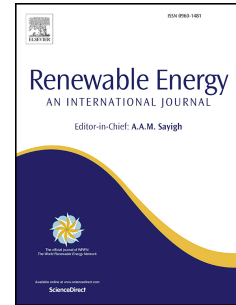


Accepted Manuscript

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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PII: S0960-1481(17)30396-8

DOI: [10.1016/j.renene.2017.05.011](https://doi.org/10.1016/j.renene.2017.05.011)

Reference: RENE 8774

To appear in: *Renewable Energy*

Received Date: 31 January 2017

Revised Date: 20 April 2017

Accepted Date: 2 May 2017

Please cite this article as: Santos CI, Silva ConstançaC, Mussatto SI, Osseweijer P, van der Wielen LAM, Posada JA, Integrated 1st and 2nd generation sugarcane bio-refinery for jet fuel production in Brazil: Techno-economic and greenhouse gas emissions assessment, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.05.011.

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

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11
12 **Abstract:** This study presents a techno-economic analysis and an environmental
13 assessment, of the whole production chain (biomass production, sugar extraction,
14 biomass pretreatment, sugars fermentation, and products recovery and purification), of a
15 fully autarkic sugarcane-based biorefinery for biojet fuel production. All scenarios
16 considered correspond to 1st/2nd generation integrated biorefineries (*i.e.* simultaneous
17 use of sugarcane juice stream and lignocellulosic fractions) with a production scale of
18 208 kton (biojet fuel).yr⁻¹. In this paper, we compared multiple options for the most
19 relevant processing steps of the biorefinery: eight biomass pretreatment technologies
20 (*i.e.* dilute acid, dilute acid + alkaline treatment, steam explosion, steam explosion +
21 alkaline treatment, organosolv, alkaline wet oxidation, liquid hot water and liquid hot
22 water + alkaline treatment); two biojet fuel production routes from sugars (*i.e.* ethanol
23 to jet and direct fermentation); one biojet fuel production route from biomass (*i.e.* fast
24 pyrolysis); two biojet fuel production routes from lignin obtained after biomass
25 pretreatment (*i.e.* fast pyrolysis and gasification Fischer- Tropsch); and one alternative

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