Interagency Working Draft Biofuel Greenhouse Gas Modeling Workshop

California’s perspective on modeling land-based biofuel GHGs

Cheryl Laskowski, PhD
Chief, Transportation Fuels Branch
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The Low Carbon Fuel Standard

- Executive Order S-1-07 called for the reduction of the carbon intensity of transportation fuels in California
- University of California reports established the LCFS framework
- Use of carbon intensity metric to include all activities in the production, transport, storage and use of a fuel including other ‘processes’ such as land use change (LUC) that may result from biofuel production*
- Staff evaluated models available and underwent a multi-year public process to establish LUC factors

Corn Ethanol LUC GHG Emissions

* Estimate inclusive of international LUC provided by one of the authors

Chart adapted from Plevin, R.J., J.F. Beckman, A. Golub, Julie Witcover, and M. O'Hare. 2015. 'Carbon accounting and economic model uncertainty of emissions from biofuels-induced land use change', Environmental Science & Technology, 49: 2656–64. DOI: 10.1021/es505481d
Uncertainty in LUC CI

Frequency distribution for ilucFactor

Probability density

Simid=2, Exp=5oy_constrained. Trials=2500

\( \text{g CO}_2 \text{e MJ}^{-1} \)
Differences Across LUC Models

- Methodology used (i.e., partial-equilibrium, general equilibrium, integrated assessment, static, dynamic)
- Embedded parameters (i.e., elasticities) and assumptions governing trade of commodities
- Land cover types, land availability and relationship which govern transformation between the various types of land
- Carbon stock data and emissions profile related to land conversion
- Amortization period over which emissions are attributed
Crops and Residues used in Biomass-based Diesel Production

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<th>Year</th>
<th>Soy</th>
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<th>Fish Oil</th>
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Additional Considerations for Biofuels and Transportation Fuel Policy

- Uncertainty and risk
- Verification and ground truthing
- Non-linear effects as biofuels become widely adopted
- Least regrets policies
Resources

• LCFS webpage: https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard

• LCFS contacts list: https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-contacts

• Cheryl Laskowski, Chief, Transportation Fuels Branch
  Cheryl.Laskowski@arb.ca.gov