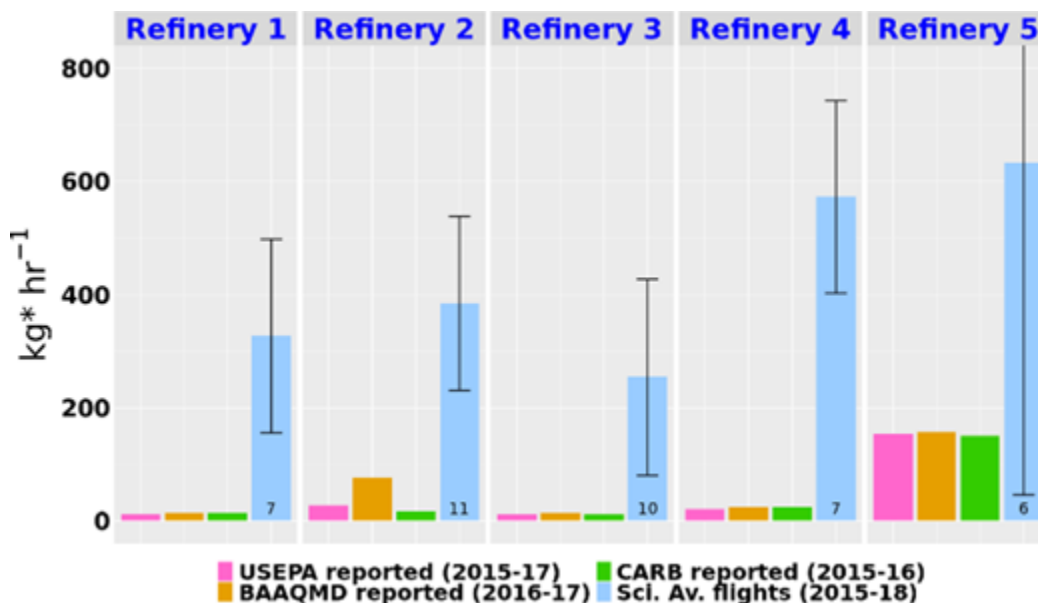


Bay Area Airborne Methane Emissions Quantification Study

Abstract

This study derives methane emission rates from 92 airborne observations collected over 23 facilities including 5 refineries, 10 landfills, 4 wastewater treatment plants (POTWs), 2 composting operations, and 2 dairies in the San Francisco Bay Area. Emission rates are measured using an airborne mass-balance technique from a low-flying aircraft. Annual measurement-based sector wide methane emissions are $19,000 \pm 2300$ Mg for refineries, $136,700 \pm 25,900$ Mg for landfills, $11,900 \pm 1,500$ Mg for POTWs, and $11,100 \pm 3,400$ Mg for composting. The average of measured emissions for each refinery ranges from 4 to 23 times larger than the corresponding emissions reported to regulatory agencies, while measurement-derived landfill and POTW estimates are approximately twice the current inventory estimates. Significant methane emissions at composting facilities indicate that a California mandate to divert organics from landfills to composting may not be an effective measure for mitigating methane emissions unless best management practices are instituted at composting facilities. Complementary evidence from airborne remote sensing imagery indicates atmospheric venting from refinery hydrogen plants, landfill working surfaces, composting stockpiles, etc., to be among the specific source types responsible for the observed discrepancies. This work highlights the value of multiple measurement approaches to accurately estimate facility-scale methane emissions and perform source attribution at subfacility scales to guide and verify effective mitigation policy and action.

Visual Abstract



Full Manuscript

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