

September 22, 2023

The Honourable Liane Randolph
Chair, California Air Resources Board
1001 I St.
Sacramento, CA 95814

RE: Carbon accounting, book & claim, and the GREET model

Dear Chair Randolph and Members of the California Air Resources Board,

Recently, groups and opponents of animal agriculture have changed their messaging to attack the science of carbon accounting and the market mechanisms that have been in place for decades, mostly for the trading of renewable electricity, and now also to trade renewable gaseous and liquid fuels. I am writing, as President and CEO of M-RETS to provide members of the CARB board examples of the unwavering, widespread, and public support for Argonne National Laboratory's GREET model for carbon accounting and the use of book and claim.

M-RETS is a nonprofit, mission-driven organization that operates an environmental attribute tracking platform to manage the activity of a diverse variety of environmental attributes and other energy commodities to facilitate the drive toward economy-wide decarbonization.

The GREET Model continues to be an appropriate and fair foundation for the Low Carbon Fuel Standard. As you already know, Argonne National Lab's GREET model is a tool that examines the lifecycle impacts of vehicle technologies, fuels, products, and energy systems. It provides a transparent platform through which energy and vehicle producers, researchers, and regulators can evaluate energy and environmental effects of vehicle technologies and energy and product systems. For any given energy and vehicle system, GREET can calculate total energy consumption (non-renewable and renewable), emissions of air pollutants, emissions of greenhouse gases, and water consumption.

Because of its wide use, support for it is well documented:

The US Department of Energy (DOE) [says](#) "In addition to [DOE's Bioenergy Technologies Office], the EERE's other Sustainable Transportation Offices, the Vehicle Technologies Office and the Fuel Cell Technologies Office use GREET. Beyond DOE, the GREET suite of models are used by a large field of researchers in government, industry, and academia. At present, there are more

than 35,000 registered GREET users worldwide. In many circles, GREET is considered the state-of-the-art model for energy and environmental analysis of transportation fuels and vehicle technologies, both emerging and conventional. GREET is widely used for biofuel life cycle analyses, including those by regulatory agencies.”

The [Union of Concerned Scientists](#) uses GREET to underpin their report “Cleaner Cars from Cradle to Grave How Electric Cars Beat Gasoline Cars on Lifetime Global Warming Emission.” In it, UCS says: “For all of our vehicle manufacturing modeling efforts, we used the 2014 versions both of GREET 1 (a fuel cycle model) and GREET 2 (a vehicle cycle model) (ANL 2014a; ANL 2014b).”

The **Environmental and Energy Study Institute** [calls GREET](#) “the most comprehensive, up-to-date lifecycle assessment model for various fuels (including biofuels and petroleum-based fuels).”

E&E News ([April 2023](#)): “Producers say the U.S. GREET model, which is run by the Department of Energy’s Argonne National Laboratory, is more accurate than [a European methodology known as CORSIA run by the International Civil Aviation Organization (ICAO)] and does not overly penalize farmers for using land to cultivate crops. They say GREET better considers precision farming tactics that lower emissions like strip-tilling, which uses less diesel fuel emissions than standard tilling, and nitrogen fixation, which reduces the need for nitrogen fertilizer.

“The Inflation Reduction Act calls on Treasury to authorize the European tool, along with “any similar methodology” that meets Clean Air Act requirements. That could potentially include GREET. ICAO already uses GREET to influence its findings.”

GEVO produced this comparative piece called “[Why We Believe Argonne Greet Is the Superior Model](#).” The two-page piece starts with “We believe Argonne GREET® (Greenhouse gases, Regulated Emissions, and Energy use in Technologies), developed by Argonne National Laboratory (Argonne) with the support of the U.S. Department of Energy (DOE), is superior to any other LCA tool available. Argonne National laboratories has been working on LCA since 1995 and has been cooperating with several federal agencies including the U.S. Department of Agriculture since 2014 to incorporate soil carbon. They update their models and stay current with the science. By employing rigorous scientific research and incorporating new developments and ideas, an accurate model for carbon intensity can be created and remove outdated boilerplate assumptions.

This allows Argonne GREET to accurately account for the entire lifecycle. It also introduces the necessary ability to adapt to new developments and technological advances, making it the only model that can lead to every player in the lifecycle being appropriately compensated.”

HOW REGULATIONS / PROGRAMS ARE COMPARED TO GREET LCA

CARBON EMISSION CONTRIBUTIONS	GREET	Ca. GREET 3.0	CORSIA	RFS	EU REDII	Canada CFS	RenovaBio
Farm Specific Cultivation	✓	✗	✓	✗	✓	✓	✓
iLUC Updated Land Use Data	✓	✗	✗	✗	✓	N/A	N/A
Land Management Changes	✓	✗	+/-	✗	✓	✓	✓
Carbon Capture and Sequestration Crediting	✓	✓	✗	✓	✓	✓	✓
Electricity Source	✓	✓	✓	✓	✓	✓	✓
Thermal Source	✓	✓	✓	✓	✓	✓	✓
Methane Avoidance for Manure Systems	✓	✓	✗	✓	N/A	N/A	N/A
Hydrogen Source	✓	✓	✓	✓	✓	✓	✓

✓ Always calculated ✗ Not calculated +/- Carbon emission calculated if positive, and not if negative N/A Not within system boundary

THIS GRAPHIC REFLECTS CURRENT REGULATIONS AS OF MARCH 2022

In July a group of **21 federal lawmakers** sent [a letter to U.S. Treasury Secretary Janet Yellen urging the Treasury Department to adopt the U.S. Department of Energy’s GREET model](#) as the secondary methodology for calculating the sustainable aviation fuel (SAF) tax credit. The lawmakers note that adoption of the GREET model “ensures that every participant involved in the SAF lifecycle has the opportunity to effectively engage in carbon-reducing practices.”

In response to this congressional letter, [Emily Skor, CEO of Growth Energy](#) said, “GREET is the best lifecycle analysis model to fully and accurately capture the full carbon emissions benefits of American-made, farm-based feedstocks for SAF.”

In addition to the GREET model, “book and claim” is a critical and well supported decarbonization practice. [RMI states](#), “[b]ook and claim is a flexible model for verified information to flow — or chain of custody model — that allows clean [electricity,] fuel or materials producers to ‘book’ the emissions savings of a good they produced in one place, and customers to “claim” the emissions benefit from these goods for climate disclosures in a different place.” This science-based accounting framework is the most widely used method in situations like renewable energy production and consumption where electrons or molecules are placed into common carrier networks and flow under the laws of physics—comingling with differently created yet indistinguishable electrons or molecules.

Without book and claim accounting, the U.S. power grid would look vastly different. Book and claim accounting allow a diverse array of consumers to access greener options they otherwise could not access. [According to the National Renewable Energy Laboratory](#), green power sales—unrelated to state renewable portfolio standards—represented 37 TWh between 1.8 million customers in 2010. In 2021 8 million customers consumed 244 TWhs, representing “27% of all U.S. renewable energy sales...and about 6% of all U.S. retail electricity sales.” This provides for a significant contribution to electricity grid decarbonization efforts, not to mention the significant national security, economic, and many other benefits.

It is the environmental attribute certificates (EAC) that allow market participants to claim the consumption of renewable fuels or electrons in a book and claim system. [The U.S. Environmental Protection Agency](#) recognizes “RECs are the accepted legal instrument through which renewable energy generation and use claims are substantiated in the U.S. renewable electricity markets.”

To protect against dishonest actors, a robust system tracks the production and sale of RECs.

This [certificate-based tracking system](#) ensures RECs are only held by one organization, as well as third-party agencies. [M-RETS](#) verifies and assists with this process by using a transparent, web-based platform to track the production and use (retiring) of RECs and Renewable Thermal Certificates (RTCs). This system ensures single-use transactions by issuing a unique, traceable, digital certificate for every megawatt-hour (MWh) of renewable energy generated by registered units or imported into its system. This creates an honorable system complying with state policy and preventing double counted.

Just as RECs can be booked (produced) in one place and claimed (used) in another, so too can carbon reductions and emissions. For example, most hydrogen projects making green hydrogen from the electrolysis of water get their electricity from the grid. When grid connected hydrogen projects buy RECs from a clean energy generator, the hydrogen project can use the booked RECs to claim it is producing zero carbon hydrogen. This is true even though the electrons were not necessarily physically delivered to the hydrogen producer, the property right inherent in the RECs allows the hydrogen developer to make this legally supportable claim.

To continue the hydrogen example, when a hydrogen producer books the carbon reductions from a biogas system, which reduces methane emissions on a farm, and claims those reductions in the overall production of the hydrogen from the resulting biogas, this is the widely accepted same book and claim process that green hydrogen producers use.



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M-RETS intends the provided examples to substantiate the widespread academic, government, and industry support for Argonne National Laboratory's GREET model. Efforts to undermine its use of lifecycle analysis will delegitimize decades of climate science that underpin the critical work currently underway to decarbonize our economy.

Further, M-RETS would like to reiterate the basis for book and claim is an established electricity and energy mechanism to enable robust decarbonization and support credit markets. The inclusion and acceptance of book and claim in the LCFS accelerated decarbonization efforts globally and will help California achieve their aggressive—and widely admired—climate goals.

M-RETS appreciates the opportunity to share our perspective and for your continued efforts on behalf of CARB. Please feel free to contact us with any questions or if we can provide any additional information.

Sincerely,

A handwritten signature in black ink that reads "Benjamin L. Gerber".

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