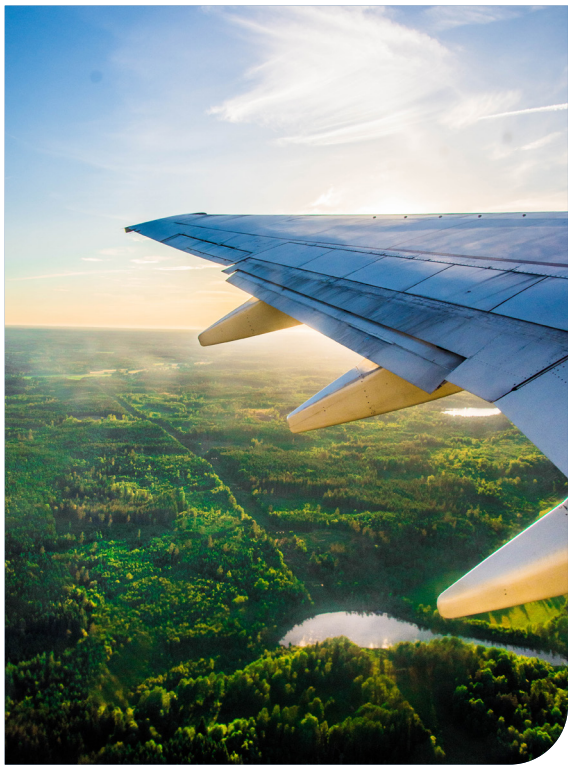
WHY POLICY MATTERS TO MEET NET-ZERO GOALS SOONER



Gevo sits at a unique vector between several industries — including, but not limited to, aviation, transportation & logistics, refining, energy, and agriculture — all of which involve significant government regulation and tax incentives. As such, government proposals, policy, regulation, and legislation have the potential to impact Gevo in outsized ways.

The United Nations has said we need to cut greenhouse gas emissions to limit global warming to 1.5°C above pre-industrial levels. To meet this goal, the Intergovernmental Panel on Climate Change (IPCC) says we need to both cut the amount of carbon being emitted while also implementing carbon dioxide removal solutions. Policy needs to be in place to support counting of all carbon, both emitted and removed from the entire business system.

The European Climate Law, adopted in June 2021, sets the EU target of reducing greenhouse gas (GHG) emissions by at least 55% compared to 1990 levels, in line with the priorities of the European Green Deal. Achieving emissions reductions in the aviation sector is a key part of the larger climate policy challenge, as exemplified by the ReFuelEU Aviation initiative. To realize the targets of this new Regulation, vast quantities of SAF produced in Europe are needed quickly.

Gevo believes it can play an integral role in helping airlines, transportation and logistics companies and others to reduce their greenhouse gas emissions and contribute to carbon dioxide removal solutions.

We are seeking additional ways to leverage carbon dioxide removal solutions, including capture and sequestration (CCS) technologies to dramatically lower Gevo SAF's greenhouse gas emissions. As an industry leader, Gevo already has several financeable, off-take fuel supply agreements in place to supply nearly 1.3 billion liters.

At Gevo, we prefer biomass to create SAF with low or negative carbon (GHG) emissions intensity (CI)[1] by starting with low-CI feedstock (non-edible cereal residues and waste from grain milling of corn) and increasingly leveraging renewable energy sources for production. The existing commitments from airlines can be seen as approval of Gevo's production capabilities, methods, and feedstocks.

Gevo believes that we can't improve what we don't measure. We believe that undertaking comprehensive LCA is necessary to count every molecule of carbon we leverage. This is the only way to ensure every player in the ecosystem, from farmer to flyer, is appropriately recognized for carbon reduction technologies. The approach to completing a fuel's life-cycle analysis (LCA) is to ensure the use of a model that is comprehensive and incorporates the best available scientific data, assumptions, and information. After reviewing numerous models and methodologies, Gevo has worked extensively with the experts at the U.S. Argonne National Laboratory (ANL).

Ensuring everyone is appropriately recognized and our customers are receiving the low-CI score fuel they want, Gevo believes ANL's Greenhouse gases, Regulated Emissions and Energy use in Transportation (GREET) model is currently the only methodology that is capable of accurately depicting a fuel's CI score.

Different policies and regulations use select parts of the GREET methodology. The result is that the exact same fuel with the same feedstock and inputs can output completely different results depending on the policy. This potentially harms all players in the SAF ecosystem that we are trying to help. Picking and choosing which values count, creates a framework where CI scores cannot be compared on a like-to-like, or apples-to-apples basis.

To visualize this, we compare five widely known LCA frameworks for an ethanol-to-jet fuel pathway using the

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same feedstock (non-edible cereal residues and waste from grain milling of corn) and process (plant) inputs to the GREET methodology.

- Argonne's GREET
- CARB's[2] Low Carbon Fuel Standard (CA LCFS)
- U.S. EPA's Renewable Fuel Standard (RFS)
- ICAO's[3] Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)
- EU Renewable Energy Directive (RED II)[4]
- The total CI reductions for each model, compared to the baseline fossil jet fuel (CORSIA's fossil jet fuel baseline is utilized for this exercise), vary from 29% to 110%.[5] This clearly demonstrates the inconsistencies across programs.

Table 1 Carbon Intensity Evaluation Comparison

CARBON INTENSITY EVALUTION[6]	FOSSIL JET	ANL GREET	CA LCFS	RFS	CORSIA	EU RED II
Combustion	73					
Jet Fuel Production	16					
Corn Feedstock		20	20	17	11	12
Better Land Management		-18				-22
CCS		-36	-34			-34
iLUC		8	20	29	25	
AtJ[7] Production Energy		13	13	12	11	11
Chemicals & T&D		5	4	5	7	7
Tailpipe		1	1			
TOTAL	**89**	**-8**	**24**	**63**	**54**	**-26**
REDUCTION FROM FOSSIL JET	-	109%	73%	29%	40%	129%

CORSIA values are indicated in red as RSB and ISCC have not aligned on the final numbers to date Oct 2022.

TO BETTER UNDERSTAND HOW THESE NUMBERS ARE DERIVED, we have described the inputs in the "Carbon Intensity Evaluation" below:

FEEDSTOCK

Gevo's preferred feedstock, non-edible cereal residues and waste from grain milling of corn, falls under the Annex IX, Part A of RED II, as specified in a Commission Implementing Regulation from 2022[8]. Gevo uses US-grown industrial or field corn. Inedible field corn makes up approximately 99% of corn grown while sweet corn, what we find in the grocery store, is less than 1%[9]. 'Corn Feedstock' includes GHG emissions associated with fertilizer use, equipment operation, and transportation of the corn to the plant site. It also considers co-product credits from the fuel production process that can go back into the animal feed or human food supply chains, such as dry distillers grain and corn oil.

BETTER LAND MANAGEMENT

Gevo works with farmers that implement regenerative agricultural practices such as reduced tillage and cover crops. These practices capture more carbon in the soil as measured by soil organic carbon (SOC) levels. This additional carbon sequestration — or carbon permanence — should be accounted for in LCA

A SUMMARY OF CARBON INTENSITY EVALUATIONS

models, however, many models do not. Only Argonne's GREET and EU RED II incorporate better land management credits in their LCA methodologies. Recognizing that there may be greater expense and effort to the farmer associated with these practices, Gevo plans to provide the carbon reduction benefit back to the farmer to monetarily support these impactful GHG reductions in Gevo's supply chain. Ensuring every molecule of carbon is counted from farm to flyer enables Gevo to compensate the farmer for the true value of their low-carbon corn.

CARBON CAPTURE AND SEQUESTRATION (CCS)

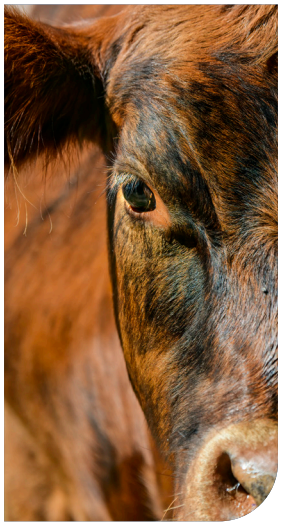
Gevo's fuel process uses corn starch as a feedstock. Corn captures CO_2 through photosynthesis while it grows, and the CO_2 is (re)-released during fermentation processes at the plant. Thus, capturing and storing this biogenic CO_2 before it (re)-enters the atmosphere and storing it is another important strategy Gevo is using to further reduce emissions. However, not all methodologies provide or recognize this important GHG-reduction strategy.

INDIRECT LAND USE CHANGE (ILUC)

One of the potential side effects of biofuel production is "indirect land use change" (iLUC). When cropland is diverted from food and fiber to produce biofuels, this can lead to agricultural expansion into lands such as forests and wetlands that have high carbon storage. This expansion can cause additional GHG emissions beyond the direct emissions of the biofuel production itself.

Because iLUC is driven by economic factors rather than being project-specific, regulators assign a flat iLUC value to each type of biofuel feedstock regardless of how it is actually produced at the farm level. Given this rigidity, it is critical that iLUC modelling be based on the most accurate, up-to-date modelling. However, different policies rely on different modelling methods to calculate it. Most policies rely on assumptions and data that are almost a decade old or older, despite dramatic improvements in iLUC modelling in recent years. This can be seen today in active regulation and policy:

- California Air Resources Board (CARB) most recently updated their iLUC emission value for CA-LCFS in 2015.
- The U.S. EPA, which oversees the RFS, most recently updated their iLUC emission value in 2010.
- Both CA-LCFS and ICAO's CORSIA iLUC values rely largely on emissions factors from 2006.
- The exampled policies and regulations above rely on outdated emissions factors and assumptions concerning land conversion, market effects of biofuel co-products, and emissions reductions in farming practices.[10] Thus we believe policies and regulations should:
- Use models that capture the nuances of how land use change actually occurs in the real world, such as Argonne GREET's CCLUB-CENTURY model.
- Rely on the most up-to-date science and data on land carbon stocks.
- Incorporate the model by reference rather than prescribing outdated values from older models.
- Rather than promote innovation, these antiquated assumptions stifle innovation by lowering — or even removing — the incentive to produce the fuel.
- Gevo also mitigates iLUC emissions by producing both food and fuel from our corn rather than displacing lands used for food production. According to the European Commission, the "overwhelming majority" of agricultural expansion into high-carbon lands due to biofuels are from increased production of oil crops, rather than by starch crops like corn.[11]



PRODUCTION ENERGY

Gevo accounts for all production energy inputs when completing a fuel's LCA. Gevo plans to keep these inputs as low as possible, by designing our plants to use renewable energy sources where possible with tangible goals to mitigate grid electricity and fossil fuel inputs significantly. Gevo also strives to design in efficiencies to leverage recycled waste energy — and goes as far as using bio-based products (biogas from an on-site facility) and recycled co-products before supplementing with conventional fuels.

CHEMICALS, TRANSPORTATION AND DISTRIBUTION (T&D), AND TAILPIPE

Certain chemicals in the hydrocarbon production process are used that generate GHG emissions. These are counted in the fuel's LCA along with emissions from transporting the fuel to the terminal and final fueling station. Tailpipe emissions, that result from the consumption of biofuel in engines, are low — they are still accounted for when creating hydrocarbon products from bio-based feedstocks like corn. Most of the GHG emissions balance with the CO_2 captured through photosynthesis of the feedstock.

A SUMMARY OF CARBON INTENSITY EVALUATIONS

IMPLEMENTING LONG-TERM CONSISTENT POLICY

Effective biofuel implementation includes clear and intentional greenhouse gas (carbon) mitigation strategies. Gevo believes these efforts shouldn't go unrecognized and that means implementing the most up-to-date scientific modeling available consistently across policy, regulations, and programs. As such, Gevo advocates for the good approach exemplified by the Argonne GREET to be used to evaluate the biofuel's LCA. In the context of EU policy, the New Regulatory Framework for Carbon Removals is an excellent opportunity to fill regulatory gaps and bring about a more holistic and accurate accounting of carbon.

Argonne's GREET fairly and accurately incorporates the best available science compared to other methodologies noted above, specifically by including:

- Lower indirect land use (iLUC) change impacts
  - > Reflecting current scientifically validated greenhouse gas data for iLUC
- Better land management strategies and appropriate GHG emission reductions and credits
  - > No-till/low-till activities
  - > Satellite-leveraged farming operations; and
- Carbon capture and sequestration in geologic reservoirs
  - > Biogenic CO_2 capture and permanent storage activities.

As depicted above in Table 1, when different methodologies generate antiquated and inconsistent LCA results for biofuels, this creates an infrastructure that isn't inclusive for biofuel producers. For biofuel companies like Gevo that work to intentionally reduce GHG emissions and are actively seeking opportunities to deploy carbon dioxide reduction technologies — all to meet the IPCC's climate goals — this creates imbalance in the programs in which Gevo participates — and seeks to participate. This means Gevo's GHG reduction efforts go unnoticed and unaccounted for across programs, penalizing the farmer by not compensating him/her for their agricultural practices and carbon sequestration that are needed for low CI crops. This is harmful for the entire biofuel industry as a whole — as the main objective is to deploy climate change mitigating solutions to reach IPCC's 1.5°C goals. If tangible biofuel operations that are commercializing low carbon fuels but aren't being given due credit, the incentive to commercialize these products comes into questions — and the fossil alternatives continue to prevail — all to the detriment of the climate. All in all, while there are numerous, new decarbonization solutions, many are not as close to commercialization as Gevo's SAF. Gevo's approach to SAF production is practical, economical, and scalable.

GEVO BELIEVES:

- Ensuring farmers are appropriately compensated for their regenerative agricultural practices is incumbent on fuel producers to incentivize the growing of low CI score crops.
- Feedstock agnostic low CI SAF is a necessary component for the aviation sector to reach European and global 2050 net-zero goals.
- The U.S. Department of Energy's Argonne National Laboratory's GREET model is the most comprehensive, regularly updated, and best method to ensure carbon is appropriately counted from farm to flyer. Best practices from the model should be looked at as inspiration for the EU's New Regulatory Framework on Carbon Removals.

[1] Carbon Intensity in the context of Sustainable Aviation Fuel is defined as the total greenhouse gas emissions in grams of carbon dioxide equivalent of the SAF divided by the total megajoule of SAF (gCO2e/MJ)
[2] California Air Resources Board (CARB)
[3] International Civil Aviation Organization (ICAO)
[4] EU Renewable Energy Directive (RED II)
[5] If the table's cell above is blank, this means the methodology doesn't account for that input and it's not applicable in the fuel's LCA and final CI score.
[6] Numbers won't sum perfectly due to rounding assumptions related to whole number presentation
[7] AtJ = Alcohol to Jet Fuel
[8] Commission Implementing Regulation of 14.6.2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria, Annex IV
[9] Iowa Corn. https://www.iowacorn.org/media-page/corn-facts
[10] Life Cycle Associates. Review of GHG Emissions of Corn Ethanol under the EPA RFS2. https://growthenergy.org/wp-content/uploads/2022/02/Net-Gain-Ramboll-studies.pdf
[11] European Commission. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0807

303-858-8358 info@gevo.com **www.gevo.com**