The Proof Is in the Pluming: Factory Farm Biogas Has no Place in the Low Carbon Fuel Standard

California's Low Carbon Fuel Standard (LCFS) program currently allows producers of factory farm biogas to earn credits in the pollution trading program for producing and selling a supposedly carbon negative fuel. This is built on the faulty assumption that factory farm gas — produced from manure and other farm waste in anaerobic digesters — eliminates the dairy industry's greenhouse gas footprint and then some. However, by turning manure into a commodity, the LCFS program risks locking in current factory farm herd sizes and even incentivizing expansion.[1] Moreover, it does nothing to address enteric fermentation, which accounts for 27 percent of U.S. methane emissions (compared to 9 percent for manure management).[2]

Additionally, new research from Food & Water Watch (FWW) reveals that farms with anaerobic digesters continue to release methane from their manure lagoons at alarming rates. FWW overlaid data on methane plumes from Carbon Mapper with locations of anaerobic digesters that feed into the LCFS. Our findings are a wakeup call to the state of California as it proposes amending its LCFS.

Specifically:

- We identified 16 dairy operations with digesters feeding into LCFS projects that released methane plumes after their digesters were installed. All but one are located in California. The remaining one is owned by Threemile Canyon Farms in Boardman, Oregon. Reported livestock numbers on each factory farm range from 5,200 to 39,000.

- We identified a total of 59 post-installation plumes from these dairy operations, recorded between March 2017 and July 2023. Forty-nine of these plumes have reported emissions rates ranging from 44 to 1,729 kilograms of methane per hour (kg CH4/hr). Carbon Mapper identifies sources with average plume rates exceeding 10 kg CH4/hr as "super-emitters."[3]

- If these 49 plumes released at these rates for one hour, their cumulative methane emissions would have the carbon dioxide (C02) equivalent of driving a passenger car 1.1 million miles — 45 times around the equator.

- Most of the factory farm gas from these dairy digesters is upgraded into compressed natural gas (CNG) and sold as vehicle fuel. California Bioenergy LLC (CalBio) earns LCFS credits by upgrading and piping gas from 11 of these digester projects. Other companies receiving credits using gas from these digesters include Clean Future Inc., Iogen D3 Biofuel Partners LLC, and Lakeside Pipeline LLC.

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Anaerobic digesters are prohibitively expensive to install and operate on all but the largest factory farms, and even so, often rely on public funding. In fact, 12 of the 16 digester projects with methane plumes in our dataset have received funding from California's Dairy Digester Research & Development Program (DDRDP), totaling $26.9 million from 2017 to 2019.[4]

Since the program's inception in 2015, CalBio projects alone have captured $110 million of DDRDP funding — more than any other entity.[5] At the same time, the 11 digesters with identified plumes that feed into CalBio's pathways continue to release methane. If they released at their reported rates for one hour, their cumulative emissions would have the C02 equivalent of burning over 30 thousand gallons of gasoline — or driving around the equator 28 times.

Cluster of dairy farms with digesters (in blue) producing factory farm gas for California Bioenergy. Red bursts are methane plumes.

Methane plumes reported in Carbon Mapper come from sporadic monitoring, suggesting that this is just the tip of the iceberg; these and other factory farms with anaerobic digesters are likely releasing significantly more methane plumes. Clearly, digesters do not make dairy and other factory farms carbon negative. Instead, they provide cover for the expansion of factory farms and factory farm gas, which thwarts California's efforts to combat climate change while wasting hundreds of millions of public dollars. California must remove factory farm biogas as a pathway in the LCFS and ban new and expanding factory farms.

Methodology

Food & Water Watch mapped anaerobic digesters that participate in California's Low Carbon Fuel Standard (LCFS) pathways, using data disclosed by the California Air Resources Board.[6] The data were pulled in March 2022 and November 2023. We located digester addresses from the pathways'

application packages and used Google Maps to geocode them. We then mapped them in ArcGIS Pro.

We overlaid the digester layer with data on livestock methane plumes pulled November 2023 from Carbon Mapper.[7] Carbon Mapper is a collaboration that uses airborne and satellite imaging from NASA and Arizona State University's Global Airborne Observatory to detect carbon dioxide and methane plumes from point sources. The airborne and satellite imaging generally detects methane plumes with emission rates of at least 10 kilograms per hour (kg CH4/hr) and 250 kg CH4/hr, respectively.

Carbon Mapper identifies the plume sources and their respective industries, and as such, we limited our search to livestock plumes. According to Carbon Mapper, the majority of livestock plumes in the database come from anaerobic lagoons. It does not include plumes originating from enteric fermentation and other non-point sources.

Using ArcGIS's satellite imagery as our base map, we looked for methane plumes located over dairy operations whose digesters feed into LCFS pathways. Plumes located outside of the operations' visible boundaries were excluded. We also excluded any plumes that occurred before or during the month the digesters were installed, as indicated in each pathway's application package.

Plume data may include emissions rates, but do not include the duration or cumulative emissions. As such, we applied the emissions rates to estimate the total emissions occurring over one hour for all plumes with reported rates. We calculated the carbon dioxide equivalency (CO2e) of these emissions using the U.S. Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator.[8]

Endnotes

1 Lazenby, Ruthie. "Rethinking Manure Biogas: Policy Considerations to Promote Equity and Protect the Climate and Environment." Vermont Law & Graduate School. Center for Agriculture and Food Systems. August 2022 at 24; Kelloway, Claire. "Big Ag and Big Oil eye biogas profits, Shell buys Nature Energy." *Food & Power Net*. December 7, 2022.

2 U.S. Environmental Protection Agency (EPA). "Methane Emissions in the United States: Sources, Solutions & Opportunities for Reductions." May 23, 2019 at 17 to 18.

3 Carbon Mapper. "Frequently Asked Questions (FAQ)". Available at https://carbonmapper.org/our-mission/faq/. Accessed January 2024 and on file with FWW.

4 California Department of Agriculture. Dairy Digester Research & Development Program. List of Award Recipients. Accessed January 2024. Available at https://www.cdfa.ca.gov/oefi/ddrdp/.

5 *Ibid.*

6 CARB. "Current Fuel Pathways." Accessed April 2022 and November 2023. Available at https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities and on file with FWW.

7 Carbon Mapper. Available at https://carbonmapper.org/. Accessed November 2023 and on file with FWW.

8 EPA. Greenhouse Gas Equivalencies Calculator. Available at https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator. Accessed January 2024.