



March 15, 2023

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Per email: LCFSWorkshop@arb.ca.gov

Comments in response to the February 2022 LCFS Workshop: The Question of Unintended Consequences

Ms. Laskowski and Mr. Botill:

350 Humboldt and Climate Action California submit these comments in response to the February 22 Workshop on the Low Carbon Fuel Standard Program (LCFS), where staff solicited information about “unintended consequences” of fuel/technology deployment under the program. In fact, it is unintended consequences that trouble us the most about the LCFS, and we are grateful for the opportunity to explain our concerns.

It is clear that the LCFS is helpful in the energy transition, transferring billions of dollars from fossil fuel manufacturers to innovative lower intensity carbon fuels, with only transaction costs to the public. Nonetheless LCFS is a complex system, and the devil is in the details.

In this comment letter we discuss two types of unintended consequences of the LCFS program: the crediting scheme’s encouragement of some of the least beneficial uses of fuel feedstocks; and lengths to which industry, incentivized by LCFS payments, goes to block and avoid effective regulation.

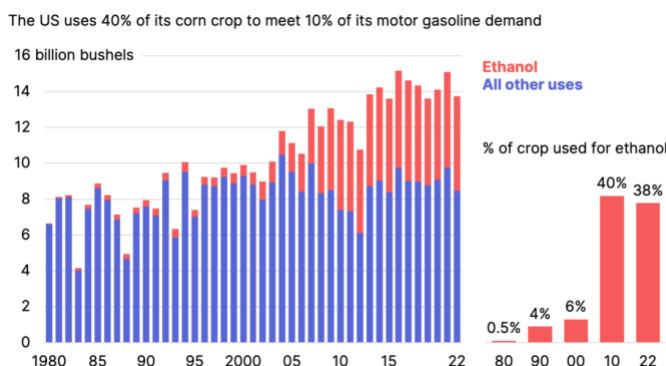
Unintended Consequences of LCFS’ crediting system

1. LCFS credits in some cases forestall more beneficial uses.
 - a. SB 1383 sets up a hierarchy for use of organic materials that would otherwise be destined for a landfill:
 - Waste food diversion
 - Conversion to compost or mulch
 - Methane capture and combustion for local use
 - Methane capture and conversion to renewable natural gas (RNG)

- Methane flaring

Unfortunately, the LCFS awards credits regardless of whether a landfill operator has developed such beneficial uses. LCFS should use the credit system to prioritize higher level uses, reserving credits for unavoidable methane production, e.g., captured methane from organic waste put in the landfill years ago. Permits should be provisional, so that (as is happening now) when beneficial uses are available, LCFS credits will not be provided.

- According to the USDA, 38 percent of United States corn production is now going to ethanol.¹ This is at a time when there are serious food shortages, and even impending famine in many parts of the world due to climate change and the war in Ukraine. Surely feeding people is a more beneficial use than slightly lowering the carbon intensity (CI) of transportation fuels.²



- In some circumstances, LCFS credits for “avoided agricultural methane emissions” take a step beyond forestalling beneficial uses—to actually encouraging emissions, consigning us to walking a methane treadmill.

For example, in 2022 a group of seven dairies in the North Coast and a digester business from the east coast decided to cash in on LCFS by creating flush-based lagoons for the production of methane from manure.³ Their initial application for a grant from the California Department of Food and Agriculture (CDFA) Dairy Digester Research and

¹ <https://www.nathanielbullard.com/presentations> Source is USDA, Slide 14.

² There are still, as methodologies have grown more sophisticated, unresolved questions about the CI of ethanol, with some analyses in peer reviewed journals showing CI higher than fossil fuels when all factors are considered. See the 2022 article: Brandao, Miguel, Reinout Heijungs, and Annette R. Cowie. "On quantifying sources of uncertainty in the carbon footprint of biofuels: crop/feedstock, LCA modelling approach, land-use change, and GHG metrics." *Biofuel Research Journal* 9, no. 2 (2022): 1608-1616. https://www.biofueljournal.com/article_148830_cfd95668b16943c4b53ed4b7e16977ce.pdf "In terms of the carbon footprint of biofuels, several sources of uncertainty make the estimation of impacts extremely variable, such as i) crop/feedstock, ii) land-use change, iii) modelling approach, and iv) GHG metrics."

³ We obtained the California Dept. of Food and Agriculture (CDFA) application for grant funding for this project by public records request; information about the project comes from the grant application. The application, redacted in inexplicable ways by CDFA, is available at: https://www.dropbox.com/s/0n1vhf1opdx0yxd/MIRANDA%20DAIRY%20DIGESTER%20APP%20_13312%20Daniel%20Chandler%20-%20PRAR_Bates%20000001%20-%200000184.pdf?dl=0

Development Program was turned down, but they are continuing development of the project thanks to LCFS largesse.

Some of these dairies have small lagoons, others only scrape systems. Dry manure from six farms will be brought to a lagoon at the seventh, and digestate will be returned to the farms by truck to be used as a soil amendment. But if spreading it is not possible, this “product” will be kept in a lagoon on the central farm (creating more methane).

In several ways this project, which depends on the LCFS program to enhance the dairies’ bottom line, contorts a system that was better for the environment and arguably, healthier for the herds. Year-round operation is planned despite the fact that the animals are normally pastured at least six months a year, depositing manure in the fields. When the cows are not pastured, manure is normally separated and spread on fields, thus avoiding synthetic fertilizers. With the lagoon/digester project operating, all of these benefits will be lost.

Currently, only 2.3 percent of emissions from cattle manure come from the North Coast.⁴ The dairies plan to expand the size of their herds as they are now in the business of selling biogas as well as milk. And larger herds mean more enteric methane. The digester company plans to use organic waste diverted from a landfill for 20 percent of the feedstock to power the system, despite the fact there are more beneficial uses (food diversion, compost, mulch) available. Worse, the project proposes to use internal combustion engines (rather than a fuel cell) to convert biogas into electricity, polluting a relatively pristine area of the state. In short, thanks to the LCFS avoided emissions credits, seven dairies are abandoning a sustainable, low-emission, low-pollution manure management model for one designed to subvert beneficial uses of organic waste in order to capture methane dollars.

The LCFS should use CDFA’s reasons for not funding the program (which presumably have something to do with the above issues) in evaluating any similar LCFS application. Our fear is that because the program is not designed to consider unintended negative consequences, it is unlikely to do so.

3. With respect to agricultural methane from manure, the LCFS is working at cross purposes with the Alternative Manure Management Program (AMMP), stacking the deck against better methods of methane abatement, an unintended consequence.

The LCFS biases the choices of economic actors in the dairy business, by rewarding one method of methane reduction (anaerobic digesters). In this way the LCFS skews dairies’ choice of how to operate and how to manage their manure and their herds. In fact there are at least two superior alternatives for reducing emissions from manure.⁵

⁴ Marklein, Alison R., Deanne Meyer, Marc L. Fischer, Seongeun Jeong, Talha Rafiq, Michelle Carr, and Francesca M. Hopkins. "Facility-scale inventory of dairy methane emissions in California: implications for mitigation." *Earth System Science Data* 13, no. 3 (2021): 1151-1166.

⁵ Aguire, op cit, shows solid/liquid/separation to be almost as effective as digestion plus SLS. But very importantly, SLS results in much less ammonia.

- a. AMMP pays farmers to switch to dry rather than flush production, as the former produces a tiny fraction of the methane the latter does.

The LCFS needs a monitoring system that will tell the program when dairies are opting to produce methane for sale instead of converting to dry methods. A coordinated effort with CDFA could develop and enforce criteria that would not reward dairies opting to sell methane when they could prevent its generation.

- b. In recent rigorous studies, vermifiltration has been shown to abate as much methane as digesters.⁶ It is roughly as expensive to implement, but it reduces methane without the moral hazard presented by LCFS credit sales.
4. Not least of unanticipated LCFS consequences is simply digesters' well-documented negative effects on human health. Digesters produce more ammonia than other manure management methods. And "[Ammonia] can travel long distances to contaminate water and soil and threaten ecosystems. Communities nearby also worry that the ammonia emissions will contribute to particulate matter that is seriously dangerous to human health. In essence, the digester program could undercut the state's overarching environmental goals and public health priorities."⁷

Greenwashing by Emitting Industries; Moral Hazard.

Two additional unintended consequences are of a different order of magnitude than those mentioned above. Political arm twisting and misleading public advertising are common tactics used to prevent regulation/phasing out of agricultural methane and natural gas. The LCFS unintentionally promotes these outcomes which directly conflict with the goal of the program, to reduce carbon intensity.

1. The dairy industry attempts to prevent both reporting and regulation of emissions.
 - a. On the national level, the logical vehicle for reducing methane produced by unnecessary manure management practices is the Farm Bill, which must be renewed every five years. With the sole exception of anaerobic digesters, which the LCFS has converted to a profit center for farms, agricultural interests and rural legislators have kept all methane reduction measures out of every iteration of the Farm Bill to date—while agriculture accounts for 36 percent of US methane emissions.⁸
 - b. The EPA in 2009 passed a reporting requirement that would have meant dairies with 3,200 cows or more must report the methane released. This requirement has never

⁶ Dore, Sabina, Steven J. Deverel, and Nicholas Christen. "A vermifiltration system for low methane emissions and high nutrient removal at a California dairy." *Bioresource Technology Reports* 18 (2022): 101044. Miito, Gilbert J., Pius Ndegwa, Femi Peter Alege, Sifolo Seydou Coulibaly, Russ Davis, and Joe Harrison. "A vermifilter system for reducing nutrients and organic-strength of dairy wastewater." *Environmental Technology & Innovation* 23 (2021): 101648.

⁷ Emma Foehringer Merchant, Grace van Deelen. *Inside Climate News*:

<https://insideclimatenews.org/news/19092022/dairy-digesters-methane-california-manure/>

⁸ https://www.epa.gov/sites/default/files/2019-06/documents/methane_emissions_overview_may2019.pdf

- gone into effect because rural legislators tack onto the budget bill a provision prohibiting EPA from spending any funds on the reporting program.⁹
- c. While any information specific to local US dairies, and thus to regulation, has been blocked, USEPA has reported large increases in agriculture related methane:
- EPA data, covering emissions from 1990-2020, shows declines in most sectors. Agriculture is an exception, where emissions have risen 7.8% since 1990, now accounting for 11.4% of emissions when including on-farm energy use. More specifically, there are worrying trends on agriculture's methane emissions. While overall methane emissions have declined 16.6% since 1990, agriculture-related methane emissions, deriving primarily from enteric fermentation in ruminants (mostly beef and dairy cattle) rose by 7.2% since 1990. And methane emissions increased a whopping 71% from manure management. The EPA tied the growth of manure-related methane and nitrous oxide emissions since 1990 to the factory farm system of hog (44% increase in methane) and dairy (122% increase in methane) production that liquify their manure.¹⁰
- d. There are many resources available to LCFS staff who might be interested in documenting this pattern of political interference blocking federal regulation, including a 2021 Petition to the EPA to regulate agricultural methane.¹¹
- e. At the state level, the structure of SB 1383 is itself evidence of industry's successful campaign to avoid regulation. As CARB staff are no doubt fully aware, no regulation of enteric methane is permitted. Regulation of methane from manure is permitted only if a number of difficult conditions are met. In the meantime, all efforts to abate methane must be done by public payments to agricultural interests, embodied in cap and trade payments for digesters, CDFA alternative manure management grants, and CDFA digester grants. An objective outside observer would look at these arrangements and say that they are designed to fail SB 1383's stated purpose – and indeed they have failed as shown in the graph below from CARB's "Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target," March 2022.¹² The major methane reduction CARB can report is from an overall lower herd size, or "leakage."

⁹ Ryan Levandowski, *Georgetown Environmental Law Review*.

<https://www.law.georgetown.edu/environmental-law-review/wp-content/uploads/sites/18/2021/01/GT-GELR200048.pdf>

¹⁰ Ben Lilliston, Institute for Agriculture and Trade Policy, March 2022: <https://www.iatp.org/new-epa-data-confirms-role-factory-farms-rising-agriculture-emissions>. Retrieved March 5, 2023. The actual EPA report is available at: <https://www.epa.gov/sites/default/files/2021-04/documents/us-ghg-inventory-2021-chapter-5-agriculture.pdf>

¹¹ Ryan Levandowski, *op cit.*; and <https://food.publicjustice.net/wp-content/uploads/sites/3/2021/04/2021.04.06-Industrial-Dairy-and-Hog-CAA-111-Petition-FINAL.pdf>

¹² <https://ww2.arb.ca.gov/sites/default/files/2022-03/final-dairy-livestock-SB1383-analysis.pdf>

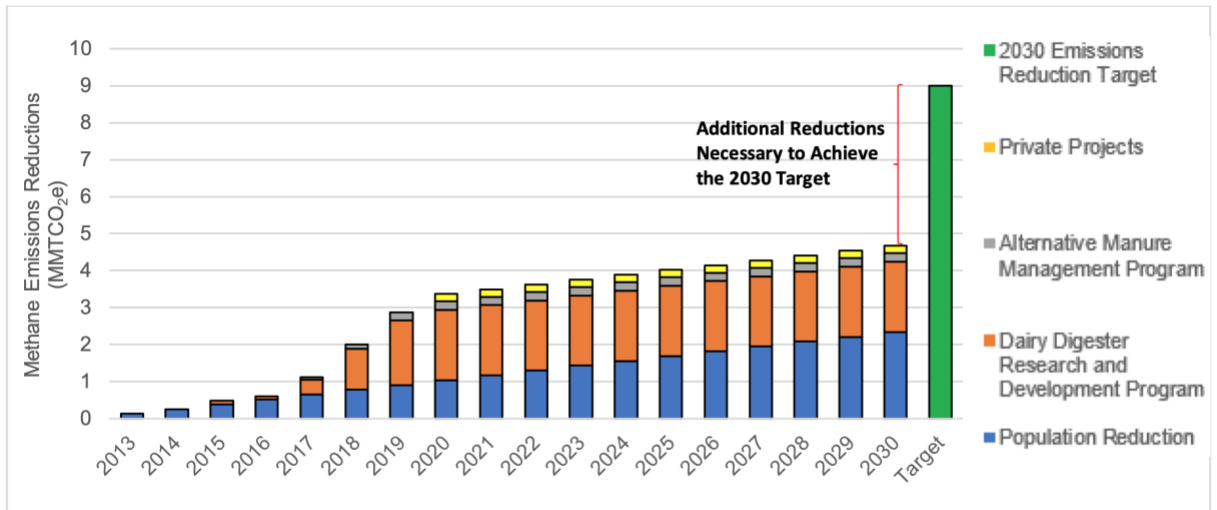


Figure ES-1. Projected Annual Methane Emissions Reductions through 2030 without Additional Funding beyond FY 2020-21

- f. By incentivizing “avoided emissions” credits, the LCFS acts to take to pressure off CARB to regulate methane, and encourages unregulated development of anaerobic digesters (AD). AD has a role in abating methane, but it will have an outsized role unless dairy greenhouse gases are regulated.

Hundreds of large dairies simply vent methane 24/7—emissions that are not regulated. This should not be permitted: dairies with lagoons should be required to switch to dry production or install a digester. But because the LCFS incentives are causing more and more dairies to opt for digesters, CARB—the regulator—dodges the problem and merely *hopes* that 40% of methane will be abated by 2040. This is a vain wish, since a digester will only reduce 25% or less of greenhouse gas emissions from a dairy.¹³

The LCFS should cancel the avoided emissions credits for dairy digesters as soon as methane from manure *can* be regulated, which is January 1, 2024.

2. The fossil gas industry’s attempts to co-opt dairy methane as “renewable natural gas” threatens to increase emissions, while welcoming the moral hazard of “exonerating” continued emissions of carbon—which is wrongly treated by the LCFS as an externality. We must not forget that the \$67 billion in fossil fuel profits in 2022 in California occurred *after* the small penalties exacted by cap and trade and LCFS. The damage

¹³ Hopkins op cit. A digester is 75% efficient in reducing manure methane. However, there are other emissions from manure than those that end up as biogas; In particular, digestate and the process of spreading it produce emissions, especially of nitrous oxide a gas even more warming than methane. Enteric methane is roughly half of the total methane emitted from a dairy, so the total effect of a digester is to reduce about 25% of all greenhouse gases. Another study found that a combination of solid/liquid separation *and* anaerobic digestion reduced 41% of (non-enteric) greenhouse gases so the total reduction was less than 25%. Aguirre-Villegas, Horacio A., Rebecca A. Larson, and Mahmoud A. Sharara. "Anaerobic digestion, solid-liquid separation, and drying of dairy manure: Measuring constituents and modeling emission." *Science of the total environment* 696 (2019): 134059.

caused by these emissions is in no way compensated by those responsible. The polluters are not paying.

- a. Since the fossil fuel industry has been spreading disinformation about fossil fuels and cleaner alternatives for over 30 years, it is not surprising they have jumped on the “biomethane bandwagon” to delay phase-out of natural gas and confuse the public.¹⁴
- b. The Renewable Gas Coalition’s website displays the greenwashing at full tilt. For example, this rhetorical question and answer:

Shouldn’t we discontinue all gas use, including RNG, because of the potential for pipeline leaks?

Even if we only deliver 99.9% of this fugitive biogenic methane for productive use, we still need to capture and deliver everything we can. The very good is not the enemy of the perfect.¹⁵

The fact is that pipeline and in-building leaks are 4.8 percent of “natural gas” production.¹⁶ This leak rate makes natural gas a greater threat to the environment than burning coal.¹⁷

- c. However, the leak rate of biomethane or renewable natural gas is as bad or worse than pipeline leaks, despite the disingenuous hypothetical on the website that 99.9% could be captured. A recent review of the literature by Emily Grubert, an esteemed climate scientist, concludes:

...Literature estimates for methane leakage from biogas production and upgrading facilities suggest that leakage is in the 2%–4% range (mass basis), up to as much as 15%. Policy makers should consider that under reasonable leakage and demand assumptions, RNG could be climate intensive.¹⁸

- d. In line, again, with SB 1383, the CPUC recently applied the same type of incentivization of landfill biogas that LCFS does for agricultural methane. By 2030 gas utilities will be required to use 12 percent “renewable natural gas.”¹⁹ Biomethane from landfills and wastewater treatment plants are expected to be the main sources.

¹⁴ There are numerous sources. Here is a middle of the road public media source: <https://www.cnn.com/2022/12/09/politics/big-oil-disinformation-record-profits-climate/index.html> and here is a very recent source about attempts to influence COP 27: <https://insideclimatenews.org/todaysclimate/climate-disinformation-campaigns-threaten-cop27-progress-a-new-report-concludes/>

¹⁵ <https://www.rngcoalition.com/rng-qa>

¹⁶ Howarth, R.W., Methane Emissions from the Production and Use of Natural Gas. EM. The Magazine for Environmental Managers • A&WMA • December 2022. https://www.research.howarthlab.org/documents/Howarth2022_EM_Magazine_methane.pdf

¹⁷ Ibid. “When used for heat energy, natural gas with methane emissions of 4.8% are far worse for the climate than either coal or oil for at least the first 20 years after the fuel is burned.”

¹⁸ Grubert, Emily. “At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates.” *Environmental Research Letters* 15, no. 8 (2020): 084041.

¹⁹ Andrew Baker, *Natural Gas Intel*, February 2022. <https://www.naturalgasintel.com/california-natural-gas-utilities-required-by-2030-to-supply-12-rng/>

Farm methane is to be limited: “For the medium-term goal, there is a ceiling on dairy biomethane of 4 percent of total biomethane procurement.”²⁰

- e. There are more direct links between manure methane and fossil fuels. Chevron has contracted with and is financing a hub of seven dairies under the name Cal Bio. All the dairies were funded by the CDFA digester program.²¹ The intent is to use the biomethane for transportation fuel. Chevron is quoted as saying,

Chevron is complementing the strength of its traditional products business with new offerings that help customers support a lower carbon future. Carbon negative renewable natural gas produced from dairy biomethane is an essential part of its portfolio of solutions.²²

It is not yet clear whether Chevron and Cal Bio will apply for LCFS funding, but it seems likely.

- f. In all of these cases the greenwashing includes the factoid that this is “waste,” and using it has a negative carbon impact. As we have pointed out above and in previous comments, the purported negative carbon intensity is primarily an artifact of how LCFS has defined “avoidable emissions.”

To summarize most of this comment, regulating digesters and dairy methane would, and should, allow the LCFS and CPUC to achieve their goals without unintended consequences. Ultimately, there is nothing to be done about greenwashing except to change the factual basis behind it by ensuring LCFS credits are legitimate – which for agricultural biogas and biomethane they currently are not.

Thank you for your consideration of these points.

Sincerely,



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²⁰ Ibid.

²¹ <https://www.chevron.com/newsroom/2022/q4/chevron-calbio-expand-partnership-on-dairy-biomethane-fuel-projects>

²² Ibid.