# Scully's Low Lifecycle Emissions Analysis for Corn Ethanol is Not Credible

In 2021, Scully et al.'s article "Carbon intensity of corn ethanol in the United States: state of the science" posits that the carbon intensity of corn ethanol is 46% lower than gasoline.[1]

Published in Environmental Research Letters, the analysis was funded by POET, LLC, a large biofuels producer, and conducted by scientists and engineers from the consulting group Environmental Health & Engineering. This page discusses some of the flaws in the Scully analysis that render its conclusions biased, unrealistic and misleading.

**Scully's Methodology and Assumptions Were Designed to Serve its Funder's Goal**
How the Scully study is not a credible review of the 'state of the science' of corn ethanol

*Despite calling itself a review of the state of the science,*

> **Scully deconstructs then recombines data** from different studies[2] **to arrive at its own estimate** for the carbon intensity of land use change to corn production – which is lower than any of the studies in the range of estimates it considered[3] – then labels this new lower number a "central best estimate."[4] *See Figure 1, reproduced from Spawn et al.[5]*

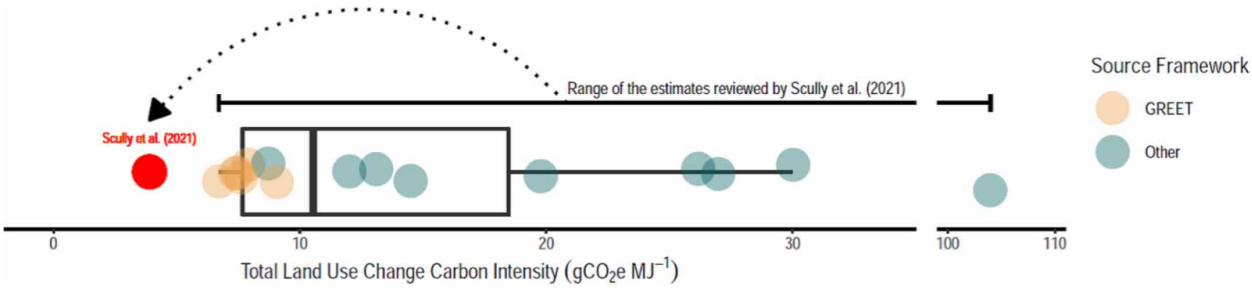


**Figure 1.** Boxplot of all the studies initially considered by Scully *et al (blue and yellow dots)*, as well as the much lower estimate the Scully et al authors advance after reviewing these studies (red dot). Each dot shows the total land use change carbon intensity estimate from a particular study. These values were taken from figure 2 of Scully *et al*.[4]

*This lower carbon intensity figure largely results from revising downward the predicted emissions associated with land use change.[6] How does Scully achieve this?*

1. **Scully selects its favorite criteria** for its assumptions about whether land is converted to corn production, self-determines these to be 'best practices,' then dismisses all other studies that include different criteria.[7] "Ultimately, select elements of just 2 of the 16 studies Scully et al initially reviewed comply with these criteria."[8]

2. **Scully creates its own model to predict the soil organic carbon gains or losses** from conversion of pastureland to cropland results in soil carbon sequestration.[9] Scully achieves this by assuming the land history to be "50 years as cropland followed by 25 years of pasture and 25 years of cropland" — essentially pre-depleting the base line soil organic carbon stocks.[10]

**Scully's self-created model for predicting the emissions impact of land use change spins out over time to assert that cropland expansion sequesters more carbon in the soil than pastureland – counter to empirical evidence and ecological understanding.** To do this it pre-depletes the base line soil of organic carbon stocks by assuming a land use history that is 25 years of cropland before the corn is planted.

Scully's self-created model also

- predicts that carbon sequestration takes place "regardless of the accompanying tillage and yield assumptions." [11]
- assumes achieving higher yields, but leaves out the greenhouse gas implications from the additional fertilizer needed to presumably produce those yields. [12]

*Scully's non-scientific methodologies lead independent researchers to say:*

"**Scully et al provide neither a comprehensive nor an impartial review.** In all, the C intensity of Scully et al for corn-grain ethanol is hardly credible."

**[Scully] has "the potential to spawn perverse policy outcomes** by attributing far greater climate benefits to the production and use of corn grain ethanol than can be supported by current evidence." [13]

1 Melissa J Scully et al 2021 Environ. Res. Lett. 16 043001, p. 16.

2 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, p. 5.

3 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, Figure 1, p. 2.

4 Melissa J Scully et al 2021 Environ. Res. Lett. 16 043001, p. 7.

5 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, p. 2.

6 "Yet, their proposed value proves to be considerably smaller than all prior estimates, an outcome that primarily results from their profoundly reduced estimate of LUC emissions (figure 1)." (Spawn p. 2)

7 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, p. 2.

8 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, p. 2.

9 Extensive research that shows soil carbon is "generally lost upon converting perennial vegetation to annual cropland regardless of the land use history or subsequent tillage regime." (See Spawn at p. 3 and footnotes 15-21). Spawn states "To our knowledge, there exists no empirical evidence supporting the proposition that cropland-pasture conversion to corn production generally enhances soil organic carbon stocks." (Spawn at p. 4)

10 "By simulating the most recent 25 years of cropland-pasture as cropland, this treatment effectively pre-depletes the simulated baseline of soil organic carbon stocks such that when cropland-pasture is subsequently converted to corn production in the model, its soil organic carbon is predicted to respond similar to converting generic 'cropland' to corn production." (Spawn p. 3)

11 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, p. 3.

12 "Scully et al, for example, assume a large degree of cropping intensification in their treatment of LUC, which presumably requires additional fertilizer and amendments that would increase emissions from the 'farming' sector. Yet, because they determine farming emissions separately as the mean of a GREET-based estimate and their own revisions to ecoinvent, their estimate does not appear to account for these additional intensification emissions." (Spawn p. 5)

13 Seth A Spawn-Lee et al 2021 Environ. Res. Lett. 16 118001, p. 6.