



February 20, 2024

Matthew Botill  
California Air Resources Board  
1011 I Street  
Sacramento, CA 95814

**Subject: Comments on the Proposed Low Carbon Fuel Standard Tier 1 Calculators**

Dear Mr. Botill:

Thank you for the opportunity to comment on the Proposed Low Carbon Fuel Standard (LCFS) Amendments and updated Life Cycle Analysis (LCA) and Documentation.

Ductor was founded in 2009 with the ambitious aim of creating a solution that would help solving today's environmental challenges in the energy and agricultural sectors. Today we build, own, and operate turnkey microbiological facilities that turn organic resources from the agricultural sector into sustainable fertilizers and biogas. We are focused on building and operating anaerobic digestion facilities throughout the United States, including in California, that will reduce agricultural emissions.

We recommend the following minor changes to the proposed Tier 1 calculators. We believe our insights can help refine the calculators to better serve a broad range of fuel developers and accelerate the growth of alternative fuels in California.

Our specific comments and recommendations are summarized below.

**Recommendation for Tier 1 Organic Waste (OW) Calculator: Recognize Diversity and Address N<sub>2</sub>O Emissions in all Waste Treatments**

California has seen an increase in composted materials since the implementation of SB1383. However, the Tier 1 Organic Waste (OW) calculator has not been updated to reflect these changes in waste management. We suggest:

- Introducing options to indicate the percentage of Other Organic Waste (OOW) diverted from composting, in addition to landfilling.
- Incorporating user inputs for site-specific baseline CH<sub>4</sub> emissions.
- Including user inputs for site-specific baseline N<sub>2</sub>O emissions.

## Recommendation: Align Tier 1 Calculators with CA GREET4.0 Livestock Categories

In the CA GREET4.0 RNG tab, livestock categories include Beef, Dairy Cow, Dairy Heifer, Swine, Layer, and Broiler and Turkey. However, the Tier 1 calculator for animal manure (tier 1 DSM) presently covers only dairy cow, heifer, and swine categories. We suggest minor changes to align the tier 1 DSM with CA GREET4.0: CARB should incorporate poultry manure categories into the DSM, using corresponding baseline manure management emissions described in CAGREET4.0 (Figure 1). To reflect these changes, we propose renaming the Tier 1 Dairy and Swine Manure Calculator to the Tier 1 Livestock Manure calculator.

| Manure Region Management System Usage (MS%)                           | Beef Feedlots <sup>2</sup> |               | Layer Operation |             | Broiler and Turkey Operation |                    |
|---|----------------------------|---------------|-----------------|-------------|------------------------------|--------------------|
|   | Dry Lot                    | Liquid/Slurry | Anaerobic La    | Poultry w/o | Pasture                      | Poultry w/o Litter |
| U.S. Average  | 100.0%                     | 0.7%          | 12.9%           | 87.1%       | 1.0%                         | 99.0%              |
| Manure Management System MCFs   |                            |               |                 |             |                              |                    |
| U.S. Average  | 1.2%                       | 30.4%         | 71.5%           | 1.5%        | 1.2%                         | 1.5%               |
| Direct N <sub>2</sub> O Emission Factors (kg N <sub>2</sub> O N/kg N) | 0.02                       | 0.005         | 0               | 0.001       | 0                            | 0.001              |
| N Loss Factors through Volatilization of NH <sub>3</sub>              | 23%                        | 26%           | 54%             | 34%         | 0%                           | 34%                |

**Figure 1.** Snapshot of CA GREET4.0 Waste Tab showing manure management system baseline MCF values.

We also note that livestock manures, and especially poultry manure, emit significant amounts of N<sub>2</sub>O under traditional management systems. These emissions are amplified by the increasing concentration of modern livestock and poultry operations. This concentration leads to an overabundance of nutrients, exceeding the capacity of nearby crops to absorb them. Without effective manure management solutions to distribute these excess nutrients, they accumulate in concentrated areas, creating hotspots with devastating environmental consequences. These consequences include, but are not limited to, the eutrophication of water bodies and the proliferation of harmful algal blooms<sup>1</sup>.

Ductor's technology transforms nitrogen-rich organic resources from agriculture, aquaculture, and other organic sources into energy and fertilizers. We specialize in feedstock that cannot be used directly in conventional anaerobic digestion and biogas facilities. This feedstock is fed into the Ductor pre-process, where an IP-protected consortium of microorganisms and the IP-protected Ductor process converts them via fermentation and subsequent ammonia recovery into organic and sustainable liquid nitrogen fertilizer. The digestate is further processed into additional fertilizing and soil-improving products. Ductor's liquid fertilizer and soil-improving products can be delivered to markets requiring nutrients, easing the effects of concentrated livestock operations on our soils and watersheds.

We urge CARB to consider including avoided N<sub>2</sub>O emissions in all manure-to-RNG pathways and the associated Tier 1 calculator. The state can enable significant reductions in agricultural N<sub>2</sub>O emissions and mitigate the effects of concentrated livestock operations by accounting for avoided N<sub>2</sub>O emissions in LCFS pathways.

<sup>1</sup> Bryant, Ray B., et al. "Poultry manure management: Opportunities and challenges for a vertically integrated industry." *Journal of Environmental Quality* 50.4 (2021): 1201-1213. <https://doi.org/10.1002/jeq2.20273>

## **Conclusion**

Biogas and RNG offer immediate solutions for reducing emissions in the waste, agricultural, and livestock sectors. We believe that the changes to the Tier 1 calculators suggested above will facilitate these reductions.

Thank you for your consideration of these comments, and please do not hesitate to reach out with any questions.

Sincerely,

Bernard C. Fenner  
CEO Ductor Corporation, President Ductor Americas, LLC

Ductor Americas, Inc  
1200 18th Street NW  
Suite 700  
Washington, District of Columbia  
20036