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Measuring Indirect Land Use Change with Biofuels: Implications for Policy

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March 18, 2011

***farmdoc daily* (1):20**

Recommended citation format: Khanna, M. "Measuring Indirect Land Use Change with Biofuels: Implications for Policy." *farmdoc daily* (1):20, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, March 18, 2011.

Permalink: http://farmdocdaily.illinois.edu/2011/03/measuring-indirect-land-use-ch.html

http://farmdoc.illinois.edu/podcasts/apbr/apbr_11_01.mp3

Biofuels have gained increasing attention as an alternative to fossil fuels. The three main motivations for increasing biofuel production include: reducing greenhouse gas (GHG) emissions, decreasing reliance on foreign oil, and stimulating rural development. The Energy Independence and Security Act (EISA) of 2007 established a Renewable Fuel Standard (RFS) that aims to increase the volume of renewable fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022. The RFS imposes volumetric requirements for different types of biofuels based on their GHG emissions and sets an upper limit on corn ethanol of 15 billion gallons from 2015 onwards in order to encourage a transition to advanced and cellulosic biofuels which could reduce GHG emissions by more than 50% compared to gasoline.

The implementation of the RFS relies on a life-cycle assessment (LCA) of the GHG intensity of different biofuels. LCA studies measure emissions from the production of biofuel feedstocks, conversion of feedstocks to biofuel in the refinery, distribution to blenders and fuel pumps, and finally tailpipe emissions. A similar process is used to measure emissions from gasoline, from extraction of crude oil to tailpipe emissions. Emissions per unit of biofuel is then compared to gasoline in order to determine whether a particular biofuel meets GHG reduction thresholds or to calculate how much overall fuel intensity is decreased through the use of biofuels.

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Several recent studies have argued that in addition to the emissions accounted for in the production of feedstocks up to tailpipe emissions, large scale biofuel production induced by current US policies could lead to indirect land use changes (ILUC) in other countries. Since biofuel production requires land normally devoted to crop production to be diverted to the production of biofuel feedstocks, large scale production of biofuel in the US could affect world commodity prices as globally traded food/feed crops are diverted to biofuel production. The competition for cropland induced by biofuel production has the inevitable impact of raising world prices of not only the biofuel feedstocks but also of other crops that compete for limited land resources. The increase in world prices could induce crop acreage expansion on native vegetation and forested land in other regions which releases the carbon stored in these ecosystems, leading to ILUCs that also contribute to GHG emissions.

When ILUC emissions are taken into account, some studies argue that the GHG mitigation benefits of biofuels could be eroded or even negated and that biofuels create a “carbon debt” with a long payback period. The estimates of this payback period, however, vary widely across biofuels from different feedstocks and even for a single biofuel across different modeling assumptions. In the case of corn ethanol, this payback period is found to range from 15 to 200 years.

In this policy brief, we discuss the link between biofuel production and land use change, and examine the methods used to measure ILUC, including the assumptions that need to be made. We then discuss whether an ILUC factor should be included in the life-cycle assessment of biofuels and what implications of such inclusion may be for policy. Finally, we discuss whether biofuels can be one solution to climate change, even in the presence of ILUC.

Read the entire Agricultural Policy Brief at:

http://farmdoc.illinois.edu/policy/apbr/apbr_11_01/apbr_11_01.html