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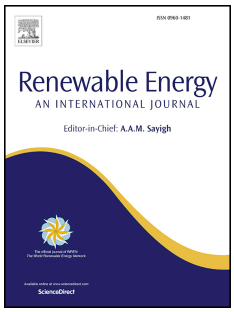

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Integrated 1st and 2nd Generation Sugarcane Bio-refinery for Jet Fuel Production in Brazil: Techno-economic and Greenhouse Gas Emissions Assessment

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Abstract: This study presents a techno-economic analysis and an environmental assessment, of the whole production chain (biomass production, sugar extraction, biomass pretreatment, sugars fermentation, and products recovery and purification), of a fully autarkic sugarcane-based biorefinery for biojet fuel production. All scenarios considered correspond to *1st/2nd* generation integrated biorefineries (*i.e.* simultaneous use of sugarcane juice stream and lignocellulosic fractions) with a production scale of 208 kton (biojet fuel).yr^{-1}. In this paper, we compared multiple options for the most relevant processing steps of the biorefinery: eight biomass pretreatment technologies (*i.e.* dilute acid, dilute acid + alkaline treatment, steam explosion, steam explosion + alkaline treatment, organosolv, alkaline wet oxidation, liquid hot water and liquid hot water + alkaline treatment); two biojet fuel production routes from sugars (*i.e.* ethanol to jet and direct fermentation); one biojet fuel production route from biomass (*i.e.* fast pyrolysis); two biojet fuel production routes from lignin obtained after biomass pretreatment (*i.e.* fast pyrolysis and gasification Fischer- Tropsch); and one alternative