

# **Optimizing Sustainability of Biofuels in an Uncertain Decision Environment**

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The question of increasing biofuels production has become controversial. On the one hand, production of corn-based biofuels creates a ‘food/feed vs. fuel’ tradeoff condition, along with subsequent uncertainties for both consumers and producers. On the other, advanced biofuels (from, e.g., switchgrass, miscanthus, algae), though widely acknowledged as environmentally more friendly and economically efficient, are not available on a large commercial scale yet.

For many years, the US policy has been actively supporting the production and consumption of biofuels with subsidies and mandates. However, due to the limited production and consumption of cellulosic ethanol, in 2010, the Environment Protection Agency waived and adjusted the envisaged mandate down to 16 billion gallons by 2022.

Clearly, there is a disparity between the current biofuels production/consumption, on the one hand, and expectations in terms of the desired level of biofuels production/consumption, on the other. In addition, the limited resource availability for the production of biofuels feedstocks and the question of sustainability of biofuels production are major issues impacting decision making that, in addition, is plagued by uncertainties, due to incomplete information or missing knowledge about the consequences of possible policy actions.

The paper presents a multi-objective optimization model, combining fuzzy logic and parametric programming, to answer the question of sustainable biofuels production, in the situation of limited resources and in an uncertain decision environment.