

Renewable Fuels Law: An Introduction

July 9, 2024

Joe Kakesh
General Counsel, Growth Energy



Growth Energy[™]
Expanding America's Bioeconomy

Introduction

What is a renewable fuel?

“Fuel that is produced from renewable biomass and that is used to replace or reduce the quantity of fossil fuel present in a transportation fuel.” 42 U.S.C. § 7545(o)(1)(J) (Renewable Fuel Standard (RFS) definition)

Why are renewable fuels important?

Fuels made from renewable biomass or other non-fossil sources of CO₂ often have lower lifecycle greenhouse gas (GHG) emissions, sometimes referred to as “carbon intensity,” than fossil fuels.

How are renewable fuels regulated?

- Mandates that require obligated parties to produce or buy renewable fuels
- Standards that create markets for producers to meet or exceed GHG emissions reduction thresholds
- Incentives that provide tax credits and other incentives to spur production of lower-emissions fuels

Key Renewable Fuels Programs

Renewable Fuel Standard (the “RFS”)

- Primary renewable fuels law in the United States
- Annual Renewable Volume Obligations (“RVOs”)

Low Carbon Fuels Standards (“LCFS”)

- State
- International

Inflation Reduction Act (the “IRA”)

- On-road fuels
- Sustainable aviation fuel (SAF)
- Hydrogen fuel
- Carbon capture, utilization, and sequestration (CCUS)
- Infrastructure incentives programs (HBIIP)

Other Programs

- State blending mandates
- State incentives

The Renewable Fuel Standard



Growth Energy[™]
Expanding America's Bioeconomy

The Renewable Fuel Standard

The RFS is a blending mandate. EPA must ensure that certain volumes of four “nested” categories of renewable fuels are included in the nation’s transportation fuel supply each year. The categories are defined by the amount by which they reduce lifecycle GHG emissions as compared to a petroleum baseline:

<u>Fuel Category</u>	<u>GHG Reduction</u>	<u>Other Requirements</u>
Total	20 percent	Renewable biomass
Advanced	50 percent	No corn starch biomass
Biomass-based diesel	50 percent	Animal/municipal waste
Cellulosic	60 percent	Cellulose/lignin



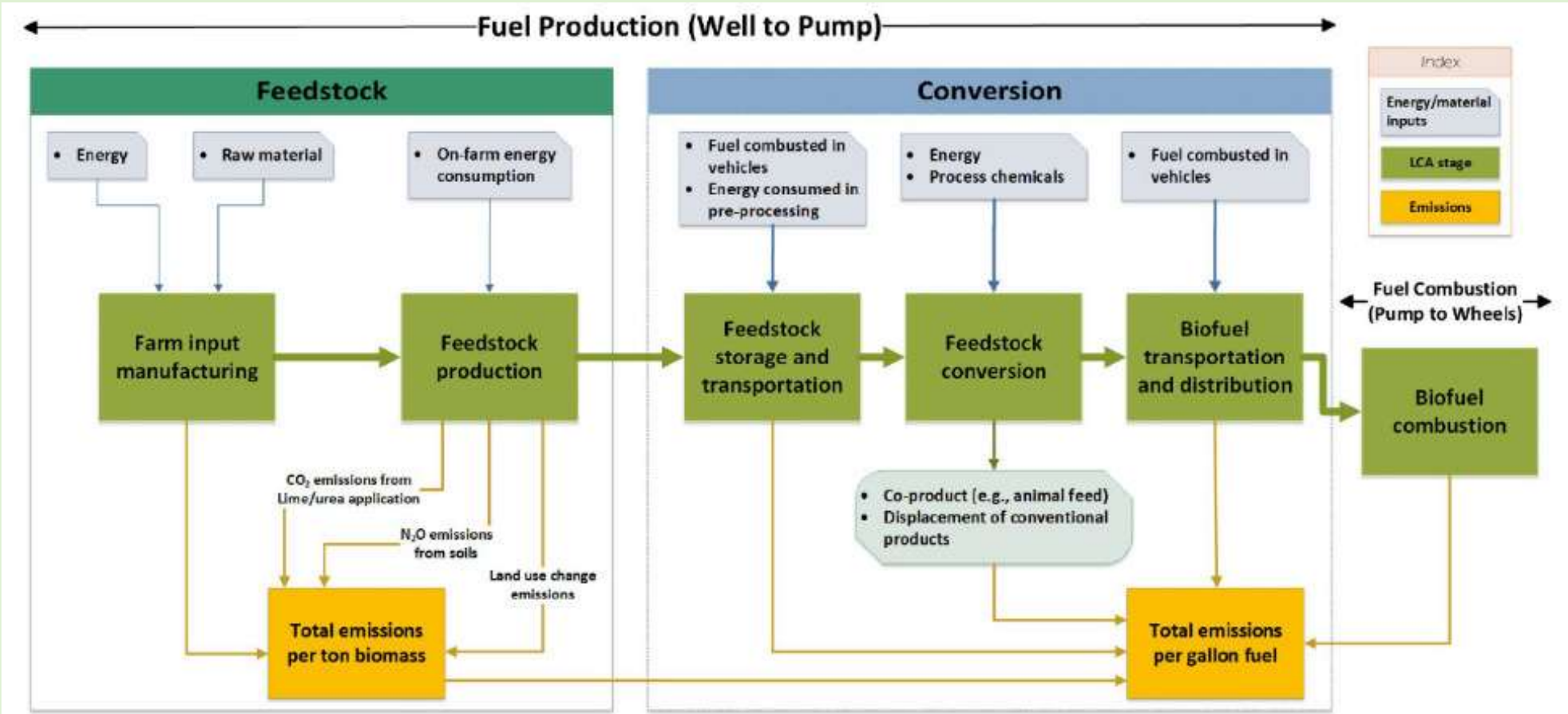
Measuring Lifecycle GHG Emissions

Section 211(o)(1)(H) of the Clean Air Act

“The term ‘lifecycle greenhouse gas emissions’ means

- the aggregate quantity of greenhouse gas emission (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Administrator,
- related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer,
- where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.”

Lifecycle GHG Emissions Modeling



Michael Wang, "Biofuel Life-cycle Analysis with the GREET Model." Presentation at the EPA Biofuel Modeling Workshop. Argonne National Laboratory. March 1, 2022. <https://www.epa.gov/system/files/documents/2022-03/biofuel-ghg-model-workshop-biofuel-lifecycle-analysisgreet-model-2022-03-01.pdf>.

RFS Requirements

- EPA, by rulemaking, establishes or “sets” applicable national renewable volume obligations (RVOs) for each fuel category
- EPA must consider six statutory factors in setting the RVOs
- EPA translates applicable national volumes into RVO percentage standards for each “obligated party” – petroleum refiners and importers – who are responsible for meeting the volume obligations
- RVO percentage standards based on estimated renewable fuel supply volumes, waivers, and estimated total transportation fuel production.
- Certain refineries may seek small refinery exemptions (“SREs”) by showing that they suffer “disproportionate economic hardship” from complying with the RFS.

RFS Statutory Factors

Environmental

- Lifecycle analysis of GHGs
- Land use changes
- Water supply and quality
- Air quality
- Wetlands, ecosystems, and wildlife

Energy Security

- Domestic production and international trade

Infrastructure

- Distribution capacity

Commercial Production

- Fleet analysis
- Effect of RFS on ethanol demand

Costs to Consumers and Costs to Transport Goods

Other

- Job creation and rural economic development
- Agricultural commodity and prices

RFS Standard Equation – How Blending Obligations are Set

$$\frac{\text{Estimated amount of renewable fuel that must be produced (RVO)}}{\text{Estimated total amount of transportation fuel that will be produced} - \text{Exemptions}} = \text{“Percentage standard” refiner blending obligation}$$

Low Carbon Fuel Standards



Growth Energy[™]
Expanding America's Bioeconomy

Low Carbon Fuel Standard (LCFS)

- An LCFS is a renewable fuel standard – not a blending mandate – that incentivizes GHG reductions and lower “carbon intensity” (CI) scores.
- Carbon intensity is a measure of the “global warming emissions (usually measured in CO₂ equivalents) per unit of fuel over the fuel’s lifecycle.
- The more that a producer exceeds the threshold GHG reduction standard, the more valuable their fuel in an LCFS market.
- LCFS programs usually require lower CIs over time, to incentivize innovation and improved technologies.
- California, Washington, and Oregon have LCFS programs, as well as Canada.

Carbon Intensity

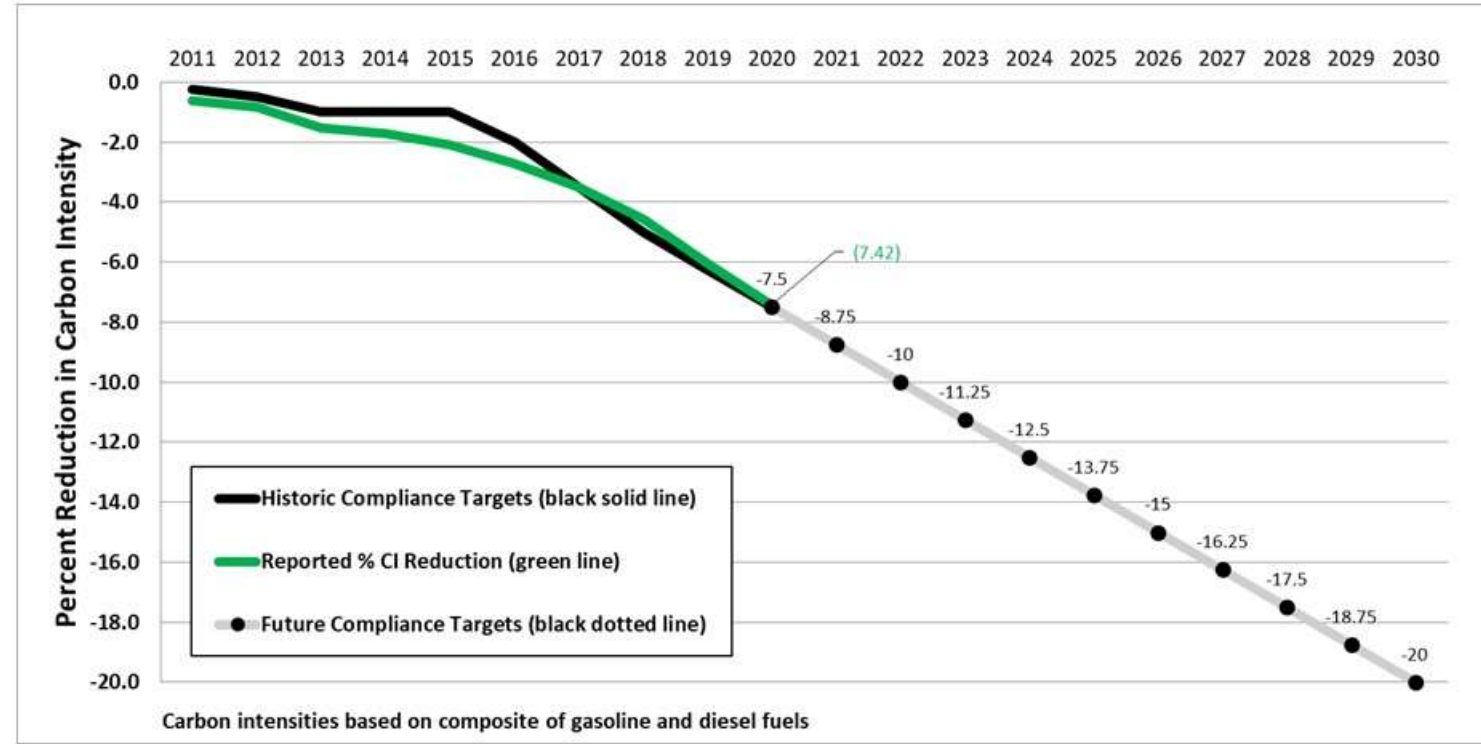
- CI – amount of carbon equivalent by weight emitted per unit of energy over the lifecycle or “pathway” of the fuel.
- In California, CI is measured in terms of grams of CO₂ equivalent per megajoule (1 million joules) of energy:

gCO₂e/MJ

- The LCFS then sets a standard, e.g., 50 gCO₂e/MJ, that establishes the benchmark against which LCFS credit markets operate.
- The benchmark is set against a baseline year, and it gets more stringent over time.

California CI Performance Standard

2011-2020 Performance of the Low Carbon Fuel Standard



Last Updated 04/30/21

This figure shows the percent reduction in the carbon intensity (CI) of California's transportation fuel pool. The LCFS target is to achieve a 20% reduction by 2030 by setting a declining annual target, or compliance standard. The compliance standard was frozen at 1% reduction from 2013-2015 due to legal challenges, contributing to a build-up of banked credits as regulated parties bringing new alternative fuels to market continued to over-comply with the standard. The program will continue post 2030 at a to be determined stringency.

[Click to download the Excel spreadsheet of this graph.](#)



The Inflation Reduction Act



Growth Energy[™]
Expanding America's Bioeconomy

Inflation Reduction Act (IRA)

- Biofuels provisions of the IRA provide tax incentives for biofuels that meet CI reduction thresholds, and then “scales up” the credit for exceeding the threshold
- Implementation of the IRA has required more intensive interagency engagement between IRS, Department of Energy, EPA, and USDA, among others
- Most of the credits expire after a few years; the limited timeframes for credit availability affect investment horizons
- Highlights the importance of lifecycle GHG emissions modeling

Key IRA Biofuels Provisions

40B – Sustainable aviation fuel (SAF)

45Q – Credit for carbon oxide utilization/sequestration (CCUS)

45V – Clean hydrogen

45Z – Clean fuel production (includes SAF and non-SAF)

Biomass-Based Diesel and Second-Generation Biofuel Producer Credit Extensions

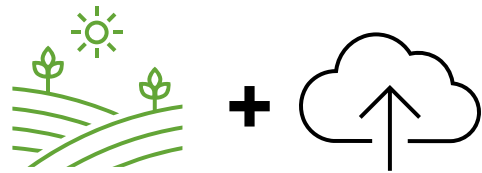
USDA Biofuels Infrastructure Funding

GHG Emissions Modeling Elements



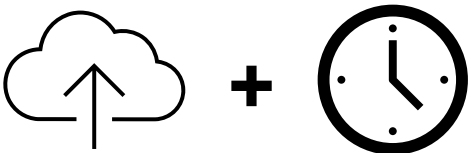
Agroeconomic models

- Used to estimate supply and demand factors, including land use type and land use change



Emissions factors

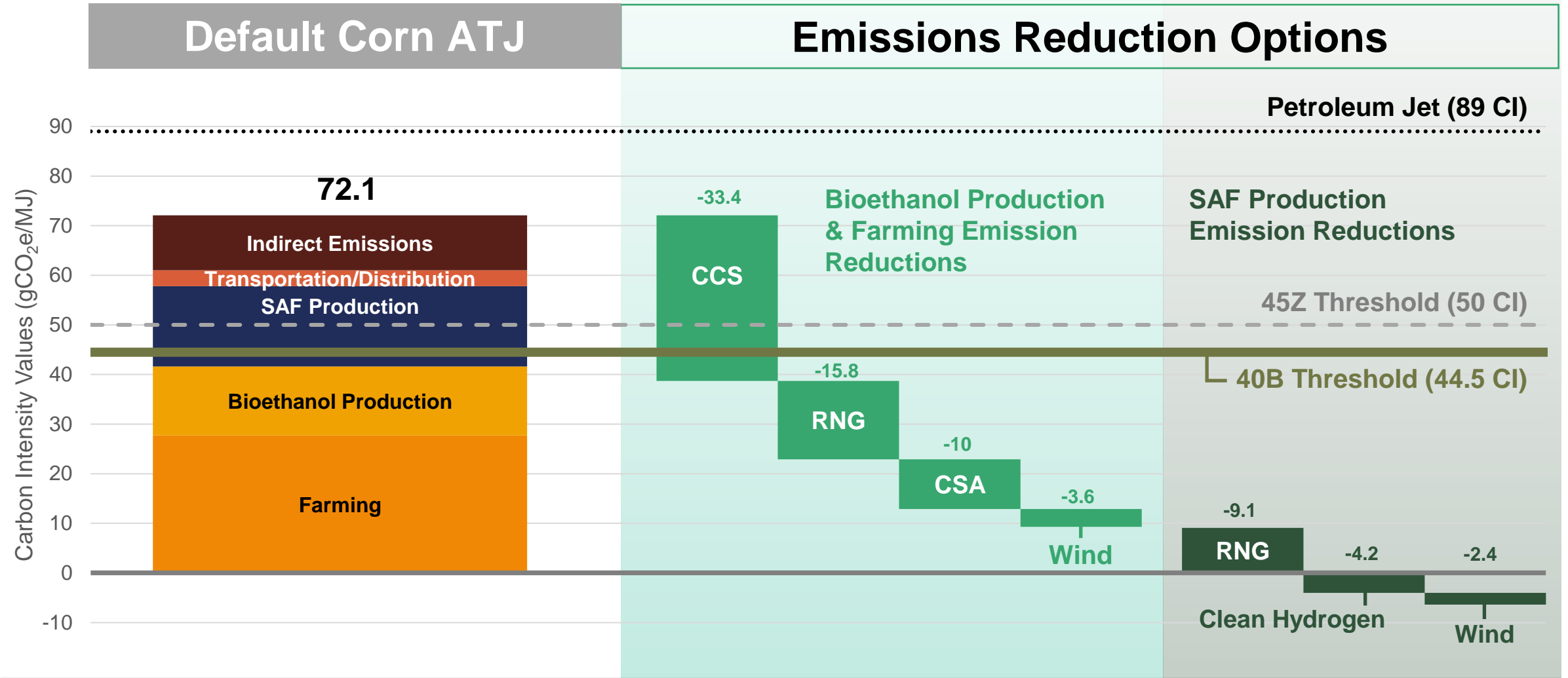
- Used to estimate carbon emissions impacts per unit of different types of land



Amortization period

- Used to determine the time period over which emissions impacts are distributed

Potential GHG Emissions Reductions Pathways



IRA Carbon Model Language – A Legal Comparison

SAF Tax Credits

IRA Section	How Should Treasury Determine “Lifecycle GHG Emissions”?
40B (SAF)	Use the most recent ICAO; or “ any similar methodology ” which satisfies RFS criteria for “lifecycle greenhouse gas emissions”
45Z (SAF)	Use the most recent ICAO; or “ any similar methodology ” which satisfies RFS criteria for “lifecycle greenhouse gas emissions”

IRS: Argonne GREET is *not* a “similar methodology” for 40B; Bespoke “Section 45B(e) GREET model” released 4/30/24.

Non-SAF Tax Credits

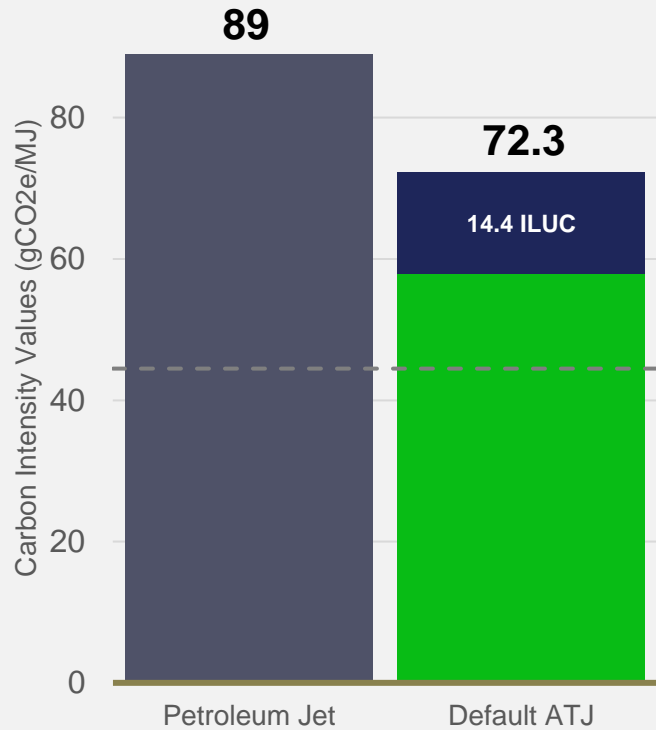
IRA Section	How Should Treasury Determine “Lifecycle GHG Emissions”?
45V (Hydrogen)	Use “ the most recent ” Argonne GREET model; or a “ successor model ”
45Z (Clean Fuels)	Use “ the most recent ” Argonne GREET model; or a “ successor model ”

Treasury issued proposed 45V regulations on 12/26/23 and sought comment on GREET; Growth filed comments 2/13; awaiting final guidance and model.

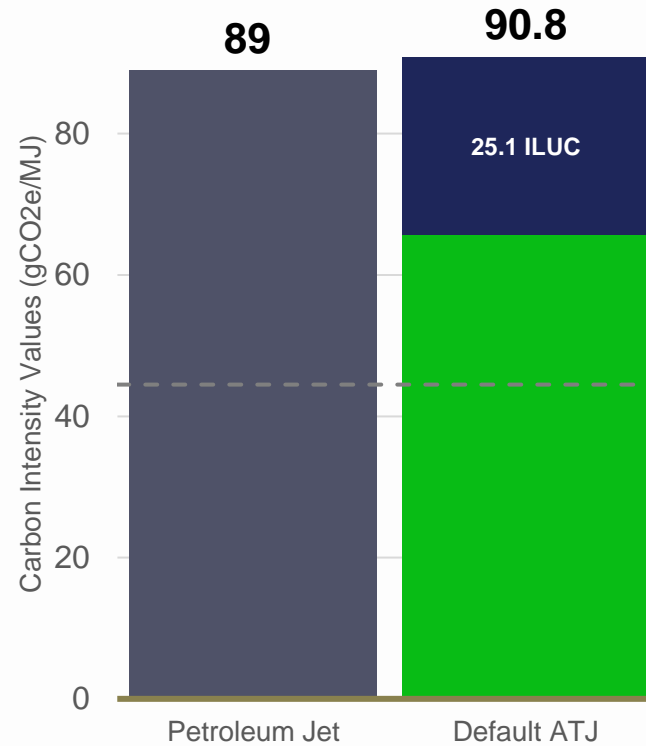
Carbon Intensity Reduction Comparison of U.S. Corn Ethanol in Jet Fuel



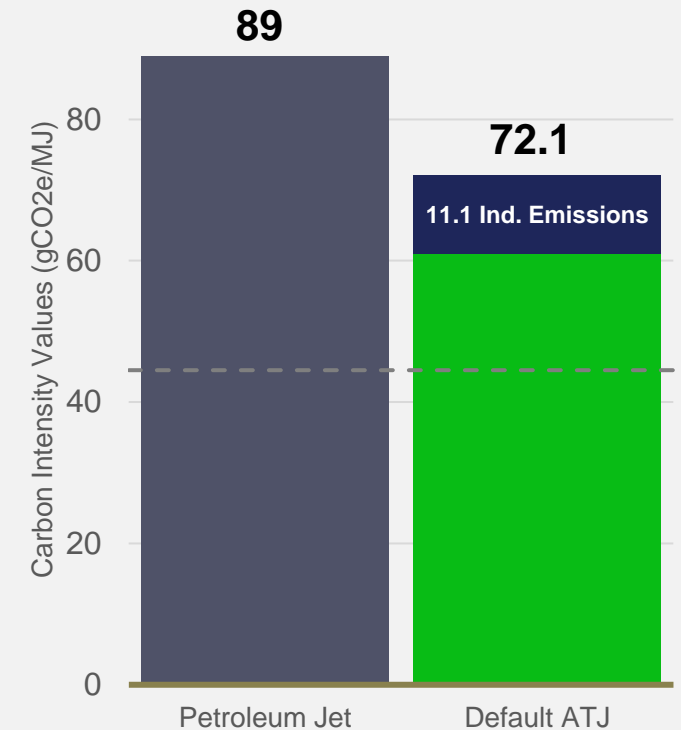
2023
DOE R+D GREET



ICAO CORSIA



2024
40B GREET



*The unit of measurement for all carbon intensity (CI) scores is gCO₂e/MJ
 *To be eligible for 40B tax credit, the fuel's CI must be at least 50% lower than baseline CI of petroleum jet fuel

* Charts for illustration purposes only. | Default EJT in GREET chart uses standalone configuration with corn oil extraction. | CCS = carbon capture and sequestration. CCS technology is not currently recognized by CORSIA; the figure in the CORSIA chart assumes a hypothetical scenario where CCS is accepted in the policy. | CSA = climate smart agriculture. The figure of CSA Offsets in the CORSIA chart shows indirect CI reduction through carbon offsets from regenerative agricultural practices assuming same inputs in GREET.

Thank you!

