Meeting the Demand for Biofuels: Implications for Land Use and Greenhouse Gas Emissions

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There is growing interest in second generation cellulosic biofuels due to their enhanced potential to contribute to energy security and reduce greenhouse gas emissions while mitigating the food vs. fuel competition for land as compared to corn ethanol. Cellulosic biofuels can be produced using several feedstocks including crop residues and perennial grasses. Policy support in the form of a Renewable Fuel Standard (RFS) and tax credits are being provided to stimulate demand for these biofuels. This research develops a framework to analyze the impact of these policies on fuel consumption and greenhouse gas emissions as compared to those with a carbon tax policy. A dynamic simulation model that incorporates the spatial heterogeneity in the agricultural sector is used to examine the feedstocks that should be grown and where, the economic competitiveness of biofuels relative to gasoline and their implications for life cycle greenhouse gas emissions. We compare the welfare costs of meeting the RFS (and accompanying tax credits and subsidies) as well as their implications for the allocation of land among food/feed and biofuel crops and for food and fuel prices with those of a carbon price policy that prices all fuels based on their life-cycle emissions intensity.