermodynamics and biohydrogen. Its recent research is related to exergetic analysis, economic analysis and ecological analysis of the production of biohydrogen from cassava wastewater.

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