

Stakeholder Synergy for Cellulosic-based Bioeconomy in the United States

Ximing Cai

Department of Civil and Environmental Engineering;
Center for Center for Advanced Bioenergy and Bioproducts Innovations (CABBI),
University of Illinois Urbana-Champaign, Urbana, Illinois, U.S.
xmcai@illinois.edu

Abstract

The Renewable Fuel Standard (RFS), a U.S. federal program, has posed mandates on renewable biofuel use, especially the advanced cellulosic-based sources; however, the mandates have been postponed due to a large gap between the actual advanced biofuel production and the RFS targets. This can be attributed to a variety of factors, including limited private investment and government assistance, technology setbacks, and insufficient resource availability and infrastructure support. Moreover, the lack of coordination among multiple stakeholders can be a critical barrier for development, which is mostly ignored in the current literature. We propose a stakeholder synergy approach to analyzing the feasibility and barriers of cellulosic-based bioeconomy in the U.S. Based on various data sources including survey results, social media posts, empirical and theoretical analyses, and model simulation outputs, we identify the preferences, barriers, and opportunities with producers, consumers, biorefineries, rural communities, government, and NGOs. Furthermore, we develop an agent-based model (ABM) based on the understanding of stakeholders' behaviors, resource constraints, and technology & policy. The ABM simulates the complex interactions of multiple stakeholders under various resource constraints, and it presents as a communication tool between researchers and stakeholders. The modeling results show that the emergence of a cellulosic biofuel economy not only depends on resources, technologies, and demands, but also on the collaboration ("synergy") and coordinated efforts by multiple stakeholders. Finally, based on a synthesis of the various views of researchers, the public, and stakeholders, the challenges and research and policy innovation needs to promote cellulosic-based bioeconomy will also be discussed.