575b All Biomass Is Local: Environmental Impacts of Ethanol Derived from Corn Grain

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This is a life cycle assessment study on the ethanol production system in which ethanol is derived from corn grain via wet milling. We investigate the effects of farming location on corn production environmental performance and find that performance varies significantly with location. Four wet milling plants in different are investigated. The functional unit is defined as one kg of ethanol. Ethanol is used as a liquid fuel in a midsize passenger vehicle in the form of E10 (a mixture of 10 % ethanol and 90 % gasoline by volume). The system boundary includes biomass production, transportation of biomass to a wet milling, wet milling process, transportation of ethanol to users, and ethanol fueled vehicle operation. The allocation procedures for external functions are done by the system expansion approach. Thus, the system boundary is expanded to include the avoided product systems (e.g., gasoline fueled vehicle operation, etc.). The potential impact categories considered here are nonrenewable energy consumption, natural resource use (e.g., coal, crude oil and natural gas), climate change, photochemical smog, acidification, and eutrophication. Environmental impacts are estimated by characterization factors given by the United States Environmental Protection Agency (EPA-TRACI).