

ASSESSMENT OF THE OVERALL ENVIRONMENTAL AND SOCIOECONOMIC
SUSTAINABILITY OF THE VONORE, TENNESSEE
SWITCHGRASS-TO-ETHANOL PRODUCTION SYSTEM

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Abstract

A five-year East Tennessee demonstration-scale switchgrass-to-ethanol production system is used to explore the availability of recommended sustainability indicator data and associated measurements for the feedstock production and logistics portions of a biofuel supply chain. Starting with a suite of 35 recommended environmental and socioeconomic indicators developed for comparing the sustainability of bioenergy production systems across different feedstock types and locations, context-specific knowledge pertaining to the available indicators is distributed within a hierarchical decision tree framework. The overall sustainability of this no-till switchgrass production system is assessed relative to two alternative business-as-usual scenarios (unmanaged pasture and tilled corn production), and the relative contributions of the social, economic and environmental information are determined for the overall trajectory of this bioenergy system's sustainability under each scenario. Within this East Tennessee context, switchgrass production shows potential for improving environmental and social sustainability trajectories without adverse economic impacts, thereby leading to potential for overall enhancement in sustainability within this local agricultural system. Given the early stages of cellulosic ethanol production, it is currently difficult to determine quantitative values for all 35 sustainability indicators across the entire biofuel supply chain. This case study demonstrates that integration of qualitative sustainability indicator ratings may increase holistic understanding of a bioenergy system in the absence of complete information.