The Proof Is in the Pluming: Mega-Dairies With Digesters Continue to Spew Methane

California's Low Carbon Fuel Standard (LCFS) program continues to allow 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]

For instance, a recent statistical analysis by Food & Water Watch (FWW) found that average herd sizes increased on California dairies with digesters, while falling on those without digesters.[2] Moreover, the LCFS does nothing to address enteric fermentation, which accounted for 27 percent of U.S. methane emissions in 2022 (compared to 9 percent for manure management).[3] Nor does it erase emissions related to producing feed, livestock industry's single largest source of greenhouse gas emissions.[4]

Additionally, new research from Food & Water Watch (FWW) reveals that factory farms with anaerobic digesters continue to release methane from their manure management at alarming rates. FWW overlaid data on methane plumes from Carbon Mapper with locations of anaerobic digesters that feed into the LCFS. Our findings confirm that rewarding factory farms for their pollution in the LCFS is a boondoggle that is bad for the climate. This is further warning to anyone interested in effective climate action that factory farm biogas is a false solution.

Specifically:

- We identified 29 digesters on factory farms feeding into LCFS projects that released methane plumes after their digesters were installed. This includes 13 additional operations since our previous analysis (released February 2024).[5]

- All but one of these factory farms are located in California. The remaining one is owned by Threemile Canyon Farms in Boardman, Oregon. Reported livestock numbers at these factory farms range from around 2,000 to up to 79,000.

- We identified a total of 119 post-installation plumes from factory farms, recorded between September 2016 and July 2025. This includes an additional 60 plumes since our previous analysis.[6]

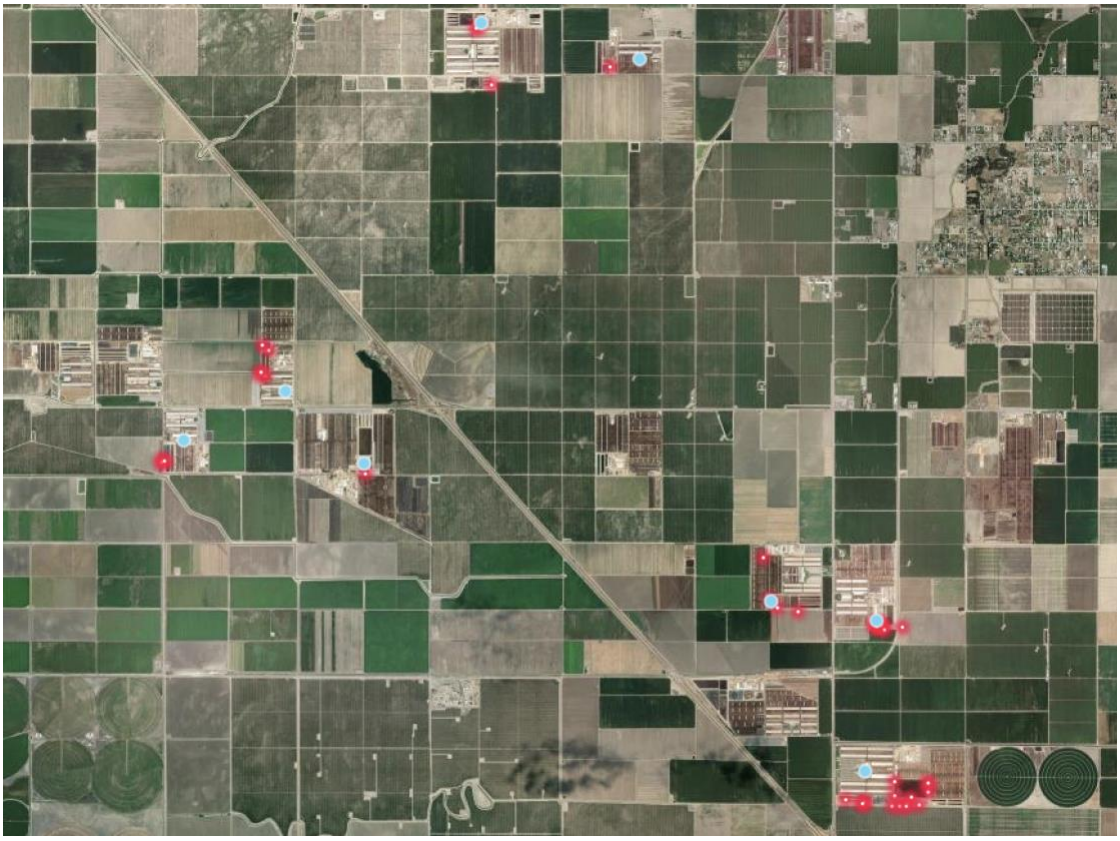
- Ninety-seven of these plumes have reported emissions rates, ranging from 47 to 1,711 kilograms of methane per hour (kg CH4/hr). The average emission rate is 301 kg CH4/hr.

info@fwwatch.org
202.683.2500 (DC)
510.922.0720 (CA)
foodandwaterwatch.org

- If these 97 plumes released at these rates for one hour, their cumulative methane emissions would have the carbon dioxide equivalent (CO_2e) of driving a passenger car over 2 million miles — 84 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 16 of these digester projects (see Fig. 1). Other companies receiving credits using gas from these digesters include Calgren Dairy Fuels LLC, Lakeside Pipeline LLC and CleanFuture Inc.

Fig. 1: California Bioenergy (CalBio) digester cluster outside of Bakersfield, CA



Blue dots are dairy operations with digesters; 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. The LCFS projects identified are likely spewing significantly more methane plumes, not to mention numerous additional mega-dairies and factory hog farms with anaerobic digesters.

Taxpayers Subsidize the Factory Farm Industry's False Solution

Methane from dairy manure management is an industry-created problem. Manure deposited in fields by grazing cattle releases little to no methane, while factory farm practices like liquid manure storage release significant amounts. The collapse of the family-scale dairy and the rise in mega-dairies coincided with a doubling of U.S. methane emissions from dairy manure management since 1990 — despite the overall U.S. herd size remaining steady.[7]

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, 22 of the 29 digester projects with post-installation methane plumes in our dataset have received funding from California's Dairy Digester Research & Development Program (DDRDP), totaling $47.4 million from 2017 to 2019. CalBio captured $31 million of this alone. [8]

Since the program's inception in 2015, CalBio projects have captured over $122 million of DDRDP funding — over half of all funding to date.[9] At the same time, over half of post-installation plumes identified in this project hovered over dairy operations feeding into CalBio digester projects. If CalBio's plumes emitted methane at their reported rates for one hour, their cumulative emissions would have the CO_2e of burning 50 thousand gallons of gasoline — or driving 46 times around the equator.

Conclusion

Clearly, digesters do not make dairy and other factory farms carbon negative. Instead, by putting a lucrative price on factory farm gas credits, California is incentivizing the expansion of mega-dairies and other factory farms — which will bring more manure waste, more methane emissions, and more local pollution for frontline communities. This thwarts California's efforts to fight climate change and address environmental injustice, all while squandering hundreds of millions of public dollars. California must stop offering credits for factory farm gas in the Low Carbon Fuel Standard, and ban new and expanding factory farms.

Methodology

Food & Water Watch mapped livestock operations with anaerobic digesters that participate in California's Low Carbon Fuel Standard (LCFS) pathways, using data disclosed by the California Air Resources Board.[10] We pulled these data in April and July 2025. We located digester addresses from the LCFS pathway application packages and used Google Maps to geocode them, crosschecking the satellite imagery of the operations with images provided in the application packages. We then mapped them in ArcGIS Pro.

We overlaid the digester layer with data on livestock methane plumes pulled from Carbon Mapper in September 2025. Carbon Mapper is a nonprofit organization focused on filling data gaps and improving global monitoring of methane and CO2 to enable science-based decision-making. It uses remote sensing technology to detect, pinpoint, and quantify methane and CO2 at the scale of individual facilities. Carbon Mapper's public data portal[11] includes observations of thousands of methane plumes sourced from multiple sensors onboard aircraft and satellites on an ongoing basis. Airborne surveys generally detect methane plumes with emission rates of at least 30 kilograms per hour. Tanager satellites detect methane at rates of at least 100 kgCH4/hr."

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 Pro's satellite imagery as our base map, we looked for methane plumes located over dairy operations whose digesters feed into LCFS pathways. We excluded plumes originating from outside of the operations' visible boundaries or on factory farm gas upgrading facilities. We also excluded any plumes that occurred before the digesters went into operation, as indicated in the LCFS pathway application packages.

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 the course of an 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.[12]

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 Food & Water Watch (FWW). "How California's Low Carbon Fuel Standard Incentivizes Pollution Nationwide." June 2025 at 3.

3 Lazenby (2022) at 25; U.S. Environmental Protection Agency (EPA). "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022." EPA 430-R-24-004. April 2024 at 2-4.

4 Gerber, P. J. et al. (2013). Tackling Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities. Rome: Food and Agriculture Organization of the United Nations (FAO) at xii.

5 FWW. "The Proof Is in the Pluming: Factory Farm Biogas Has no Place in the Low Carbon Fuel Standard." February 2024.

6 *Ibid.*

7 EPA. "Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2022." EPA 430-R-24-004. April 2024 at 5-11, 5-13, table 5-6, and A-320, table A-155.

8 FWW analysis of California Department of Agriculture. Dairy Digester Research & Development Program. "Report on Funded Projects from 2015 - 2025." March 2025.

9 *Ibid.*

10 California Air Resources Board. "Current Fuel Pathways." Accessed March and July 2025. Available at https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities and on file with FWW.

11 Carbon Mapper. Available at https://data.carbonmapper.org/#1.34/30.8/50.5.

12 EPA. Greenhouse Gas Equivalencies Calculator. Available at https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator. Accessed September 2025.