

Modeling and Assessing Income, Labor and CO2 Emissions Multipliers from Different Biorefinery Technological Routes in Brazil.

Topic: (8.5) Impact Analysis: Multipliers (2)

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Abstract: We have evaluated a range of biorefinery technological routes based on sugarcane bagasse, through estimating their income, labor and emissions (CO₂) multipliers in Brazil. By treating this range of novel technologies as new industries, we have built and compared different scenarios through an environmental and socioeconomic perspective – changes in emissions, labor and income due to the insertion of each one of these new economic activities into the Brazilian economy. We have used a hybrid (energy commodities in physical units and non-energy commodities in monetary units) input-output database, into which, basically a set of technological routes family were introduced: integrated gasification combined cycle (IGCC), Biomass to Liquids (BTL) and Hydrolysis. The process analyses of these technological routes are mainly based on Santos et al. (2016) – as well as their respective production recipe and minimum selling prices. These industrial plants are capable to convert the lignocellulosic material (sugarcane bagasse) to: ethanol, electricity, DME, diesel, gasoline, higher alcohols, and succinic acid (a bio-chemical platform). Even though many products can be obtained from these novel technologies, this study considered only a subset that represents products currently traded in the Brazilian market. All of these biorefinery types have not reached the commercial scale yet. Therefore, this approach can support policy makers and R&D funds (such as the one derived from Brazil's petroleum production) to identify biorefinery technological routes worth investing, according to their estimated environmental and socioeconomic effects.