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Biofuels and BC's Low Carbon Fuel Standard

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Issue

The American Environmental Protection Agency's (EPA) Renewable Fuel Standard regulations raise the contentious issue of how to assess greenhouse gas (GHG) emissions from biofuels. The EPA was expected to account for direct and indirect land-use changes associated with biofuel production; this would have set a high standard for the environmental performance fuels like corn-based ethanol. However, the final standard was not as comprehensive as expected. The EPA used a complete lifecycle GHG approach but in their final analysis found lower overall indirect land use change impacts from corn ethanol and therefore an improved GHG lifecycle performance.

The issue for BC is that fuel standards in other North American jurisdictions impact the province which has its own Low Carbon Fuel Standard (LCFS). As a result, it is prudent to consider the EPA process carefully, and review emerging academic literature on GHG land-use calculations for biofuels.

Background

On February 5, 2010 the EPA announced the finalization of a Renewable Fuel Standard. According to the EPA's own lifecycle analysis of GHG emissions from renewable fuels, biofuels such as corn-based ethanol will meet the 20 per cent GHG reduction threshold established by the Energy Independence and Security Act of 2007 (EISA).

The EISA established eligibility requirements for renewable fuels, including mandatory lifecycle GHG reduction thresholds. EISA established specific lifecycle GHG emission thresholds for each of four types of renewable fuels, requiring a percentage improvement compared to lifecycle GHG emissions for gasoline or diesel (whichever is being replaced by the renewable fuel) sold or distributed as transportation fuel in 2005. EISA requires:

- A 20% reduction in lifecycle GHG emissions from any renewable fuel produced at new facilities constructed after the act came into force;

- A 50% reduction in order to be classified as biomass-based diesel or advanced biofuel; and
- A 60% reduction in order to be classified as cellulosic biofuel.

The purpose of the lifecycle emissions analysis was to determine whether fuels produced under varying conditions complied with the GHG thresholds for the different categories of renewable fuel. The EPA found lower overall indirect land use changes (less land needed to produce biofuels) associated with corn-based ethanol than originally anticipated, thereby improving its lifecycle GHG performance.

These findings have implications for BC. The BC LCFS follows the majority of the academic literature, which consistently indicates that the use of croplands for biofuels increases GHGs through emissions from land-use change. The Canadian federal government has indicated that it will follow US climate policy, so it is possible that legislation similar to that promoted by the EPA could be introduced in Canada with an eye to protecting corn growers in the Canadian prairies.

Recommendations

The LCFS was enacted in BC in 2008 with the objective of reducing the average carbon intensity of transportation fuels by at least 10% by 2020. The BC standard calculates GHG emissions from biofuels in accordance with the *GHGenius*[i] model developed for Natural Resources Canada (NRCan). This determines the amount of greenhouse gases generated over the entire lifecycle, from feedstock production through conversion to fuel to combustion or oxidation in a fuel cell. GHGenius identifies the amount of greenhouse gases generated by a wide variety of fuels and technologies, the amount of energy used and provided, and the cost effectiveness of the entire life cycle.[ii]

When the EPA announced the finalization of its Renewable Fuel Standard, it was believed that lifecycle analyses that would take into account land-use changes.[ii] This was expected to raise the bar for the performance of bio-fuels, particularly corn-based ethanol which has questionable environmental benefits compared to traditional gasoline. Since the final standard was not as strong as expected it has opened the way for large increases in the production of corn-based ethanol.[iv]

The EPA offered three main reasons for lowering the emissions contribution from land-use change:

- New studies that show the rate of improvement in crop yields as a function of price mean that model yields increase in response to higher crop prices. Less land is therefore needed both domestically and globally for per unit of crop yield as biofuel demand expands.

- New research indicates that distiller's grains and solubles (DGS), a corn ethanol production co-product, are more efficient as an animal feed (thus, less corn needed for feed) than originally assumed. Therefore, domestic corn demand and exports are not impacted as much by increased biofuel production as they were in the previous analysis.

- Improved satellite data suggests that pasture is likely to expand onto existing grasslands. Adjusting for this reduces the GHG emissions associated with land use change.[v]

The EPA conclusions about the lifecycle GHG performance of corn-based ethanol contradict previously published peer-reviewed academic literature. Searchinger et al. (2008) for example report that, "For most biofuels, growing the feedstock requires land, so the credit represents the carbon benefit of devoting land to biofuels. Unfortunately, by excluding emissions from land-use change, most previous accountings were one-sided because they counted the carbon benefits of using land for biofuels but not the carbon costs, the carbon storage and sequestration sacrificed by diverting land from its existing uses."[vi] Although the EPA claims to avoid these shortcomings, a full and rigorous analysis of their conclusions is warranted.

Conclusion

Agricultural crops grown for ethanol production currently account for only ten per cent of BC's bioenergy production, but if the EPA is correct, BC may want to consider expanding ethanol production from agricultural resources such as corn. If the EPA is incorrect, however, BC may want to focus more on deriving energy from cellulosic ethanol sources, such as pine-beetle damaged timber, biomass from forestry products, and municipal waste.

BC policymakers need to understand how other jurisdictions develop their own policies. In light of the EPA's current policy and the intent of the Canadian federal government to take the lead from American policy, BC will want to have a firm grasp of all aspects of the LCFS. At this time the EPA analysis runs counter to the prevailing academic literature, but that does not mean the analysis is incorrect. Further research is needed, and a timely step in that direction should be the undertaking of a critical literature-based review of the EPA's findings.

Sources

[i] GHGenius: A Model for Lifecycle Assessment for Transportation Fuels: http://www.ghgenius.ca

[ii] National Resources Canada, 'GHGenius Description' http://oee.nrcan.gc.ca/transportation/tools/greenhouse-gas-info.cfm?attr=8

[ii] Sustainable Business, February 4, 2010, 'EPA Includes Land-Use Changes in Renewable Fuels Standard': http://www.sustainablebusiness.com/index.cfm/go/news.display/id/19698

[iv] Washington Post, February 4, 2010. 'EPA biofuels guidelines could spur production of ethanol from corn' by Steven Mufson http://www.washingtonpost.com/wp-dyn/content/article/2010/02/03/AR2010020303804.html

[v] US Environmental Protection Agency, February 2010, 'EPA Lifecycle Analysis of Greenhouse Gas Emissions from Renewable Fuels': http://www.epa.gov/oms/renewablefuels/420f10006.htm

[vi] Searchinger, T. et al (2008). Use of US croplands for biofuels increases greenhouse gases through emissions from land-use change, Science 319, 1238-1240.