DAFRE Seminar

Evaluating Impacts of Future Biorefinery Industries

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Abstract

Sugarcane-based technology for producing first generation ethanol is in the mature stage of development in Brazil, which is the world largest supplier of ethanol production from this resource. Ethanol is supplied at competitive prices in the country and, from a perspective of carbon footprints, provides benefits compared to gasoline. In this vein, other sugarcane-producing countries might join the ethanol bandwagon. Indeed, prime candidates are Australia, China, Colombia, India, Indonesia, Mexico, Pakistan, Philippines, Thailand and the United States of America. Along with colleagues, I have evaluated potential economic consequences of growing this nascent industry in these countries using an input-output approach. We examined its potential by configuring a new biofuel industry by borrowing information from the existing large-scale alcohol industry in Brazil and adjusting for possible productivity differentials. Brazil's data are based on an IO-LCA (input-output life cycle assessment) approach. We augmented the industry's sales following a hypothetical anhydrous ethanol consumption scenario. We thereafter reconciled the national accounts. We conclude the analysis by quantifying and comparing the different net effects of this new industry for each of the assessed countries: in the terms of labor compensation and employment. In a distinct, but somehow complementary project, I also have assessed impacts due to the implementation of advanced biorefinery technologies – along with colleagues. Since sugarcane bagasse is a by product of the ethanol (and also sugar) production, Brazil is a large scale producer of this lignocellulosic biomass, which is a promised input for novel biorefineries. We also have built and compared different scenarios through a socioeconomic perspective – combining process analysis with an input-output approach. These industrial plants would be capable to convert sugarcane bagasse to: ethanol, electricity, DME, diesel, gasoline, higher alcohols, and succinic acid (a bio-chemical platform). We have simulated the scenarios for the São Paulo state, which is considered a Brazilian "sugarcane hub". We conclude the analysis by estimating and comparing the multipliers of these six different technological routes for this specific region.

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