***TITLE: ESTIMATE OF THE GLOBAL INDIRECT ENERGY AND EMISSION EFFECTS FROM BIOFUELS***

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**Overview**

Biofuel consumption has accelerated globally over the last decade. Since 2001 a combination of demand growth and stagnating production capacities has pushed up global oil prices, creating opportunities for alternative sources of energy. However, the most important drivers of the recent increases in biofuel use are policies put in place across the world to promote biofuel production and use. These policies are exemplified by the Renewable Fuel Standards in the U.S. Energy Independence and Security Act (EISA) 2007 .The EISA set mandates for biofuel use that grow gradually from 9 billion gallons in 2008 to about 36 billion gallons by 2022 ((US-GOV, 2007). These policies were designed to promote energy security by diversifying liquid fuel consumption away from crude oil. In addition, the policies in the U.S., EU and a few other countries included greenhouse gases (GHG) emission reduction goals that require biofuels to meet lifecycle emission reduction thresholds relative to their fossil equivalents, including emissions from "direct and indirect land use change". Efforts directed at the land use change effects of biofuels has generated a copious amount of research over the last few years (Rathman et al, 2010; Kretschmer and Peterson, 2010), but there are other equally important sources of indirect emissions from biofuels. Initial analysis suggests that domestic biofuel policies may increase or decrease total fuel consumption, but unambiguously increase fuel consumption in the rest of the world (Rajagopal et al, 2011). These indirect fuel consumption effects are expected to result from decreases in oil prices due to the substitution effects of biofuels on oil use (Al-Riffai et al, 2010). As with other indirect effects it is not straightforward to measure the net impacts on energy use and emissions, particularly since biofuels may also induce changes in the composition of global energy use.

**Methods**

We evaluate the impacts of U.S. biofuel policies on the global consumption and composition of energy resources using a dynamic general equilibrium model of the global economy spanning the 2002 to 2030 period. The model includes 18 different global regions and 33 producing sectors and commodities. Dynamics of capital formation, international investment flows and wealth allocation are incorporated in the model. The regional supply of energy resources (crude oil, coal and natural gas) are modeled through supply curves fitted to global energy production data between 1990 and 2010.

**Results**

A preliminary simulation of biofuels consumption in the U.S. from 2001 to 2010 shows lower domestic consumption of crude oil and imports versus the baseline case. The consumption of other energy resources increased slightly, but the overall effects was a negligible change in total energy consumption within the domestic economy. Although oil prices are slightly lower with, than without, biofuels, the effects on rest of the world fuel use and composition are also small.

**Conclusion**

Results of preliminary simulations suggest that U.S. biofuel policies do reduce its dependence on oil imports, but has small effects on global fuel use and composition.

**References**

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