345 Inverness Drive South
Building C, Suite 310
Englewood, CO 80112

T 303-858-8358
F 303-858-8431
gevo.com

May 10, 2024

VIA ELECTRONIC FILING
Submitted via LCFS Comments Upload Link

The Honorable Liane M. Randolph, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Gevo, Inc.'s Comments on the Low Carbon Fuel Standard Workshop, April 10, 2024

Dear Chair Randolph:

Gevo, Inc. (Gevo) appreciates this opportunity to comment on the April 10, 2024, Workshop held by the California Air Resources Board (CARB) on the Proposed Amendments to the Low Carbon Fuel Standard (LCFS) and additional information CARB shared in the Workshop process.

Gevo's mission is to produce low-carbon, renewable energy-dense liquid hydrocarbons for drop-in transportation fuels such as gasoline, jet fuel, and diesel. Gevo's alcohol-to-hydrocarbons production process uses a combination of decarbonization technologies and sustainably farmed feedstock to produce fuels with substantially reduced carbon intensity (CI) compared to fossil fuel equivalents. We broke ground on our first alternative jet fuel (AJF)/sustainable aviation fuel (SAF)[1] production facility, "Gevo Net-Zero 1" (NZ1), in Lake Preston, South Dakota, in September 2022. This facility will use a three-part strategy to produce low-CI SAF: 1) use locally-sourced corn feedstock from farmers engaged in sustainable agriculture to both reduce on-farm greenhouse gas (GHG) emissions and sequester carbon dioxide (CO_2) in the soil; 2) decarbonize the fuel production process by replacing conventional fossil fuel inputs with wind energy, renewable natural gas, and green hydrogen; and 3) use carbon capture and sequestration (CCS) technology to reduce emissions from the production process

[1] Gevo typically uses the term "sustainable aviation fuel" or "SAF" to refer to our fuel. This fuel meets the definition of "alternative jet fuel" (AJF) as set forth in the LCFS regulations. Accordingly, our references to SAF in this comment letter should be deemed synonymous with AJF.

further. The Gevo approach is aimed at decarbonizing every step in our SAF's life cycle, which we track all the way from the farm field through to the aircraft using our Verity Tracking platform.

Gevo currently is participating in the LCFS through our production of renewable natural gas (RNG) from three dairies, for which we installed dairy-manure biomethane capture and upgrading equipment, thereby producing pipeline quality RNG rather than allowing the methane from the manure to continue to be released from the dairy lots. In addition, we intend to submit a Tier 2 LCFS Provisional Pathway application for the SAF, renewable diesel, and renewable naphtha fuels that will be produced at the NZ1 facility, utilizing our field corn starch feedstock and alcohol-to-jet (ATJ)/alcohol-to-hydrocarbons production process.

Gevo submitted comments on CARB's proposed LCFS amendments on February 20, 2024, and we incorporate those comments here by reference.[2] Although we continue to urge CARB's consideration of all of the comments we submitted on February 20, the comments here relate to areas elaborated in the April 10 Workshop by CARB staff and other commenters and in the materials CARB provided in support of that Workshop.

I. Gevo Supports Strengthening the Compliance Curve, Step Down, and Automatic Acceleration Mechanism

As noted in our February 20 comments, Gevo strongly supports CARB's intent to strengthen the overall compliance curve. CARB's analysis clearly shows that this is needed to support California's emission goals. However, as we noted in our comments the analysis undertaken and submitted by ICF demonstrated that CARB could go even farther, as ICF's LCFS analysis found that a 2030 target for the program greater than 40% is achievable when all low carbon fuels are allowed to contribute fully under the program's technology-neutral, performance-based design.[3] Thus, while supporting CARB's benchmarks/compliance curve proposal, we urged CARB to view the proposed targets as a minimum, and to continue to consider ways to further advance emissions reduction through LCFS emissions targets.

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[2] *See* Gevo, Inc.'s Comments on "Proposed Amendments to the Low Carbon Fuel Standard" (February 20, 2024) (available as Comment #196 in CARB's Public Comments Received portal).

[3] ICF's prior analysis, captured in the report, "Analyzing Future Low Carbon Fuel Targets in California," was previously submitted to CARB by the Low Carbon Fuels Coalition. *See* Letter from the Low Carbon Fuel Coalition to CARB Chair, Liane Randolph (Sept. 28, 2023) (attaching the ICF report).

In addition, while supporting CARB's proposals for a CI stepdown and for adoption of an Automatic Acceleration Mechanism (AAM), we urged CARB to consider a significantly greater stepdown than the 5% that had been proposed and to further strengthen the AAM.

Gevo appreciates CARB's effort to analyze additional compliance curve, stepdown, and AAM combinations. Based on our review of the additional data that CARB provided, it appears that the 5% and 7% stepdown options would be insufficient to address the excess credit buildup in the bank that weakens the effectiveness of the LCFS, even if these stepdowns were accompanied with an AAM trigger (and even if the 5% stepdown were to be coupled with two AAM triggers). In assessing the ICF and CARB analyses side-by-side, Gevo continues to urge CARB to consider a stepdown of 10-11% in 2025, which is supported by the ICF analysis as we detailed in our previous comments.[4] That said, of the options CARB has assessed, the 9% stepdown appears to be the most viable, as such a stepdown is projected to result in credits closer to the demand to be sparked by the compliance curve rather than allowing the credit bank to continue to build to excess. Accordingly, Gevo urges CARB to adopt a stepdown of not less than 9%, though a 10-11% stepdown is supportable and warranted based on the analysis, and we continue to support the adoption of the AAM to serve as a safeguard that could be triggered in case market conditions again hew to an excessive credit bank and/or depressed credit values that could undermine the emissions-reducing effect of the LCFS.

II. Further Support Should Be Provided for Alcohol-to-Hydrocarbons in the LCFS Revisions

In various places in the proposed regulations, CARB proposes to enumerate certain feedstocks and/or production processes, rather than retain the feedstock- and technology-neutral approach that has typically been taken under the LCFS. Although CARB staff did not further elaborate on these proposed changes during the Workshop, staff did note an overall intent for the LCFS to remain focused on performance, rather than on specific technologies or feedstocks. Thus, we reiterate here the areas where the proposed LCFS revisions appear contrary to this intent, with specific respect to our concern that CARB's proposed changes would create unnecessary administrative and other barriers to low-carbon fuels from the alcohol-to-hydrocarbons/ATJ pathways.

- Temporary Alternative Jet Fuel Pathways Should Include a Specific Corn Starch ATJ Pathway (§95488.9(b)): As noted in our February 20 comments, Gevo strongly

[4] As we laid out in our February 20 comments, ICF's analysis demonstrates that "a stepdown of at least 10.5% in 2025 likely is needed to ensure that the credit bank reverses and is drawn down to the level necessary to continue to incentivize LCFS-driven emissions reductions, i.e., with the credit bank holding approximately two to three quarters' worth of deficits."

supports CARB's proposal to include alternative jet fuel (i.e., SAF) temporary pathways in Table 8. We respectfully request that CARB expand the ATJ temporary pathways to include corn starch feedstock processed using an alcohol-to-hydrocarbon production process. As Gevo detailed in our February 20 comments, the alcohol-to-hydrocarbon pathway is well established, with multiple ATJ/SAF facilities using this production process coming online. Inclusion of the corn starch feedstock to alcohol-to-hydrocarbon process as a temporary ATJ pathway will further incentivize its production, helping to meet the State's emissions reduction goals and will avoid the delay that would be occasioned by deferring its addition until later. We note the concern that, as currently stated, the ATJ temporary pathway proposal in the current LCFS package would put corn starch feedstock pathways in the "any other feedstock" category with a "Baseline (2010) CI value for Fossil Jet Fuel." Similar to the July 31, 2019, proposal for ATJ temporary pathways (which also happened to artificially align the corn starch and "any other" non-enumerated ATJ feedstock pathways with the renewable diesel pathway),[5] the proposed catch-all temporary pathway designation in the current LCFS proposal would not reflect the significant CI reduction associated with the actual lifecycle analysis of the corn starch ATJ pathway.

- The Proposed Revision of the Definition of "Renewable Diesel" and the Proposed Definition of "Renewable Naphtha" Should Not Be Limited in Terms of Feedstocks or Pathways (§95481(a)): CARB's proposals would import specific feedstocks and production pathways (i.e., hydrotreated lipids and biocrudes or from gasified biomass that is converted using the Fischer-Tropsch process and portions from co-processing) into these definitions. As written, the proposed definitions would presumably exclude feedstocks and production pathways that are not enumerated. If so, our production process – the alcohol-to-hydrocarbons conversion process – apparently would be excluded from these definitions, as would our feedstock, corn starch (or other such biomass not expressly included in the proposed definitions). Yet, renewable diesel and renewable naphtha are hydrocarbon fuels that are produced alongside our SAF (i.e., alternative jet fuel) in alcohol-to-hydrocarbons production facilities. There is no rational reason for excluding such truly renewable naphtha and diesel from the CA-LCFS program and by enumerating specific technologies and feedstocks (and in this case, so few), CARB would be creating an administrative barrier to the types of innovations the State wants to encourage Accordingly, we urge CARB to make these definitions neutral as to non-petroleum feedstocks and production processes.

[5] *See* CARB, Low Carbon Fuel Standard Proposed New Temporary Fuel Pathway, Alternative Jet Fuel (July 31, 2019).

- CARB Should Expressly Include Alcohol-to-Hydrocarbons in the Tier 2 Classification Provisions (§95488.1(d)(4)): While Gevo understands that the Tier 2 pathway classification is not limited to the production processes listed in this section of the proposed regulation, we are concerned that the omission of the alcohol-to-hydrocarbon conversion process might be misread as an exclusion. Therefore, as noted in our February 20 comments, we suggest that CARB revise the language associated with Tier 2 classification to explicitly mention alcohol-to-hydrocarbon conversion technology, as follows (proposed addition underlined and bolded, while the strikethroughs are in CARB's proposal):

  (4)Drop-in fuels (renewable biomass-derived hydrocarbons using processes such as gasification and pyrolysis, synthetic hydrocarbons, ***and alcohol to hydrocarbon conversion****) except for renewable diesel hydrocarbon fuels produced from feedstocks described in section 95488.1(c)(3). This category includes fuels produced from low carbon feedstocks co-processed with fossil feedstocks in petroleum refineries;*

III. The LCFS Should Continue to Support and Credit Avoided Methane Projects, Including from Dairy RNG

Gevo appreciated CARB staff's comments during the April 10 Workshop in support of RNG crediting and responding to opposing comments on dairy and other forms of RNG. Gevo strongly supports avoided methane crediting recognizing RNG project benefits that reduce global methane emissions regardless of location or end use. This should include avoided methane from dairy-manure RNG projects. As noted, Gevo participates in the LCFS via the RNG captured from three dairies, for which we installed dairy-manure biomethane capture and upgrading equipment, thereby producing pipeline quality RNG rather than allowing the methane from the manure to continue to be released to atmosphere. LCFS policies create incentives for dairy farmers to capture methane emissions from their cows to convert into biogas. As CARB has recognized, "capturing methane from dairies is one of the primary measures for achieving the state's 2045 greenhouse gas reduction targets and SB 1383 methane reduction target."[6]

[6] California Air Resources Board, "Proposed Amendments to the Low Carbon Fuel Standard Initial Statement of Reasons," Dec. 19, 2023, at page 124.

And use of dairy digesters creates synergistic environmental benefits, as farmers can generate soil amendments that provide nutrients and decrease the amount of fertilizer needed.[7]

In our February 20 comments on the LCFS proposal, Gevo supported CARB's proposal to continue avoided methane crediting, including for dairy RNG, but we noted areas where the LCFS proposal should be further shaped to meet the State's greenhouse gas emissions goals. Gevo commends CARB to our full set of comments, but provides a brief summary of key points here:

- The requirement for physical delivery of biogas or biomethane, i.e., RNG, to a production facility proposed in section 95488.8(i)(2)(C)(2) would add significant cost burden and environmental impact as truck transport of RNG apparently would be required to decarbonize thermal energy. In addition to unduly burdening RNG suppliers like Gevo, it would be counterproductive to the State's emissions reduction goals. To avoid these results, we encourage CARB to allow for biogas or biomethane to be supplied as process energy using the book-and-claim provisions under the regulation. This would bring the CA-LCFS into alignment with the recent changes in the Renewable Fuel Standard (RFS) Biogas Regulatory Reform – which now allows for biogas to be delivered via commercial natural gas pipelines and used to decarbonize thermal demands. Such an approach encourages future GHG emitting projects to be leveraged at production facilities to lower fuels' carbon intensities and expands the understanding that natural gas in pipeline systems is fungible.

- Gevo urges CARB to continue to expand book-and-claim and deliverability requirements within the LCFS in general, and to not place book-and-claim (or other) restrictions on biomethane projects. CARB's proposals in the LCFS package that would place restrictions on biomethane projects risk the LCFS program's ability to decarbonize through biomethane projects. In particular, Gevo opposes CARB's proposal for biomethane projects breaking ground after December 31, 2029, which would mandate that "[s]tarting January 1, 2041…the entity…must demonstrate that the…pipelines along the delivery path physically flow from the initial injection point toward the fuel dispensing facility at least 50 percent of the time on an annual basis." Instead of singling out certain biomethane projects for such restrictions, Gevo supports consistency in LCFS pathways and believes biomethane projects be evaluated and credited on the science-based merits of GHG emissions reduction, rather than the project location or directionality of biomethane flow in U.S. pipelines.

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[7] See, e.g., University of California, Agriculture and Natural Resources, "California Dairy Farmers Generate Renewable Energy from Waste," (Nov. 3, 2023) available at https://ucanr.edu/News/?postnum=58234&routeName=newsstory.

Gevo's support in this regard is consistent with CARB's newly developed CCS pathways that aren't restrictive to project location or pipeline directionality.

- As we noted in our February 20 comments, Gevo supports a credit true up in the LCFS program for all pathways – including for dairy RNG – and we urge CARB to also include true ups between temporary pathways and provisional pathways. We note that the RNG temporary pathway score of -150 CI for swine and dairy manure biomethane projects is more than 50% higher than the actual CI of Gevo's operating facility. Provisional pathways undergo the same rigorous validation and verification process as for operational pathways. By allowing "true ups" between temporary and provisional CI's, CARB would allow operators like Gevo to be credited for the entirety of their projects and the real-world climate value these projects bring, thereby supporting and promoting investment in climate mitigating projects and advancing California's emissions reduction efforts.

- Gevo reasserts our concerns regarding the proposed changes to the "Retention Time and Drainage" instructions under the "Biomethane from Anaerobic Digestion of Dairy and Swine Manure" Tier 1 calculator. Currently, an applicant can select from the options that are applicable to their farms in the "Manure-to-Biogas (LOP Inputs)" tab without having to select a particular month where the system is completely emptied. CARB has now proposed a standardized requirement that: "If there is no regular storage/treatment system clean schedule, must select 'System Emptied in This Month' each September. The applicant only needs to select one 'System Emptied in This Month' for each year." While Gevo appreciates what we perceive to be CARB's approach to standardize the Tier 1 Calculator's inputs for swift processing, we are concerned that by setting this specific "System Emptied" timeframe, this requirement can result in a forced increase in the CI of a project, causing a penalty to farms that retain a certain level of volatiles in their storage system throughout the year. Accordingly, we urge CARB to retain the current approach rather than adopting this amendment. In any event, although the proposal appears to seek to standardize, and only apply to, Tier 1 applications, to the extent CARB proceeds with the proposed change, we respectfully request that CARB continue to assess site-specific optionality in Tier 2 applications. This will ensure unnecessary penalties aren't assessed for farm-specific circumstances in which the farm does not completely empty their storage systems in any year.

IV. Gevo Is Committed to Strong Sustainability and Tracking Requirements, but Urges Further Consideration of the Crop-Based Sustainability Provisions Proposal

During the Workshop, CARB repeated that its main objective in proposing sustainability certification for fuels that use crop-based (and wood-based) feedstocks is to ensure

"biofuel production must not come at the expense of deforestation or food production."[8] While Gevo is fully committed to providing low-carbon, sustainable SAF, without compromising these critical values, as we noted in our February 20 comments, we respectfully submit that CARB's sustainability certification proposal is not fit for purpose and we again urge CARB to convene a stakeholder process to flesh out an appropriately tailored approach to sustainability certifications for feedstocks that would include crediting the emissions reductions from climate-smart agriculture.

Climate-smart agriculture is an important lever for carbon abatement. As noted, Gevo plans to source sustainably-grown, low-carbon intensity (CI) field corn from the Lake Preston, South Dakota area and use Verity Tracking to measure and verify carbon intensity and all farm activities to the field level. The Gevo Growers' Program is currently enrolling farmers under our $30 million USDA Climate-Smart Commodities grant, which allows us to pay farmers more for implementing climate-smart agriculture practices such as cover crops, reduced tillage, organic fertilizers, and nutrient management. Notably, our process only uses the residual starch from the corn, first ensuring that the protein goes to food and feed uses.

Climate-smart agricultural practices are critical to producing sustainable feedstock. In addition to sequestering carbon in soil, they provide significant additional ecosystem benefits such as better soil health, better water quality, higher water use efficiency, more resilient crops, and long-term land fertility. These practices are a significant component of Gevo's approach to sustainable SAF and other low-carbon fuels production and we urge CARB to support them under the LCFS.

Gevo supports and is committed to fully meeting appropriate sustainability criteria. Unfortunately, what CARB has proposed misses the mark. CARB has failed to fully define the problem it purportedly is trying to solve and, relatedly, has failed to provide an appropriately defined solution. In terms of defining the problem, virtually all the data CARB presented at the Workshop about the potential for crop-based feedstocks to negatively affect food and forests discussed crop-based oil seeds and virgin oil. In fact, there is no mention of corn starch feedstock creating impacts of concern in the slides presented by CARB.[9] Notably, the corn starch feedstock that Gevo uses is distinguishable from oil seed and plant oil feedstocks. U.S. corn production has long had multiple uses in food, feed, and fuel and has not resulted in increased land use, nor has

[8] This intent was restated in the slide deck presented by CARB at the Workshop, "California Low Carbon Fuel Standard Workshop, April 10, 2024," at slide number 51 (hereinafter "CARB Workshop Slide Deck").

[9] CARB Workshop Slide Deck, at slides 52-56.

it negatively affected food prices.[10] Since 1920, U.S. farmers have increased their yield by approximately 140 bushels of corn per acre while reducing agriculture's land footprint by 9% nationwide.[11] Indeed, leveraging existing agricultural land, regenerative agriculture practices, and clean energy to produce both feed and fuel from the same crop while sequestering carbon throughout the production process maximizes land use efficiency and carbon abatement. Making multiple products from one crop is an efficient, sustainable use of cropland and better for our environment.

As confirmed by CARB staff during the April 10 Workshop, CARB has not set out specific sustainability requirements that it would expect to be met, instead deferring to third-party schemes. CARB's failure to set out specific requirements calls into question not only what problem CARB is trying to solve, but also how one might comply. It also raises the question of whether CARB has the legal and regulatory authority to import into the LCFS undefined substantive provisions within outside schemes.

Indeed, the provisions proposed are too vague to be implemented appropriately and consistently across production facilities and by various certification bodies. For example, the provision that "the certification must consider environmental, social, and economic criteria" could be interpreted in a variety of ways. It is unclear from the proposed language which specific environmental, social, and economic criteria would be deemed essential for the CA-LCFS program and how they might align with program goals. Further, CARB's failure to establish clear criteria calls into question why the current analytical, science-based methodologies used by CARB are assumed to be insufficient to provide the necessary controls on crop-based (and forestry) feedstocks to ensure environmental integrity. Moreover, given that CARB only detailed potential concerns about oil seed crops during the April 10 Workshop, there does not appear to be a basis for the broad application of the proposed sustainability certification requirements to all low-carbon fuels that use any form of crop-based feedstock.

In addition, it is unclear why crop and forestry-based fuels are being singled out for meeting social and economic criteria, which have implications for any fuel pathway participating in the program. These additional criteria have the potential to add substantial administrative burden to both farmers and fuel producers, potentially

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[10] *See* Oladosu, Gbadebo & Kline, Keith & Langeveld, "Structural Break and Causal Analyses of U.S. Corn Use for Ethanol and Other Corn Market Variables," Agriculture. 11. 267. 10.3390/agriculture11030267 (2021) ("The casualty analysis finds that U.S. corn use for ethanol is not a driver of corn price and net corn exports.") *See also* Taheripour, Baumes & Tyner, "Economic Impacts of the U.S. Renewable Fuel Standard: An Ex-Post Evaluation," Front. Energy Res., Sec. Sustainable Energy Systems Volume 10 (2022) ("The long-run effects of biofuel production and policy on food prices were negligible… biofuels' contribution to commodity price increases is really no different from fructose corn syrup, increased feed demands, or other market demands.")

[11] *See* USDA, "Crop Production Historical Track Records."

creating barriers to participation in the LCFS, and as such should be carefully considered in the context of what the program hopes to achieve with these criteria.

During the April 10 Workshop, CARB staff reiterated that its remit from the Board at the September 28, 2023, informal Board meeting with regard to crop-based fuels was to "investigate guardrails."[12] It does not appear that CARB staff has done that, instead – as noted – simply deferring to third-party sustainability certification schemes without determining what might or might not be needed for the State. Although the proposed LCFS regulatory revisions do not cite specific third-party schemes, during the workshop CARB staff referred to the Roundtable on Sustainable Biomaterials (RSB) and the International Sustainability and Carbon Certification (ISCC) initiative as the types of certification systems it believed would be applicable.

While Gevo is a member of and we work with both RSB and ISCC, in our experience, despite being well intentioned regarding stakeholder input, these entities have not actively included farmers in the development of standards and, as European certification bodies, do not have first-hand experience with U.S. agriculture. Also, both of these entities have multiple certification standards – yet CARB has not provided sufficient detail to suggest which might be applied.

To better meet the CARB Board remit that CARB staff "explore guardrails," we implore CARB to remove the sustainability certification requirement from the rulemaking and continue to mature the development of specific program requirements with multi-stakeholder input and workshop feedback to align whatever substantive requirements CARB might impose with specific LCFS goals and to make the provisions practicable. Critically, this stakeholder input must bring farmers and others who work in agriculture to the table, as farmers are more often than not omitted from the development of program standards, despite being the most critical actors in implementation of those standards.

Critically, in establishing specific sustainability criteria that are expected to be met for crop-based feedstocks, CARB should include provisions that allow for climate-smart agriculture practices to be credited under the LCFS. These practices represent significant additional effort on the part of the farmer to implement and are a departure from business-as-usual feedstock production. Moreover, these practices can bring significant GHG emissions reductions, as recognized by the U.S. Department of

[12] CARB Workshop Slide Deck, at slide 51.

Agriculture, the National Academy of Sciences, the IPCC, and others.[13][14][15] Hence, they should be incentivized through crediting to drive adoption of these important practices.

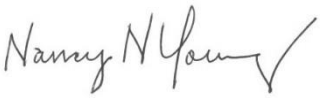
By focusing in on what the State of California seeks to achieve through additional sustainability criteria, and delineating those criteria with appropriate inputs, CARB can ensure that program requirements are fit for purpose, clear, transparent, applied fairly across feedstocks and fuel production processes, properly credit GHG emissions reductions from agricultural feedstocks, and align with LCFS-specific program goals. And such a process need not take long, as CARB could set up a process with a specified time frame (e.g., six months) as it has in other instances where program requirements need to be refined.

V. Conclusion

Thank you for the opportunity to comment on the April 10 Workshop addressing issues in the Proposed Amendments to the Low Carbon Fuel Standard. Please let us know if you have any questions regarding our comments. We look forward to continuing to participate in this program with our RNG and as Gevo begins commercial scale production of SAF and other biofuels.

Respectfully,

Kent Hartwig
Director of State Government Affairs
Gevo, Inc.



Nancy N. Young
Chief Sustainability Officer
Gevo, Inc.

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