Into the design of sustainable biorefineries: A techno-economic, environmental and social assessment of biojet fuel production chains in Brazil

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This study presents the interim results of a screening of multiple combinations of feedstocks, logistics, conversion technologies, processing conditions and regional aspects for a biojet fuel production chain in Brazil. Thus, the number of possible scenarios is narrowed down from more than 200 options to 3 relevant cases. The analysis is divided into two stages: i) screening of conversion technologies and different scenarios according to feedstock availability, techno-economic and environmental indicators; and ii) the most promising scenarios from part I are designed and simulated in order to introduce more details in the techno-economic evaluation, environmental analysis and social assessment. For techno-economic evaluation, the overall biojet fuel yield and the minimum selling price are considered as selection criteria; while for the environmental analysis, the used comparative criteria are greenhouse gas (GHG) emissions and primary energy use. In the case of the social assessment, the effects of the production chains on six main aspects are considered: employment, working conditions, labor rights, equity, education level, and GDP. The interim results are separately discussed for each dimension of sustainability (i.e. techno-economic, environmental and social) by comparing the pros and cons of the most relevant production chains. Although the information/data generated is quite extensive, detailed, and consistent among the production chains, the discussion on the ‘best’ option is deliberately left open for decision makers who can base their choices on the relative importance assigned to individual assessment criterion.

Biography

John A Posada is working as an Assistant Professor at the Department of Biotechnology, Delft University of Technology. He obtained his PhD degree (cum laude) in Bio-Chemical Process Design (National University of Colombia, 2011) and worked as Senior Researcher on the “Design of sustainable biorefineries” (2011-2015, Copernicus Institute of Sustainable Development, Utrecht University, The Netherlands). He then joined TU Delft as Assistant Professor in the area of “Integral Sustainability for Biobased Economy”. His research interests cover, amongst others, techno-economic, environmental, social and integrated sustainability assessment for the biobased economy, with special focus on the integration of the three pillars of sustainability for biorefineries.

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