BRC Science Highlight
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Assessing the Additional Carbon Savings with Biofuel

Background/objective

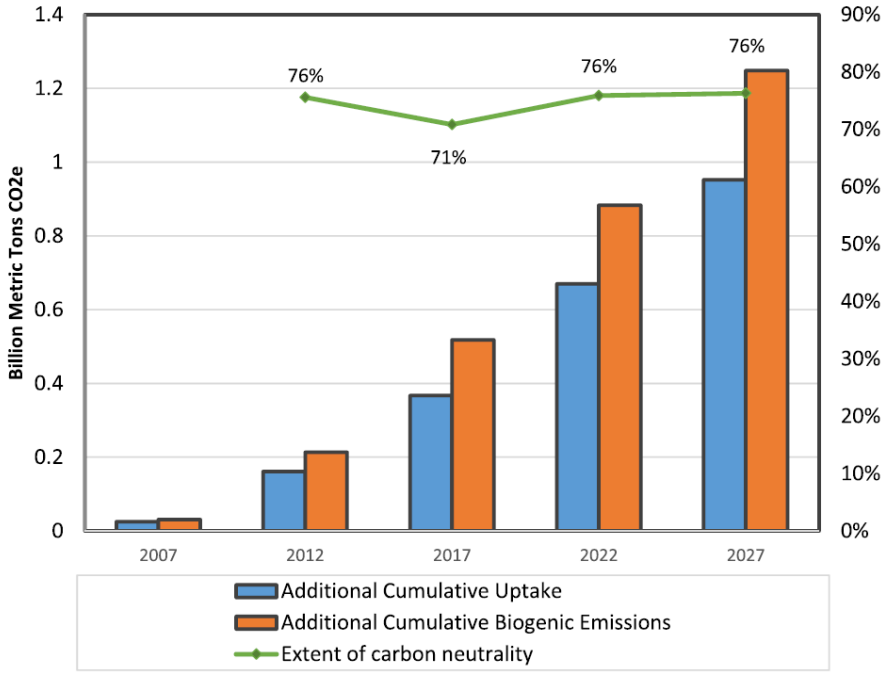
Agricultural feedstocks are typically assumed to be biogenically carbon neutral when assessing their carbon intensity. However, a recent study that used the reference point baseline approach and historical data concluded that corn ethanol has a 27% higher carbon intensity than gasoline. Here, authors implement an anticipated baseline approach in a new framework for determining carbon neutrality of biofuels. They demonstrate this approach by analyzing the carbon neutrality of corn ethanol and show that it leads to a different conclusion than the reference point baseline method.

Approach

- Assessed carbon (C) neutrality of corn for ethanol using an anticipated baseline approach to assess additional C uptake by crops.
- Integrated an economic model of the US agricultural sector and a biogenic C model with life-cycle analysis to quantify biogenic C uptake and life-cycle emissions with and without corn ethanol expansion between 2007 and 2027.

Results

- 68% of the demand for corn for ethanol was met by additional production, while 32% was obtained from a decrease in corn consumption for other uses.
- C neutrality of corn was between 71% and 76%; approximately twice that reported in a previous study that employed reference point methodology rather than an anticipated baseline approach.
- The combined biogenic C emissions and direct life cycle C emission intensity of corn ethanol is 21% lower than gasoline.



Carbon neutrality of corn for ethanol (green line), computed as the ratio of additional cumulative C uptake to additional cumulative biogenic emissions.

Significance

The approach developed here can be applied to assess biogenic carbon neutrality of energy crops for cellulosic biofuels. It can be integrated with existing life-cycle analysis to provide a more comprehensive assessment of the carbon savings possible with cellulosic feedstocks.

*Khanna, et al. 2020. "Assessing the Additional Carbon Savings with Biofuel." **BioEnergy Research**. DOI: 10.1007/s12155-020-10149-0*

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