

Webinar questions and answers

Questions	Answers
1. What are the biggest challenges and opportunities for monitoring methane emissions from agriculture?	Methane observatories rely on reconciling "bottom-up" (inventory and models) and "top-down" (satellite and aerial) data. In agriculture, this reconciliation faces major hurdles: 1. Highly Diffuse and Dispersed Sources: Unlike a single gas well or pipeline leak, agricultural emissions are spread across billions of animals and millions of smallholder farms. Measuring enteric fermentation (cow burps) across a landscape is vastly more complex than pinpointing an industrial super-emitter. 2. Biological Variability and Intermittency: Agricultural emissions fluctuate constantly based on animal diet, temperature, soil microclimates, and local water management. For instance, a flooded rice paddy's emissions change dynamically depending on the irrigation stage, making snapshot data hard to generalize. 3. Satellite Resolution Limits for Small, Fleeting Plumes: Current high-resolution satellite systems like IMEO's Methane Alert and Response System (MARS) are optimized for large point-source leaks. While they can capture massive regional agricultural signals (like intensive dairy basins or vast rice sectors), they often miss the individual farm-level signals. 4. Lack of a Unified Industry Reporting Framework: In the fossil fuel sector, frameworks like the Oil and Gas Methane Partnership 2.0 (OGMP 2.0) provide a standardized method for empirical, multi-tiered reporting. Agriculture lacks an equivalent data architecture to hold decentralized producers accountable or easily verify their data. Despite the obstacles, the "methane data revolution" offers powerful new pathways for observatories to accurately track and catalyze agricultural

	mitigation. Opportunities include designing an "OGMP-style" data framework specifically tailored for commercial livestock and rice supply chains. Using low-resolution sensors (like TROPOMI) for regional screening paired with targeted high-resolution or hyperspectral satellites. For an observatory, the ultimate goal of monitoring is to create a transparent, actionable loop. By using satellites to verify large-scale shifts in farming practices—such as alternate wetting and drying in rice paddies—observatories can give governments and supply chains the empirical proof they need to fund and scale large-scale agricultural mitigation.
2. Do you have insights on the contribution from food waste to landfills?	It may help first to clarify what we mean by organic waste. In municipal solid waste, it mainly includes food and kitchen waste and garden waste; broader definitions may also include paper, cardboard and wood. Wastewater and industrial effluents are treated separately, while manure and agricultural residues fall under agriculture. Sewage sludge may, however, sometimes be disposed of in landfills. The waste sector produces around 20% of global human-caused methane emissions, mainly from organic waste decomposing in landfills and open dumps and from wastewater¹. Organic waste is particularly important in developing countries, where food and garden waste often make up around 50% or often even more of municipal waste. Globally, food waste represents approximately 38% of municipal waste and garden waste another 8%. Together, this amounts to around 1.2 billion tonnes annually. In 2022, solid-waste management generated around 1.28 billion tonnes of CO₂ equivalent, of which approximately 89% came from disposal in landfills, dumpsites and

	uncollected waste. Methane emissions from solid-waste management were estimated at around 43 million tonnes². Food waste is only one part of the organic fraction. UNEP defines it as food and associated inedible parts (ex. bones, shells and peelings) discarded by households, food services and retailers. Approximately 1.05 billion tonnes were wasted at these stages in 2022³. Food lost earlier during production, storage or processing is measured separately. There is no robust global estimate of the exact share of landfill methane caused specifically by food waste. However, food waste is especially important because it is wet and decomposes quickly. In the United States, it represents around 24% of waste disposed of in municipal landfills but produces an estimated 58% of their fugitive methane emissions⁴. This is a US-specific example but it shows that food waste can have a much greater methane impact than its share by weight suggests. Finally, the often-cited estimate that food loss and waste causes 8–10% of global greenhouse-gas emissions covers its entire lifecycle not landfill methane alone. References: 1) Global Methane Assessment Climate & Clean Air Coalition 2) What a Waste 3.0 3) Food Waste Index Report 2024 UNEP - UN Environment Programme 4) Quantifying Methane Emissions from Landfilled Food Waste US EPA
3. What are the four main steps Climate TRACE uses to estimate emissions, and why is	Climate TRACE estimates solid waste landfill emissions through four primary steps:

verification against other data important?	• Gather Official Data: Collect existing government records and facility disclosures on location, past emissions, and metadata. • Identify Facilities via Satellite: Use optical satellite imagery to detect additional landfills, landfill boundaries, surface size, and surrounding infrastructure. • Observe & Quantify Plumes: Utilize specialized satellites and airborne sensors (e.g., Carbon Mapper, GHGSat) to measure real-time methane plumes, which are used to calibrate bottom-up estimates. • Model Emissions: Apply First-Order Decay models (via tools like SWEET) to estimate long-term gas generation over time based on waste volume and age. Verification can improve transparency and confidence in Climate TRACE's emissions estimates by comparing asset-level results with independent data sources, such as reported landfill data from US EPA GHGRP, satellite measurements from Carbon Mapper, or global inventories from EDGAR. These comparisons help identify gaps in facility coverage, assess differences in methodologies and assumptions, and evaluate the reliability of estimates across countries and regions. At a more granular level, verification can also help track changes at individual landfills over time, monitor implementation progress, and assess whether interventions are delivering the expected emissions reductions.
4. What does the large CDM pipeline and much smaller PACM pipeline indicate about the current development of landfill gas activities?	It indicates a mechanism that is still starting up, rather than a sector losing interest. The landfill gas methodology, A6.4-AMM-001, was only approved in October 2025, so no activity could progress far before then. But interest is visible in the numbers where 73 CDM landfill gas activities have requested transition to PACM, and a further 49 have been proposed as new activities. Of the 73 transitions, 60 have been approved and one is registered. The hold-up is not at the entry point but between approval and registration,

	which covers host country authorisation, validation, and the rest of the PACM activity cycle.
5. Are landfill-linked carbon credits automatically counted toward a country's NDC targets? If so, are they associated with unconditional targets or conditional targets?	Two different things are being counted here, so it helps to separate them. The emission reduction happens in the host country and appears in its national inventory. If waste is within the coverage of that country's NDC, the reduction counts toward the NDC. The carbon credit is separate, and it depends on authorisation. If the host Party authorises the units for use by another country, it applies a corresponding adjustment, and the reduction then counts toward the buyer's NDC rather than its own. If the units are not authorised, the reduction stays with the host. So no, credits are not automatically counted toward the host country's target. On conditional against unconditional, the mechanism does not determine this. It is a matter of host country policy, and it varies. Some Parties take the view that Article 6 should support mitigation beyond their unconditional target, since selling unconditional mitigation means finding the shortfall elsewhere.
6. How will the PACM downward baseline adjustment affect our credit projections over the 10-year horizon?	In the first year of the crediting period the baseline is reduced, based on either a fixed minimum or the uncertainty of your own baseline estimate, whichever is greater. The adjustment then grows each year in proportion to your first-year volume.
7. Question for Ayesha: which were the challenges faced to apply the methodology AMM-001?	As an environmental science student from Punjab, Pakistan, I have observed that many landfill sites lack proper boundaries, waste segregation, leachate management, and other basic environmental standards. How can initiatives such as Suthra Punjab establish properly engineered and environmentally compliant landfills, and what practical steps can be taken to move from safe waste disposal toward recycling, waste-to-energy, or biochar production?
8. Constitutionally, waste management are a priorities of the subnational government at	Identifying impactful landfills is well aligned with the intended use of Climate TRACE data. For local governments with incomplete or non-

Local government level. Many of these tier of government does not have aggregated waste data in place, are there provision in this tool to examine waste data and at the same time able to profile them for the opportunities embedded in Article 6? By the way, we are currently working with one of the states in Nigeria to develop methan mitigation framework	aggregated waste data, Climate TRACE’s landfill emissions estimates can provide a consistent approach for estimating waste-sector emissions across individual sites and geographic levels, helping identify and prioritize high-emitting landfills for further investigation and methane-abatement planning. Climate TRACE also provides site-level metadata to help characterize landfill types and identify relevant mitigation solutions. Once potential opportunities have been identified, they can be further profiled using the criteria and process outlined in the Article 6.2 activity framework. This next step requires additional local operational data, measurements, project-specific information, and applicable host-country requirements to assess their potential for Article 6.
9. Thank you, Ms. Nukusheva, for your great contribution promoting landfill diversion projects and highlighting the need for more attention to those project under the PACM! To all: By promoting carbon finance for landfill gas capture, do you see the risk, that it locks in landfilling over landfill diversion projects, that would lead towards higher resource efficiency and circular economy? How could the data, e.g. of Climate Trace, benefit landfill diversion projects? How	Yes, there is a risk if carbon revenue makes continued landfilling part of the project’s business model. But this is not automatic—it depends on the rules and policies around the project. The first safeguard is additionality. Credits should only be issued where carbon finance enables reductions that would not otherwise happen. Under Article 6.4, this is addressed through centralized methodologies and rules. Under Article 6.2, participating governments have greater responsibility for defining the requirements. But additionality alone is not enough. Governments have the central role in ensuring that individual projects support the overall transition of the waste sector. Through waste policies and Article 6 approval and authorization, they can exclude projects that conflict with national priorities or place conditions on them. For example, landfill-gas projects can focus on existing sites and legacy or residual waste, while being linked to source separation, organic-waste diversion and landfill-closure targets. Projects should not earn more credits

could that be promoted even more?	because more waste is landfilled, and carbon revenue should not justify expanding landfill capacity. Landfill-gas capture therefore has an important role in managing existing emissions, but it must operate alongside policies that progressively prevent new organic waste from reaching landfills. Climate TRACE tracks managed and unmanaged landfill sites, helping governments understand where landfill emissions are concentrated and prioritize resources for improved waste management. Where public site-level waste composition data is available, we incorporate it into our emissions estimates. Our Emissions Reduction Solutions identify organic waste diversion, alongside improved landfill gas capture and management, as important mitigation pathways, providing a data-driven starting point for broader waste management planning and implementation.
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