Sept. 28 LCFS Air Resources Board Hearing
Comment by Daniel Chandler, Ph.D.

My name is Daniel Chandler. I represent 350 Humboldt and Climate Action California. We support the EJAC position on avoided emissions.

There is a very large industry, with many self-interested players, who want to keep freeloading on California's drivers – who ultimately pay for the exorbitant avoided emissions credits of the LCFS. The industry calls digester biomethane "*renewable* natural gas." A more accurate name is "*avoidable* natural gas," because dairy industry manure management *choices* cause most manure methane. The main culprit is the wet or flush/lagoon system of manure management, which is unknown in Europe and used much less in other parts of the US than in California.[1] In 2023 Professor Frank Mitloehner of UC Davis published an article that showed it is possible to get to a 40% reduction in dairy methane by 2030 just by switching away from the flush/lagoon system to dry management.[2] That is the best option*, but* there are a number of *other* effective ways of cutting methane from

[1] Pressman, Eleanor M., Shule Liu, and Frank M. Mitloehner. "Methane emissions from California dairies estimated using novel climate metric Global Warming Potential Star show improved agreement with modeled warming dynamics." *Frontiers in Sustainable Food Systems* 6 (2023): 1072805. "Dairy CH_4 emissions from cow manure in California are relatively high because flush water lagoon systems are the predominate manure management system on California dairies (CARB, 2022b), and anaerobic lagoons emit the most CH_4 per head of all common manure management practices (Owen and Silver, 2015)." Also Owen, Justine J., and Whendee L. Silver. "Greenhouse gas emissions from dairy manure management: a review of field-based studies." *Global change* biology 21, no. 2 (2015): 550-565. "Our results suggest that current greenhouse gas emission factors generally underestimate emissions from dairy manure and highlight liquid manure systems as promising target areas for greenhouse gas mitigation."

[2] *Pressman, op cit.. "* We assumed the 40 percent reduction goal would be met by 2030 and assumed a constant rate of reduction to meet these goals from 2018 to 2030. Such reductions could potentially be achieved by converting manure management systems from high-CH_4 emitting anaerobic lagoons to alternative management systems."

stored manure. These include flaring,[3] vermifiltration[4] and the addition of an additive[5] to the slurry (urine and feces mixture) – each of which is as effective as digesters. Digesters only exist in 200 dairies. What about the other 1,200 dairies? If CARB regulates manure methane we can reach and exceed the 40% goal by 2030 by not creating the methane in the first place – exactly the way we are working to prevent landfill emissions by diverting organic waste.

[3] Veltman, Karin, C. Alan Rotz, Larry Chase, Joyce Cooper, Pete Ingraham, R. César Izaurralde, Curtis D. Jones et al. "A quantitative assessment of Beneficial Management Practices to reduce carbon and reactive nitrogen footprints and phosphorus losses on dairy farms in the US Great Lakes region." *Agricultural Systems* 166 (2018): 10-25.

[4] A number of presentations on vermifiltration are available at: https://lpelc.org/use-of-vermifiltration-as-a-tool-for-manure-management/. Also: 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. https://www.sciencedirect.com/science/article/pii/S2589014X22001013. https://meansandmatters.bankofthewest.com/article/financial-perspectives/industries/innovative-washington-dairy-aims-to-go-carbon-negative/

[5] Chiodini, Marcello Ermido, Michele Costantini, Michele Zoli, Jacopo Bacenetti, Daniele Aspesi, Lorenzo Poggianella, and Marco Acutis. "Real-Scale Study on Methane and Carbon Dioxide Emission Reduction from Dairy Liquid Manure with the Commercial Additive SOP LAGOON." *Sustainability* 15, no. 3 (2023): 1803.