Thank you for the opportunity to provide feedback on the LCFS pathways. If you have any questions or would like to discuss further, please do not hesitate to reach out at <u>egarland@rmi.org</u>.

Biomethane from North American Landfills

The landfill gas pathway does not currently account for fugitive methane emissions at the landfill. Emissions resulting from imperfect gas capture are considered outside the lifecycle analysis system boundary, as they occur whether a landfill is capturing gas for use as a fuel, or for flaring.

Putting captured landfill gas to beneficial use can have environmental benefits when used to decarbonize hard-to-abate sectors or displace fossil fuels. However, the emission profiles of beneficial use projects vary widely depending on how well methane is captured and controlled at the landfill itself. Per EPA's RNG Operations Guide, "fugitive emissions of methane, depending upon their magnitude, can negate the climate and environmental benefits of RNG projects."¹

Flyovers conducted for the California Methane Survey revealed that landfills were the largest point source emitters in the state,² and that when plumes were observed at landfills they tend to be very large, averaging over 800 kg/hr, which is greater than other methane sources (e.g., oil & gas, agriculture).³ Gas collection efficiency can vary widely site to site, due to design and operational factors. CARB/CalRecycle's research with Cal Poly observed real-world collection efficiencies at landfills from as low as 23% to above 99%.⁴ This large variation in gas collection efficiency is not accounted for in LCFS carbon intensity scores, which assume only a 1% methane leakage rate during extraction and processing.

California has ambitious goals to reduce landfill methane emissions, through organics diversion (SB 1383) and planned updates to its Landfill Methane Regulation. CARB should build upon these efforts and take steps to better align the LCFS program with its landfill methane reduction goals. Specifically, CARB should consider:

- Requiring credit-generating landfill gas projects to follow best practices and certify they do not have significant fugitive methane emissions: Participating landfills should follow a set of best management practices (BMPs) that reduce methane emissions (e.g., use of lower permeability covers, advanced landfill gas collection systems, and increased monitoring to detect and repair leaks), as identified in CARB's 2022 scoping plan.
- **Expanding system boundary to account for fugitive emissions at the landfill**: SB 1383 sets targets for the diversion of organic waste to landfill alternatives with significantly lower lifecycle emissions (e.g., anaerobic digestion or compost). CARB could consider shifting the baseline

¹ US Environmental Protection Agency (2022). *Renewable Natural Gas: Facility Operation Best Practices to Create a More Climate-Friendly Project*. <u>https://www.epa.gov/system/files/documents/2022-</u>11/RNG Operations Guide.pdf

² Riley Duren et al. (2020) Final Project Report: The California Methane Survey. https://www.energy.ca.gov/sites/default/files/2021-05/CEC-500-2020-047.pdf

³ Jason Schroeder (2022). Landfill Methane Research Workshop: Methane Remote Sensing for Leak Identification and Mitigation. <u>https://ww2.arb.ca.gov/sites/default/files/2022-12/Methane%20Remote%20Sensing.pdf</u>

⁴ California Polytechnic State University (2020). *Estimation and Comparison of Methane, Nitrous Oxide, and Trace Volatile Organic Compound Emissions and Gas Collection System Efficiencies in California Landfills.* <u>https://ww2.arb.ca.gov/sites/default/files/2020-12/CalPoly_LFG_Study_03-30-20.pdf</u>

scenario for the landfill pathway to organics diversion in order to properly account for fugitive emissions at the landfill. CARB could also consider establishing different tiers of landfill carbon intensity scores, one that is a conservative default score that accounts for inefficient gas collection and fugitive emissions, and an upper tier with higher gas collection efficiency assumptions that is only applicable to landfills that confirm better emissions performance through implementation of BMPs and use of advanced monitoring and measurement.