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July 12, 2023

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California Air Resources Board

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**Re: NRDC Comments on the Carbon Intensity of Biomethane from Anaerobic Digestion of Dairy and Swine Manure**

California’s Low Carbon Fuel Standard (“LCFS”) currently provides outsized carbon reduction credits to livestock biomethane producers, which undermines the uptake of the most promising and scalable transportation technologies, such as battery electric vehicles, and potentially *increases* air pollution; for example, from hydrogen production paired with biomethane credits at refineries or from continued combustion of methane which generates significant NOx emissions regardless of the source of that methane. CARB must update the carbon intensity calculation of livestock biomethane by updating the accounting baseline and capturing the full lifecycle carbon impacts of the fuel.

1. **CARB Should Correct the Over-Crediting of Livestock Biomethane by 2024 and Support Environmentally Sustainable Livestock Production Practices**

Despite the requirement under SB 1383 to meaningfully regulate manure methane by 2024,[[1]](#footnote-1) CARB Staff’s proposal for LCFS would continue to distort the carbon emissions benefits of livestock biomethane and continue to subsidize long-lasting capital investments in the industry through 2040(given that 10 years of payments would be enabled if this issue was corrected starting in 2030) with significant consequences for communities and the climate.The current system of crediting livestock biomethane through the LCFS based on negative carbon intensity (“CI”) scores has led to hundreds of millions in subsidies for the livestock biomethane industry. In addition to LCFS credits, hundreds of millions in public funding have also gone to support California’s livestock biomethane industry through programs such as the Dairy Digesters Research and Development Program (DDRDP).[[2]](#footnote-2)Yet, these investments in livestock biomethane have had a questionable climate benefit and exacerbate ongoing harm to communities impacted by environmental injustice. As described by Union of Concerned Scientists (“UCS”), this practice of granting negative emissions “goes beyond holding fuel producers accountable to clean up their own supply chains and instead allows a polluting fossil fuel producer in California to avoid making investment in cleaner technology by purchasing what are in effect offsets from the agricultural sector.”[[3]](#footnote-3)

**It is not clear that LCFS biomethane credits are an effective way to reduce carbon emissions.** As stated in an Assembly Budget Committee oversight analysis, “In many cases, [dairy digesters] might be a “white elephant” that result in more cost and pollution than if no project was undertaken at all.”[[4]](#footnote-4) Assembly staff find that other manure management solutions, such as solar drying pads, may be more effective at reducing emissions from dairies;[[5]](#footnote-5) while scientific research finds that covered manure lagoons at confined animal feeding operations (“CAFOs”) are “not observed to abate [methane] emissions” in some cases.[[6]](#footnote-6) Additionally, natural gas vehicles do not provide significant climate benefits over diesel vehicles, with the International Council on Clean Transportation finding that natural gas tractor-trailers achieve at most “11% lifetime GHG savings relative to a diesel tractor-trailer, even when assuming California achieves its maximum in-state RNG potential.”[[7]](#footnote-7) As a result, relying on digesters at CAFOs to reduce climate pollution from the transportation sector is jeopardizing California’s ability to reach its GHG emissions targets, particularly when it comes at the expense of other more effective solutions for the transportation sector.

**Beyond the questionable climate benefits, LCFS credits directly subsidize CAFOs and combustion fuels that continue to pollute.** Under current LCFS carbon-accounting, pollution-intensive CAFOs are advantaged over livestock operations with sustainable management practices.Anaerobic digestors are most economic for large CAFOs,[[8]](#footnote-8) and even then only with significant upfront and ongoing public subsidies as shown by a recent UC Davis analysis.[[9]](#footnote-9) These CAFOs are the same livestock producers that “drive the greatest source of environmental harm in the form of nitrate pollution in the groundwater, eutrophication of streams and lakes, increased ammonia and other volatile organic compound emissions, and intense, distressing odors and flies.”[[10]](#footnote-10) At large livestock operations, digesters also increase particulate matter and ozone pollution: “For example, approximately 20 digesters would emit the same amount of ozone-forming (smog) pollution as one such power plant, but only produce 3 percent of the electricity.”[[11]](#footnote-11) This pollution further harms communities that already experience high levels of pollution throughout the year. Biomethane over-crediting also disadvantages and discourages smaller livestock producers, which are more likely to operate sustainably.

Additionally, LCFS’s methane crediting distorts the relative carbon intensities of LCFS-eligible fuels, favoring air-polluting options such as compressed natural gas (“CNG”) vehicles and steam-methane reformation (“SMR”) produced hydrogen over true zero-emissions options. For example, it allows the biomethane industry to argue that “replacing just 25 percent of a fleet’s diesel trucks with negative carbon intensive RNG from dairy manure can reduce a fleet’s carbon emissions by 100%,”[[12]](#footnote-12) even when these trucks continue to spew harmful air pollution and there is “consensus across CARB’s Scoping Plan, Mobile Source Strategy, and its State Implementation Plan that biomethane should not play a significant long-term role in road transportation.”[[13]](#footnote-13) LCFS’s current carbon accounting is undermining California’s transition to zero-tailpipe-emissions transportation by over-incentivizing methane use in trucks and other combustion-based fuels that pollute and harm communities.

**To effectively mitigate methane emissions from livestock operations and protect communities, CARB should directly regulate livestock methane beginning in 2024** – a policy recommendation supported by Earthjustice, Leadership Counsel for Justice and Accountability (“LCJA”) et al., International Council on Clean Transportation (“ICCT”), and UCS.[[14]](#footnote-14) The current approach of relying on incentives and accepting free venting as an allowable baseline has not been effective in significantly reducing livestock methane emissions and is perpetuating harm to communities located near CAFOs, refineries, and highways. CARB staff and industry argue that regulation may lead to leakage of the livestock industry outside of California, but this concern can be addressed through provisions to mitigate out-of-state emissions leakage, as required by SB 1383, rather than eliminating the possibility of direct regulation entirely.[[15]](#footnote-15)

Directly regulating methane emissions would greatly affect the carbon intensity for some pathways by requiring the baseline assumption that methane would be captured, rather than vented or flared, if it were not captured by an anaerobic digestor or lagoon. Using CA-GREET, ICCT calculates that the CI of livestock-derived CNG would be approximately 36 gCO2e/MJ rather than an average value of -336 gCO2e/MJ if this change were enacted.[[16]](#footnote-16) This would prevent over-incentivizing livestock biomethane at the expense of the zero-tailpipe-emissions transportation solutions.

**CARB must also ensure that the accounting for biomethane production emissions is accurate.** Several issues with the LCFS’s livestock biomethane crediting scheme undermine the ability of the LCFS to reduce emissions, including:

* ***CARB's current carbon intensity (CI) estimate fails to account for the fact that the LCFS incentivizes facilities to produce more methane****.[[17]](#footnote-17)* The wet manure lagoon storage that is employed by large livestock facilities to harvest biomethane actually *creates* methane that would not otherwise be created by standard, dry manure storage systems.[[18]](#footnote-18) CARB must account for the fact that methane is created where it otherwise would not have been in biomethane crediting schemes.
* ***Livestock biomethane production and transportation results in methane leakage that must be accounted for in lifecycle emission assessments.*** Earthjustice notes that “fugitive emissions from biomethane and biogas supply chains exceed emissions from the oil and gas industry,”[[19]](#footnote-19) and Center for Biological Diversity (“CBD”) states that the CA-GREET model relies on assumptions about methane leakage that “dramatically underestimate leakage rates and are inconsistent with the best-available science.”[[20]](#footnote-20) The LCFS must account for fugitive methane emissions in livestock biomethane crediting schemes to effectively reduce net SLCPs.
* ***CARB does not fully account for upstream and downstream emissions from livestock biomethane production.*** For example, downstream emissions may reduce the net GHG benefits of digestors, as digested manure may result in much greater nitrous oxide (N2O, a powerful greenhouse gas) emissions than undigested manure.[[21]](#footnote-21)

**Importantly, LCFS’s over-crediting of livestock biomethane also perversely incentivizes the production of fossil-derived, SMR-produced hydrogen.** This not only overstates emissions reductions from the LCFS program, but it harms households living near refineries, where hydrogen is produced, in the process.[[22]](#footnote-22)

Under current LCFS carbon accounting, solar-powered electrolytic hydrogen receives a CI score of zero under LCFS. Meanwhile, fossil-derived hydrogen coupled with biomethane credits from CAFOs receives a score of -287 gCO2e/MJ.[[23]](#footnote-23) As a result, CARB’s accounting for hydrogen production encourages the operation of existing – and the build-out of *new* – SMR facilities, which emit NOx, CO, PM, and other health-harming pollutants in communities near refineries.[[24]](#footnote-24) As Earthjustice notes, existing LCFS policies make it more lucrative to run SMR plants and “simply go shopping for biogas credits wherever they are cheapest across North America” than to produce green, electrolytic hydrogen.[[25]](#footnote-25) The State Implementation Plan requires reducing emissions from smokestacks, but LCFS sends an opposite signal. CARB must address this distorted incentive to produce grey hydrogen by adopting our recommendation to directly regulate dairy methane emissions.

CARB has no time to waste in correcting the accounting for livestock biomethane in the LCFS. In addition to detracting from California’s climate goals by over-crediting the value of livestock biomethane, the current incentive levels discourage sustainable livestock production practices by making them less able to compete with subsidized CAFOs and exacerbates the environmental justice harms of large livestock operations*.* CARB cannot wait until 2030 to address these issues: we urge you to act now to protect communities and our progress on climate.

**VI. Conclusion**

NRDC appreciates the opportunity to shape the LCFS Program, which – if updated as described here – can help drive the transition to a cleaner, healthier, and safer transportation sector.

Sincerely,

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| **Kiki Velez**  Equitable Gas Distribution Transition Advocate  Climate and Clean Energy | **Ann Alexander**  Senior Attorney  Nature Program | **Lena Brook**  Acting Director  Food and Agriculture |
| **Pete Budden**  Hydrogen Advocate  Climate and Clean Energy | **Merrian Borgeson**  California Director  Climate and Clean Energy |  |
|  |  |  |

cc:

Chair Liane Randolph and Members of the CARB Board

Environmental Justice Advisory Committee Members

Rajinder Sahota, Chanell Fletcher, Jamie Callahan

1. Senate Bill No. 1383 (Lara), Health and Safety Code § 39730.5(b)(1) (2016), <https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383>. [↑](#footnote-ref-1)
2. Earthjustice at 9-10. [↑](#footnote-ref-2)
3. Union of Concerned Scientists, “LCFS workshop comments” (June 2023) at 2 (Accessible at <https://ww2.arb.ca.gov/system/files/webform/public_comments/3641/UCS%20LCFS%20comments%20June%202023_0.pdf>). [↑](#footnote-ref-3)
4. California Assembly Budget Committee, Subcommittee Hearing No. 3 on Resources and Transportation (Apr. 19, 2017), at 19, <https://abgt.assembly.ca.gov/sites/abgt.assembly.ca.gov/files/April%2019%20-%20Toxics%20Recycling%20Ag.pdf>. [↑](#footnote-ref-4)
5. *Ibid* at 13 and 15, finding that “[D]ue to economies-of-scale, [dairy digesters] are significantly cheaper for the 225 largest dairies,” and “[S]ome of the newer manure practices such as converting flush practices to scrape have not been evaluated as rigorously.” [↑](#footnote-ref-5)
6. Earthjustice at 10, *citing to* Vechi, N. T., et al. "Ammonia and methane emissions from dairy concentrated animal feeding operations in California, using mobile optical remote sensing." *Atmospheric Environment* 293 (2023): 119448, <https://doi.org/10.1016/j.atmosenv.2022.119448>. [↑](#footnote-ref-6)
7. O'Malley, Jane, Nikita Pavlenko, and Yi Hyun Kim. "2030 California Renewable Natural Gas Outlook: Resource Assessment, Market Opportunities, and Environmental Performance." International Council on Clean Transportation (May 2023), <https://theicct.org/wp-content/uploads/2023/05/california-rng-outlook-2030-may23.pdf> at ii. [↑](#footnote-ref-7)
8. Markus Lauer et al., Making Money from Waste: The Economic Viability of Producing Biogas and Biomethane in the Idaho Dairy Industry, Applied Energy, Vol. 222 (July 2018), <https://www.sciencedirect.com/science/article/pii/S0306261918305695>; California Assembly Budget Committee, Subcommittee Hearing No. 3 on Resources and Transportation (Apr. 2017), at 14, <https://abgt.assembly.ca.gov/sites/abgt.assembly.ca.gov/files/April%2019%20-%20Toxics%20Recycling%20Ag.pdf>. [↑](#footnote-ref-8)
9. Smith, Aaron, UC Davis, “The Value of Methane from Cow Manure” (April 14, 2023), <https://asmith.ucdavis.edu/news/digester-update>. [↑](#footnote-ref-9)
10. Earthjustice at 16, *citing to* Ruthie Lazenby, Rethinking Manure Biogas – Policy Considerations to Promote Equity and Protect the Climate and Environment (Aug. 2022), [https://www.vermontlaw.edu/sites/default/files/2022- 08/Rethinking\_Manure\_Biogas.pdf](https://www.vermontlaw.edu/sites/default/files/2022-%2008/Rethinking_Manure_Biogas.pdf). [↑](#footnote-ref-10)
11. California Assembly Budget Committee, Subcommittee Hearing No. 3 on Resources and Transportation (Apr. 19, 2017), at p. 17, <https://abgt.assembly.ca.gov/sites/abgt.assembly.ca.gov/files/April%2019%20-%20Toxics%20Recycling%20Ag.pdf>. [↑](#footnote-ref-11)
12. Clean Energy, “RNG is Decarbonizing Trucking Today” (July 2022), <https://www.freightwaves.com/news/rngis-decarbonizing-trucking-today>. [↑](#footnote-ref-12)
13. Earthjustice at 14, *referencing* CARB, State Strategy for the State Implementation Plan at 57, *including* “measures to accelerate ZEV adoption in the medium- and heavy-duty sectors by setting zero-emission requirements for fleets.” [↑](#footnote-ref-13)
14. Earthjustice at 6; International Council on Clean Transportation (“ICCT”), “Comments on the February 23 LCFS Workshop” (Mar. 2023) at 4 (Accessible at <https://www.arb.ca.gov/lists/com-attach/82-lcfs-wkshp-feb23-ws-UTdUN10+UDELPgRb.pdf>); Union of Concerned Scientists (“UCS”), “Comments on the February 22, 2023, Workshop: 1 of 2” (Mar. 2023) at 2 (Accessible at <https://www.arb.ca.gov/lists/com-attach/66-lcfs-wkshp-feb23-ws-Wy4GY1IgVlpRNAVq.pdf>); Leadership Counsel for Justice and Accountability (LCJA) et al., “Comments on Potential Changes to the Low Carbon Fuel Standard Program” (Mar. 2023) at 4 (Accessible at <https://www.arb.ca.gov/lists/com-attach/115-lcfs-wkshp-feb23-ws-UzlXPgBoVmtXJQNc.pdf>). [↑](#footnote-ref-14)
15. “The regulations include provisions to minimize and mitigate potential leakage to other states or countries, as appropriate.” SB 1383 (Lara 2016) [↑](#footnote-ref-15)
16. International Council on Clean Transportation (“ICCT”), “Comments on the February 2023 LCFS Workshop” (Mar. 2023) at 4, stating that the calculation is “[a] simple average of existing, certified pathways. Due to data limitations, we do not have access to the volume-weighted average CI of dairy biogas pathways in the LCFS.” Accessible at <https://www.arb.ca.gov/lists/com-attach/82-lcfs-wkshp-feb23-ws-UTdUN10+UDELPgRb.pdf>. [↑](#footnote-ref-16)
17. *Ibid.* [↑](#footnote-ref-17)
18. Institute for Governance & Sustainable Development, A Primer on Cutting Methane: The Best Strategy for Slowing Warming in the Decade to 2030 (2023) at 119 <https://www.igsd.org/wp-content/uploads/2022/09/IGSDMethane-Primer_2022.pdf>. [↑](#footnote-ref-18)
19. Earthjustice at 12, *citing to* Semra Bakkaloglu et al., Methane Emissions Along Biomethane and Biogas Supply Chains Are Underestimated (June 2022) https://www.sciencedirect.com/science/article/pii/S2590332222002676. [↑](#footnote-ref-19)
20. Center for Biological Diversity (“CBD”), “Comments on Potential Changes to the Low Carbon Fuel Standard Program” (Mar. 2023) at 1. Accessible at <https://www.arb.ca.gov/lists/com-attach/90-lcfs-wkshp-feb23-ws-ATNcaQZYWToANVQL.pdf>. [↑](#footnote-ref-20)
21. Michael A. Holly, Rebecca A. Larson, J. Mark Powell, Matthew D. Ruark, Horacio Aguirre-Villegas, Greenhouse gas and ammonia emissions from digested and separated dairy manure during storage and after land application, Agriculture, Ecosystems & Environment, Volume 239, 2017, Pages 410-419, ISSN 0167-8809, <https://doi.org/10.1016/j.agee.2017.02.007>. (https://www.sciencedirect.com/science/article/pii/S0167880917300701) [↑](#footnote-ref-21)
22. UCS at 3. [↑](#footnote-ref-22)
23. Earthjustice at 15, *citing* Sara Gersen, Reclaiming Hydrogen for a Renewable Future: Distinguishing Oil & Gas Industry Spin from Zero Emissions Solutions (at slide 5), <https://efiling.energy.ca.gov/GetDocument.aspx?tn=243619>. [↑](#footnote-ref-23)
24. Earthjustice at 5, *citing to* Sun et al, Criteria Air Pollutants and Greenhouse Gas Emissions from Hydrogen Production in U.S. Steam Methane Reforming Facilities, Env’t Sci. & Tech., Vol. 53 (Apr. 2019), [www.osti.gov/pages/servlets/purl/1546962](http://www.osti.gov/pages/servlets/purl/1546962); UCS at 3. [↑](#footnote-ref-24)
25. Earthjustice at 15. [↑](#footnote-ref-25)