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The role of sugarcane yield, gasoline prices and sales tax rates on the feasibility of ethanol supply chain in Brazil: Rio Grande do Sul case

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This paper explores how sugarcane yield, gasoline prices and sales tax rates affect the production and consumption of ethanol from sugarcane in Brazil. A system dynamics model of the sugarcane and ethanol production chain explores the impact of these variables to evaluate the feasibility of ethanol production. Using the VENSIM software different arrangements for sugarcane yield, gasoline prices and sales tax were simulated (horizon of 20 years). Brazil's Federal Government policy of gasoline price below the international price and the diversity of state sales tax rates produce distortions in the ethanol market and impose considerable constraints on the development of the ethanol industry. The simulations explore the Rio Grande do Sul's case and show that to ensure the feasibility of ethanol production, the pump price of regular gasoline would need to be US$1.95 per liter, which is far higher than the US$1.26 per liter currently charged. Public policies involving the liberalization of gasoline prices and the homogenization of the sales taxes on ethanol among the Brazilian states could reduce the distortions caused by these policies. These policies could contribute to reduce uncertainty in the ethanol sector and encourage technological and productive investments. Future research could add and evaluate the impacts of the environmental benefits of ethanol production and consumption (carbon trade market, payment for environmental services and bioelectricity production) and of sugarcane byproducts on its feasibility. The sensitivity analysis revealed the effectiveness of the model to support policies and managerial decision-making process in the sugarcane ethanol sector.

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