

A CASE STUDY IN PLANNING A RENEWABLE ENERGY SUPPLY CHAIN: PART II USING LIFE CYCLE ENVIRONMENTAL METRICS TO SELECT A BIOMASS FEEDSTOCK

Joel Tallaksen, Ph.D. West Central Research and Outreach Center, University of Minnesota, Morris, Minnesota,
46352 State Highway 329 Morris, MN, 56267, E-mail: Tall0007@umn.edu

Tricia Simo Kush, PEM, E-mail: tsimokush@gmail.com

Abstract

This work examines how environmental metrics impact the choice between alternative biomass feedstock supply chains for a bioenergy project. It focuses on life cycle energy and greenhouse gas emissions as important components when assessing biomass options for use at newly built or renovated bioenergy facilities. The wide variety in combinations of biomass energy feedstocks, collection methods, and regional cropping systems make each project unique. Therefore, a case study that had broadly applicable concepts was used as an example of biomass feedstock supply chain development. The case examined was the supply chain developed for the University of Minnesota, Morris renewable biomass heating facility located in rural West Central Minnesota. Though several feedstocks were initially considered, only corn stover (leaves, stalks, and cobs) and corn cobs seemed realistic options for life cycle modeling. Preliminary modeling indicates that both would significantly reduce fossil fuel use and greenhouse gas emissions compared to traditional natural gas or coal. However, the rather small difference in environmental impacts between biomass feedstocks suggests that other factors (cost, cultural practices, and inconveniences) may override specific environmental criteria unless there is a significant external cost for negative environmental impacts.

Keywords

Biofuel Logistics, Supply Chain, Analytic Modeling, Life-Cycle Assessment (LCA), Greenhouse Gas (GHG), Fossil Fuel Replacement, Biomass, Renewable Energy