

**STATEMENT BEFORE THE SUBCOMMITTEE ON CONSERVATION, CREDIT, ENERGY, AND RESEARCH**

**U.S. HOUSE COMMITTEE ON AGRICULTURE**

**Hearing on indirect land use and renewable biomass provisions of the renewable fuels standard**

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Thank you, Mr. Chairman, for the opportunity to participate in today's hearing.

My research center has worked on the economics of biofuels for the last four years. During the last 18 months, we have worked with the Environmental Protection Agency (EPA) to enhance their ability to determine if biofuels meet the greenhouse gas performance thresholds of the new RFS. We have a global production and trade model that has been used for analysis of farm and trade policies for the last 25 years. The model tracks the impacts of policy changes on world agriculture, including estimates of the change in supply and demand for agricultural products. Because EPA is charged with estimating the extent to which increased diversion of corn from feed to fuel will cause changes in agricultural production around the world, they naturally sought out researchers who could help them answer this question.

Increased use of corn to produce ethanol causes the price of corn to be higher than it otherwise would be. Both U.S. and foreign producers will respond to this price increase. Economic theory and the reality of the market suggest that one response to the price increase will be increased production of corn. In the United States the primary mechanism for increasing corn production has been through a reallocation of land. A secondary mechanism has been to convert land that was not previously planted and to plant corn or some other crop on it. Other countries will also alter their crop mix and will use more land to increase production in response to higher prices. The conversion of grassland or forests that would not have been cultivated but for higher corn prices releases CO<sub>2</sub> from the stock of carbon both in the soil and in the biomass. This release of CO<sub>2</sub> in both the United States and around the world in response to higher corn prices is logically attributable to expansion of U.S. corn ethanol production. Thus, Congress and the California legislature have good justification for wanting to account for emissions caused by market-induced changes in land use when determining whether expansion of biofuels will increase or decrease global greenhouse gas emissions. The key question is whether we can accurately predict how an expansion of U.S. biofuels will affect land use both here and abroad.

Our ability to estimate changes in agricultural land use in the U.S. due to a change in biofuels policy is reasonably good because we have been doing this for about 30 years. For example, another model called GTAP that is used to estimate land use changes from biofuels predicts an expansion of 250,000

acres per billion gallons of corn ethanol. My center's model predicts 300,000 acres per billion gallons of ethanol.

Our ability to estimate land use changes overseas is less precise. For example, my center's estimates are currently about 700,000 acres per billion gallons overseas. GTAP estimates about 400,000 acres per billion gallons. One reason why it is more difficult to estimate changes in foreign land use is the sheer number of agricultural sectors in all countries that need to be well understood and modeled. A second reason is that lower quality and availability of data in other countries relative to U.S. data makes it more difficult to estimate how land use will change.

The ability to estimate how countries would expand their agricultural land is quite limited. My center does not yet estimate land conversion from forest, but GTAP estimates that about half of the predicted expansion in cropland from corn ethanol in the United States comes from cutting down existing forests. However, over the last three years, we have seen little evidence that U.S. trees are being cut down to produce more agricultural land despite the fact that U.S. cropland has expanded by eight million acres. We have also seen no evidence that significant acres of pasture have been converted, other than a drop in Conservation Reserve Program acres in the Dakotas. Rather than conversion of forest, as predicted by GTAP, U.S. cropland has increased primarily through a reduction in CRP acres and through increased double cropping of soybeans after wheat.

Our ability to accurately measure the extent of land use changes outside the United States is limited because of a lack of reliable data and a lack of knowledge about what is actually going on in other countries. For example, the California Air Resources Board (CARB) and EPA conclude that increased crop prices from biofuels expansion will increase deforestation in the Amazon in Brazil. This conclusion seems logical because increased demand for cropland in Brazil is largely met by converting pasture to cropland. Unless the Brazilian cattle herd shrinks, it would seem that the decrease in pasture would have to be made up somehow. Where is Brazil going to get more pasture? By converting Amazon forest and savanna. Thus, the argument goes, any increase in Brazilian cropland leads to deforestation and a loss of savanna.

EPA and CARB both heavily penalize biofuels because of the presumed loss of the carbon stocks in forests and savannah in Brazil. The existing scientific literature also concludes that expansion of biofuels in the United States will lead to deforestation. But what evidence is there that increased production of crops has led to expansion of pasture in the Amazon? There is evidence that cattle numbers and pasture have both increased in the Amazon region since 1996. But was that due to the 30 percent increase in the Brazilian cattle herd or due to the 36 percent increase in Brazilian cropland under cultivation? We are only now beginning to sort that out, and preliminary data suggest that a fairly large proportion of the increase in cropland in the major crop-producing regions of Brazil was accommodated by increasing cattle stocking rates. Further analysis is needed before we can state with confidence how much of the pasture created in the Amazon was created by crop pressure rather than by increased herd size in Brazil. Why does this matter? Nobody believes that U.S. biofuels policy is going to lead to increased cattle numbers in Brazil. Rather, increased crop prices will increase cropland. If Amazon forest is getting cut down to accommodate increased cattle numbers, and increased stocking rates accommodate increased

cropland, then the primary impact in Brazil of increased crop prices will be intensification of cattle production: not loss of savanna and Amazon forest.

The precision with which life-cycle analysts can estimate the greenhouse gas emissions that are associated with the growing, transporting, and processing of the feedstock is relatively high, although the estimates are quite sensitive to the assumptions being used. The precision with which models can estimate emissions associated with market-induced land use changes is low. If Congress and individual states want to be able to estimate with any degree of confidence how expanded production of biofuels changes greenhouse gas emissions, then significant improvements are needed in our understanding of the dynamics of crop and livestock production around the world. My center is investing heavily in improving our understanding of Brazilian agriculture to better enable the EPA to conduct its analysis. I anticipate that we will be replicating this effort for other major producing countries. Without this kind of hard labor and data-intensive work, it is impossible to conclude with any certainty the extent to which increased emissions from land conversion offset the decrease in emissions from using a renewable fuel in our transportation sector.