

Lowering Organic Waste Methane (LOW-Methane)

LOW-METHANE DATA STRATEGY: UNLOCKING ACTION THROUGH WASTE AND METHANE DATA

EXECUTIVE SUMMARY

The **LOW-Methane Data Strategy** is designed to unlock action on methane mitigation from organic waste by improving data collection, analysis, and application. Methane emissions from organic waste account for approximately 10% of global anthropogenic methane emissions, making the waste sector a critical area for targeted mitigation efforts. However, data gaps and perceived financial risks have hindered effective action and investment.

This strategy outlines a structured approach to data-driven decision-making in methane mitigation. It focuses on three key phases:

1. **Quantifying the Problem** – Establishing accurate methane emissions baselines through improved data collection and assessment of waste flows and emissions sources.
2. **Quantifying the Solution** – Supporting jurisdictions in planning and prioritizing mitigation actions using

scenario modeling and emissions reduction assessments.

3. **Tracking Implementation & Progress** – Implementing monitoring and reporting systems to verify emissions reductions and support sustainable financing mechanisms.

The **LOW-Methane Data Team** plays a central role in LOW-Methane's broader goal by supporting jurisdictions and providing guidance on effective data tools and methodologies, such as satellite monitoring, facility-scale modeling, and waste characterization analysis. These tools enable cities and national governments to prioritize high-impact projects, align with climate action plans, and enhance their emissions inventories for transparency and reporting obligations. By bridging data gaps, LOW-Methane facilitates informed policy decisions, enhances access to investment, accelerates methane mitigation efforts worldwide, and contribute to climate goals and sustainable waste management practices.

About the authors: This document was developed by the members of the LOW-Methane Data Solutions Team. Individual contributors are acknowledged on the last page. LOW-Methane is an initiative coordinated by the UNEP-convened Climate and Clean Air (CCAC).





INTRODUCTION

The Lowering Organic Waste Methane initiative, or LOW-Methane (LOW-M), aims to unite players from across the public and private sectors to rapidly reduce methane from organic waste globally to advance LOW-M’s ultimate goal of reducing at least 1 million tons of annual methane emissions well before 2030 by working with national and subnational jurisdictions and unlocking public and private finance.

Reducing methane emissions is vital for mitigating short-term climate change and keeping the goals of the Paris Agreement within reach. The decay of organic waste by bacteria in waste disposal sites leads to large methane emissions. As a result, solid waste is responsible for about 10% of global anthropogenic methane emissions, making it a prime target for emission mitigation efforts.

The main barriers to enabling actions are:

- **Data gap:** while tools to collect data exist, their application and translation into actions are lacking, meaning there is a huge untapped potential of unlocking action and finance through data collection and data use. While new data sources such as satellites provide great potential, serious data gaps

remain that undermine policy and impactful investment responses. Key data gaps include the volume and composition of waste (particularly food loss and waste), and the quantified benefits of relevant prevention, recovery, and recycling solutions on human and ecosystem health, job creation, and economies.

- **Finance gap:** financing institutions are interested in dedicating finance to climate action, and waste solutions exist. However, those actors have a perceived risk over uncertainty concerning the financial sustainability of those solutions. Financing models, both in CAPEX (capital expenditures) and OPEX (operating expenditures), for upstream (food loss and waste prevention), midstream (diversion, recovery and treatment) and downstream (final disposal of organic waste) solutions in the waste sector still need further development for accessing investment. At the same time, many solutions have a low cost that could be covered by public finance when governments develop a sound budgeting system.

To overcome these barriers and achieve its goals, LOW-M works to promote multi-level government coordination and partner collaboration. National and subnational governments, as well as international players offering different types of support to waste methane action, can share information and collaborate so that efforts are aligned in such

a way that accelerates methane mitigation results. This requires relationship building, transparency, and reciprocity. A full overview of the LOW-M project structure is included

below and shows how the Data Team interacts with the other parts of the projects and jurisdictions.

Figure 1: LOW-M’s path to supporting jurisdictions for accelerating action

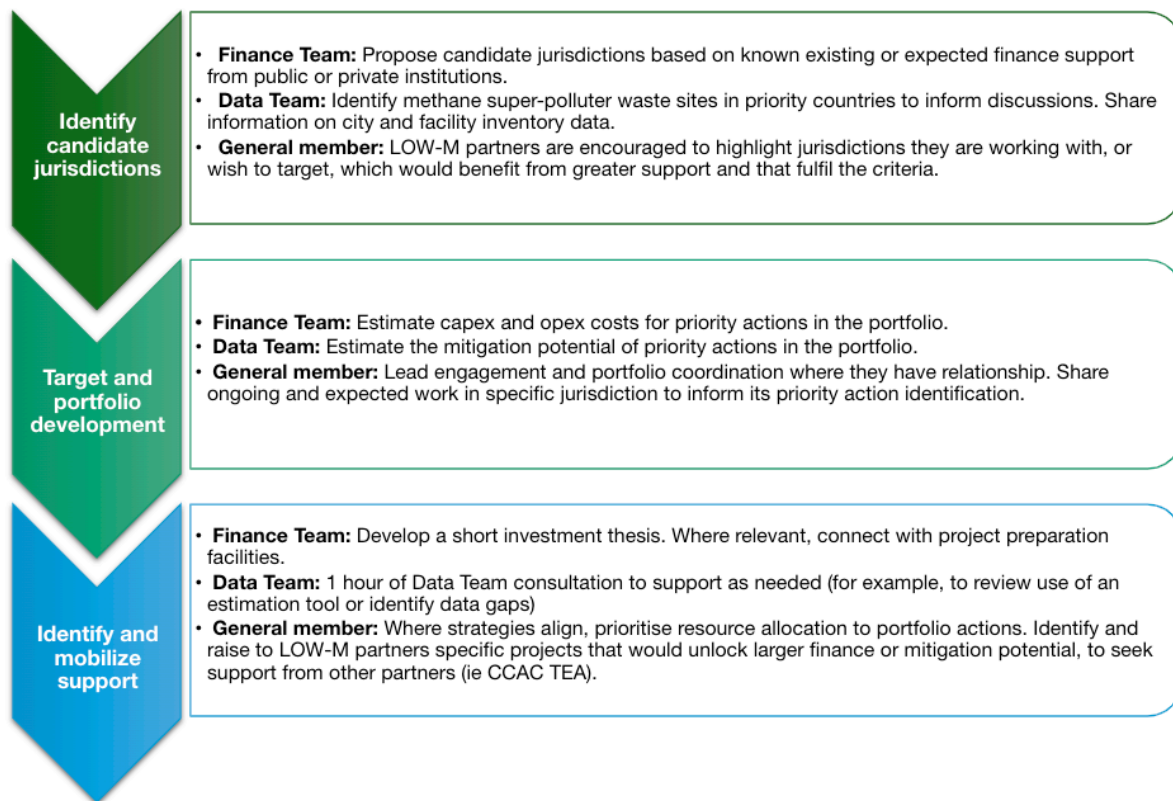
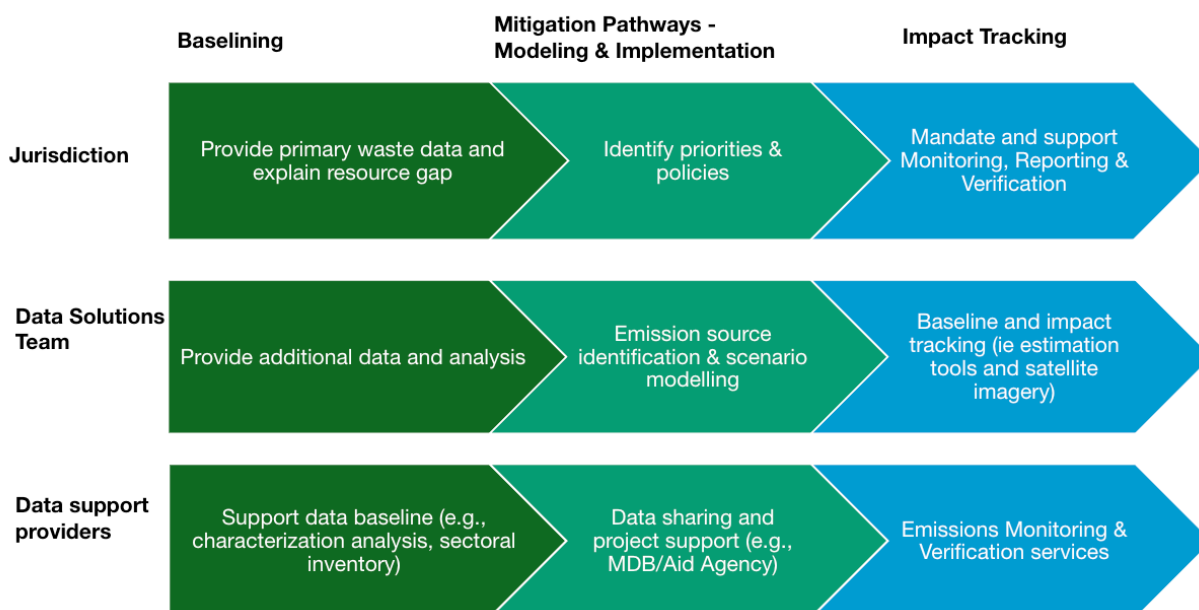


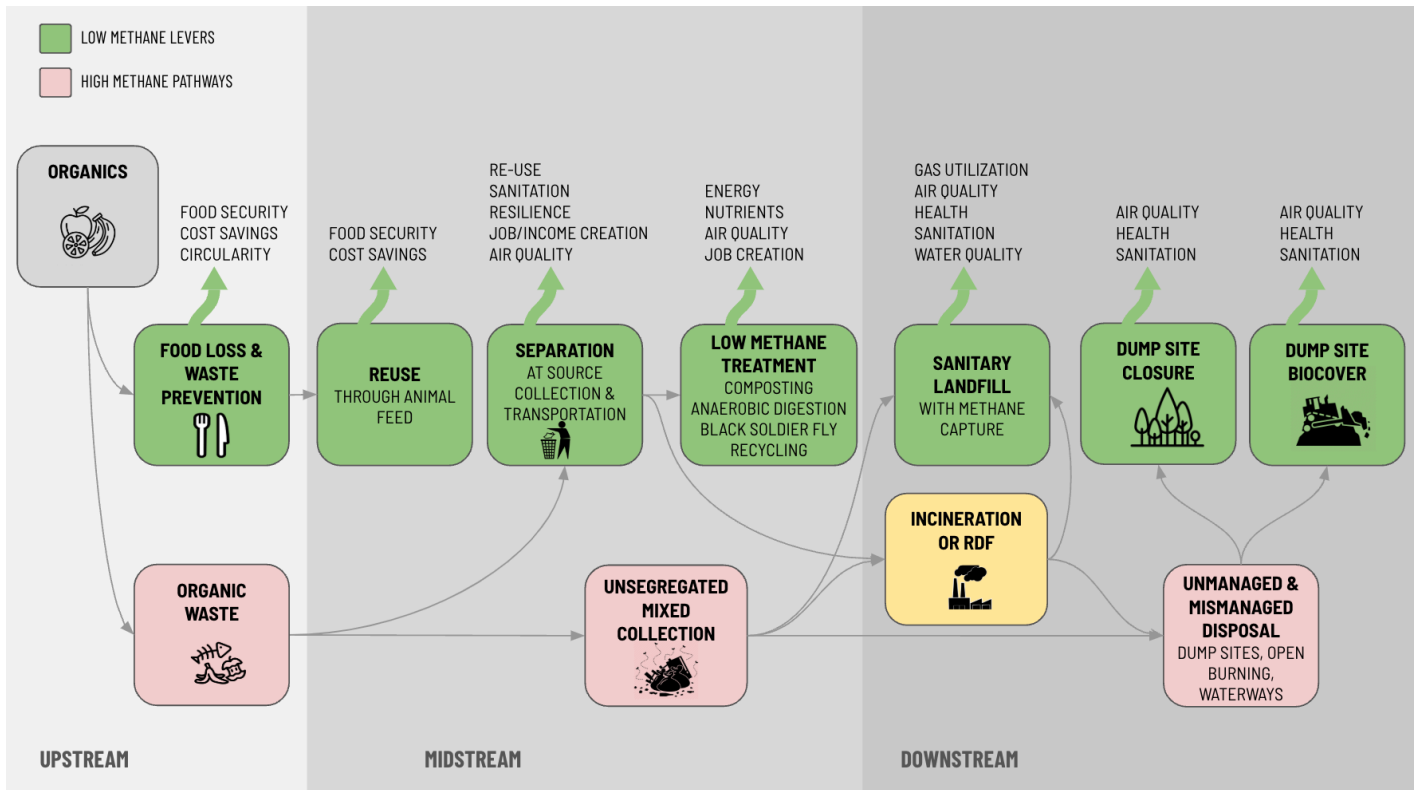
Figure 2: The roles of jurisdictions, the Data Solutions Team, and individual data support providers in the LOW-Methane Data Strategy





LOW METHANE LEVERS

The methane mitigating actions encouraged by LOW-M in the waste sector are identified below in green as Low Methane levers. As such, the Data Strategy presented in this document focuses on data needs to enable these actions, and priority will always follow the waste hierarchy.



GOALS OF THE LOW-M DATA STRATEGY

The goals of the LOW-M Data Strategy fall into three general phases: quantifying the problem, quantifying the solution, and implementing & tracking progress.

For quantifying the problem (data collection & emissions baselining), the goal is to generate and gather the data that will support the efforts under quantifying the solution (planning & prioritizing) and implementing & tracking. These data are foundational for future decision

making, providing needed information on waste flows within the waste value chain and methane emission sources. In this phase, there should be an initial assessment of the existing data for the jurisdiction and an identification of the various stakeholders who may be relevant for data collection.

In order to establish an accurate methane emissions baseline and assess the impact of mitigation action on baseline emissions, the waste streams within the jurisdiction must be characterized. This waste characterization includes collection of data on waste flows and waste composition throughout the waste value chain, and an identification of the major facilities for final disposal. A data collection template¹ can be provided to jurisdictions to

¹ LOW-M's data collection template can be found at:

<https://docs.google.com/spreadsheets/d/1LA6Xccntx96mPRIKSml51hvkzfr->

streamline the process of gathering baseline data on municipal solid waste management, while the methodology for country-level food waste measurement and reporting under the Food Waste Index² can be used for tracking food waste generation (at retail, food service and household level). Additional data points must be considered for waste generated at central markets, food manufacturers, distributors, among others.

Once waste characterization data has been collected, a baseline methane emission estimate can be generated (or improved) using models both at the facility-level for the identified final disposal facilities and at the jurisdiction-level for the entire city. These baseline emission estimates provide the jurisdiction with a more accurate understanding of existing emissions and the relative magnitude of emission sources within the jurisdiction, enabling informed decision making.

The jurisdiction-level baseline should take into account the entire waste value chain (i.e., upstream, midstream, downstream). Upstream (prevention measures) and midstream (reuse and recycle measures) data points are crucial in informing decision-making processes and shaping solutions (which will be discussed more in the next part). The best course of action in line with the LOW Methane levers is to intervene at the upstream level following the waste hierarchy.

We know that waste methane production is driven by organic waste that decomposes in final disposal sites, mainly made of food waste from transport, storage, distribution, processing, packaging, retail, public and household consumption entering the facility.

[1ojB/edit?usp=sharing&oid=109805866701888635371&rtpof=true&sd=true](https://www.unep.org/resources/publication/food-waste-index-report-2024)

² The Food Waste Index methodology can be found at: [https://www.unep.org/resources/publication/food-](https://www.unep.org/resources/publication/food-waste-index-report-2024)

Therefore, obtaining data that identify major sources of food waste generation is critical to both measure mitigation potential but also strategically decide implementation plans to reduce organic waste reduction in the most impactful locations. This also shows that the potential of implementing fast action on waste methane may often be found in small but numerous projects that, scaled in a decentralized manner, will drastically reduce landfill methane emissions

Conduction data collection at all levels of value chain may also help in creating citizens buy-in, especially when local community and informal workers, such as waste pickers, are involved in the data collection process. In global south jurisdictions, these groups have critical roles in not only in gathering accurate data but also driving solutions. This is also in line with the Reducing Organic Waste Declaration from COP29I.³

For the downstream emissions, a facility-level baseline estimate can be used directly. These modeled emission estimates will be compared to emission estimates based on atmospheric data where possible, for example obtained using satellites. This comparison ensures that the modeled emission rates align with observed emissions and can help identify shortcomings and opportunities for improvement of the model. The facility baseline estimates (including satellite observations) can help prioritize facilities for mitigation based on their respective emission rates. At large downstream facilities (e.g., landfills and dumps), methane monitoring data can be used to aid leak detection and repair, potentially identifying sources of emissions within the site that have low-cost mitigation solutions.

[waste-index-report-2024](https://www.unep.org/resources/publication/food-waste-index-report-2024)

³ The text of the ROW Declaration can be found at: <https://cop29.az/en/pages/cop29-declaration-on-reducing-methane-from-organic-waste>

For quantifying the solution (planning & prioritizing), the goal is to provide the data that a jurisdiction needs to (better) plan and prioritize mitigation action. This includes providing the resources and tools a jurisdiction needs to “support the case” for mitigation actions and investments. There should be an assessment of mitigation pathways where data and emission scenario modeling are used to assess the potential programs, policies, and projects that a jurisdiction may undertake to meet their emissions reduction goals, along with assessing the cost, timeline, and co-benefits of each pathway. A similar assessment can be done at the facility-scale. In addition to the impact of programs and policies on facility emissions, this assessment would consider the design or operational changes a facility can undertake.

Importantly, as indicated in the LOW-M levers chart (see figure 3), technologies that swap methane emissions with CO₂ are not preferable.

For tracking implementation results (monitoring & evaluating), where mitigation action is undertaken, modeling and monitoring efforts shift toward verification of emissions reductions. During this phase, there is continued monitoring of methane sources, and there may be additional collection of data on waste (waste flows and characterization). These collected data are used to track jurisdiction emissions over time in relation to the established baseline emissions. These “before” and “after” measurement data such as from satellites can be used to verify if the implementation of the relevant policies and projects lead to the actual reduction of emissions.

The power of data in finance allocation also lies in impact verification strategies. Governments should put in place Monitoring Reporting and Verification (MRV) systems that ensure the achieved mitigation will be accounted for post

project implementation. This might also be a requirement from partners in future loan or grant agreements, to ensure the sustainability of funded and implemented models over time.

Urban- and facility-scale emissions are tracked and reported, including tracking the emissions impact specific to each mitigation pathway. Like the baseline emissions, observational data from satellites and other monitoring tools can be used to provide insights in emission reductions and be compared to estimates from emissions accounting methods (e.g., model, inventory) used to track and report trends in emissions. Data on emissions and predicted (or actual) emissions reductions from LOW-M projects can be used to bolster the work of the LOW-M finance team, as this information is often asked for in funding proposals.

DATA STRATEGIES AND TOOLS

For each of the goals described above, there are specific outcomes that a jurisdiction would want to achieve, and corresponding data tools that can support the jurisdiction. Table 1 matches desired outcomes a jurisdiction may have with the supporting data tools and potential data deliverables. Within each strategy we outline a general plan for assessment of existing data and new data collection across different levels of government. Data products will support the desired outcome for a jurisdiction and the national governments through Nationally Determined Contributions (NDC) 3.0 and supporting stronger emission inventories for the Biennial Transparency Report (BTR) system coming into force in 2024/25. Through the data assessment and collection process, key stakeholders will be identified across the waste value chain.

Table 1: Available tools to support outcomes desired by jurisdiction

Systemic Goal	Data Tool Types*	Desired Outcome <i>What it does:</i>	Potential Data Deliverables <i>What it is useful for:</i>
Data collection	Data collection survey	Assessment of existing data	Identify, consolidate, and establish the quality of existing data for the jurisdiction in order to identify data gaps
Data collection	Waste characterization and flow analysis	Characterize and quantify waste streams	Waste composition and mass flow data to be used as inputs for the city-scale model
Emissions Baseline	City-scale model	Establish/Improve city baseline emissions	Model estimated city emissions that incorporate input data from jurisdictions
Emissions Baseline	Satellite monitoring*, Facility-scale model	Establish/Improve facility baseline emissions	Baseline methane emission estimate from facility-scale model that has been reconciled with methane monitoring data
Action planning	Satellite monitoring* and model data	Prioritization of sites for mitigation	Identify the sites/cities within a country or sub-national government that have the greatest methane mitigation potential. <i>Data-driven site prioritization should be combined with other aspects such as the local policy environment.</i>
Action planning	Satellite* and drone monitoring	Identify major emission sources within a facility	Use available methane monitoring data to identify large emission sources (e.g., landfills) that should be included in modeled mitigation scenarios; if available, drone monitoring can identify smaller emission sources and/or the processes and infrastructure leading to emissions at the final disposal site.
Action planning	City-scale model	Assessment of potential mitigation options for <i>Cities</i>	Identify major pathways for emission reductions using estimated emissions reductions by program, policy, project based on urban-scale scenario modeling.
Action planning	Facility-scale model, informed by satellite and drone	Assessment of potential mitigation options for <i>Facilities</i>	Estimated emissions reductions by program, policy, design upgrade at facility based on facility-scale modeling; with potential to use methane monitoring to inform chosen mitigation strategy (e.g., consider best practices that address the causes of emissions identified in a drone survey).
Tracking and Monitoring	City-scale model	Tracking and Reporting emissions reductions for <i>Cities</i>	Achieved emissions reductions by program, policy, project (i.e., modelled city-wide diversion targets can be reconciled with site-level modelling and observations)

Tracking and Monitoring	Facility-scale model, informed by satellite	Tracking and Reporting emissions reductions for <i>Facilities</i>	Achieved emissions reductions by program, policy, design upgrade at facility with the use of periodic observations to verify, and if needed, correct model estimates.
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* For more on methane satellites capabilities and functions, see “Hunting Methane Using Satellites: A Guide for Policymakers”, by UC Berkeley Law and UCLA Emmet Institute, 2025.

Overview of data tools

Below we list both the LOW-M default data tool choice and alternatives that would also supply the same data product.

Table 2: List of data tools, their limitation and cost

Data product <i>What outcome it generates:</i>	Data tools		Limitations	Cost to access the tool
Observed urban-scale methane emissions (ton/yr)	LOW-M Default	TROPOMI or other area flux mapping satellite (spatial resolution of ~7x5.5 km ²)	Ability to collect observations, detection threshold, in most cases not able to attribute emissions to a specific facility (but can be used to identify priority areas)	Low
Observed facility-scale emissions (kg/h)	LOW-M Default	Point source imaging satellite (Spatial resolution of ~25 x 25 m ²)	Ability to collect observations (especially in cloudy regions), detection threshold	Medium
		Drone mounted sensor (Screen or GDM method)	Local deployment required, Trained drone operator needed for every deployment	Medium
		Fixed, ground-based sensors	Local deployment required, Potentially large uncertainties in emission rates, use limited to 1 facility	Low
		Tracer-correlation	Local deployment required, Difficult to scale to multiple sites, requires nearby roads, needs site access to release a control tracer.	High
Location detection of emission sources at	LOW-M Default	Point source imaging satellite	Ability to collect observations, leak localization precision	Medium*

landfills		Drone mounted sensor (Tunable Diode Laser Absorption Spectroscopy, TDLAS)	Trained drone operator needed for every deployment	Medium
		Walking survey using FID sensor	Requires walking site (limited access to some areas due to safety)	Low
City-level waste characterization (waste sources, generation, collection, flow, treatment, and disposal)		GMI Waste Characterization Handbook and Tool		Low
		UN Waste Wise Cities Tool		Low
	LOW-M Default	World Bank What A Waste dataset		Low
Modeled urban-scale emissions (ton/yr)	LOW-M Default	GMI Solid Waste Emissions Estimation Tool - SWEET/WasteMAP Decision Support Tool (City)	Data quality is limited by available input data from the jurisdiction	Low
Modeled facility-scale emissions (kg/h)	LOW-M Default	GMI SWEET (Facility)/WasteMAP Decision Support Tool (Site)	Data quality is limited by available input data from the jurisdiction	Low
		LandGEM	Data quality is limited by input data from jurisdiction	Low
		GMI Anaerobic Digestion (AD) and GMI Landfill Gas (LFG) Screening Tool	Data quality is limited by input data from jurisdiction	Low
		IPCC methodology for compost and AD	Data quality is limited by input data from jurisdiction	Low
		IPCC Waste Tool (disposal sites)	Using the first order decomposition method	Low

		GIZ SWM-GHG calculator		Low
Assessing methane mitigation potential from upstream projects - <i>food loss and waste prevention</i>		EPA Avoided Landfilled Food Waste Methane Emissions Calculator	Up to six years of food waste tons and see annual methane savings for 25-year period.	Low
		ReFED Food Waste Emissions Calculator	Requires the volume of food handled operationally and where the food ends up. US factors are used.	Low
		GFN FRAME (Food Recovery to Avoid Methane Emissions) methodology	Requires food types and local GHG factors; operational data is also needed to estimate the project scenario.	Low
Assessing methane mitigation potential from midstream projects - <i>diversion</i>	LOW-M Default	WasteMAP Decision Support Tool (City/Site)		Low
Assessing methane mitigation potential from downstream projects - <i>disposal site intervention</i>	LOW-M Default	WasteMAP Decision Support Tool (Site)		Low
		Waste Reduction Model (WARM)		Low
		Afvalzorg Simple model and Multiphase model	The Afvalzorg Multiphase model allows for a more detailed calculation but is suitable for landfill sites where a reliable waste register is kept by the site operator.	Low

* This cost estimate does not include the potential cost to the jurisdiction for collecting necessary input data if not readily available.

LINKING DATA STRATEGIES AND ACTION

Effective methane mitigation in the waste sector requires a seamless connection between data collection, analysis, and practical implementation. Data is not only a tool for understanding the scale of methane emissions but also a crucial enabler of targeted and impactful action. Without robust data strategies, jurisdictions risk making uninformed decisions, missing key mitigation opportunities, and failing to attract necessary investments.

Data-driven insights can be translated into concrete actions that reduce methane emissions from organic waste. Jurisdictions can use data for emissions baselining, action planning, and tracking progress—critical steps in designing and implementing mitigation strategies. By leveraging tools such as satellite monitoring, facility-scale modeling, and waste characterization, cities and national governments can prioritize high-impact projects, close critical data gaps, and improve methane reduction outcomes.

Real-world applications of data strategies have been used to identify major emission sources, prioritize mitigation sites, and verify emissions reductions over time. These insights enable decision-makers to develop stronger policies, secure funding, and implement effective interventions that align with climate goals and sustainability commitments.

1. Action planning - Prioritization of sites for mitigation and the identification of major emission sources within a facility

Contributed by the Netherlands Institute for Space Research (SRON).

SRON has collaborated with the Global Methane Hub to use satellite data to identify large methane emissions from solid waste disposal sites to prioritize engagement. Global TROPOMI satellite data have been used to find areas with large emissions to target high-resolution (25-m) GHGSat observations to identify individual emitters and quantify their emissions. As a next step, the high-resolution observations allow the pinpointing of emissions within the site. This has, for example, allowed the identification of emission plumes from landfill infrastructure such as gas purification/processing plants. For most observed sites, emissions can be identified as coming from the areas of the site where waste has recently been deposited, such as at the active working face in managed landfills. The image below shows how identified GHGSat plume origins move across a disposal site in Morocco over time concurrently with the changes in visual activity caused by the deposition of new waste. As the addition of new waste moved to a new section of the landfill to the southwest, methane plumes were observed from that area as well.

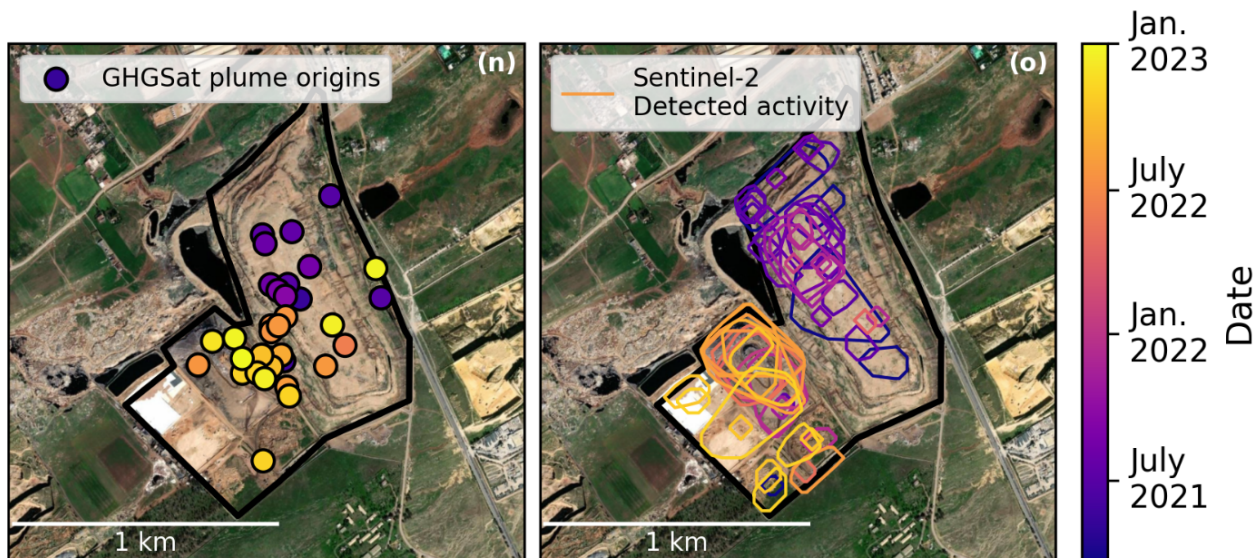


Figure 4. Observed GHGSat plume origins over time (left) and visual activity related to the deposition of waste identified over time (right). Adopted from Dogniaux et al. (2024).

2. Emissions baselining - Establish/Improve facility baseline emissions

Contributed by the Netherlands Institute for Space Research (SRON).

With the LOW-M project, multiple partners have worked on estimating baseline emission estimates from waste disposal sites in priority urban areas. One example is the Olusosun waste disposal site in Lagos, Nigeria. SRON has provided GHGSat-based emission quantifications of detected methane plumes from the site (1.4 ± 0.7 ton/hr based on 2023-2024 observations) and compared these to modelled emission estimates generated by Climate TRACE and also published on WasteMAP (2.2 ton/hr). In addition to the satellite-identified emission plumes, there can be additional (diffuse) emissions from the site not captured in the GHGSat quantifications. In addition to site-level modeled emissions, the Lagos city-level emissions modeled by RMI using SWEET model is 3.4 ton/hr. Considering that Olusosun is one of the several but biggest disposal sites for Lagos, the order of magnitude of the modeled emissions match well with the satellite observations for the

Olusosun site, providing confidence in the modeled baseline emission estimates.

For other sites, the satellite-based emission estimates have been higher than the modeled estimates, initiating further investigations.

3. Action planning - Identify major emission sources within a facility

Contributed by Carbon Mapper.

Remote sensing data from airborne surveys, similar to the data used by LOW-Methane, was used at the Sunshine Canyon landfill in the United States to guide mitigation action and assess the success of those efforts. In this example, large methane emissions were observed at California landfills during the California Methane Survey led by NASA's Jet Propulsion Laboratory over 2016-2018 ([Duren et al., 2019](#)). The recognition of these large methane sources prompted follow-up action by local enforcement agencies and site operators. At the Sunshine Canyon landfill, the remote sensing data were used to identify regions of the Sunshine Canyon Landfill where emissions were originating, including intermediate cover slopes ([Cusworth et al., 2020](#)). Through follow-

up investigation, it was found that non-standard practices of not removing daily cover before new waste placement had led to reduced methane capture efficiency and resulted in methane leakage. Mitigation was undertaken at the landfill, including improvements to the gas collection system and surface cover. Additional remote sensing data were collected by aircraft following mitigation to verify that emissions were successfully reduced, and there was a corresponding reduction in odor complaints from the community.

4. Action prioritization – City level Climate Action Planning leads to addressing data gaps and identification of high-impact projects

Contributed by C40 Cities.

As part of C40's Deadline 2020 and Climate Action Planning Programmes, all C40 cities have developed robust Climate Action Plans which include sectoral emission trajectories that demonstrate a pathway to reduce their emissions in line with the goals of the Paris Agreement.

C40 has provided technical assistance to all its Global South member cities to inform their Climate Action Planning process. This process began by developing GHG emission inventories with C40's member cities using the Global Protocol for Community-based Greenhouse Gas Emissions (GPC) framework. This allowed cities of varying degrees of technical capacity to collect and estimate their waste-based GHG emissions in a unified and flexible framework. Data collection methods included utilizing bottom-up approaches through surveys, or top-down approaches through waste characterization and flow analysis data obtained directly from city waste departments. Most of the cities in the program opted to use a methane-commitment model to estimate their

emissions using the IPCC methods, which took into account waste tonnage and facility characteristics. These calculators were available in the CIRIS GHG inventory tool developed by C40.

Because of this, C40 has been uniquely positioned to estimate current and future emissions by sector, and generated a rich and unique dataset that has allowed us to identify and quantify sectoral opportunities in the regions where C40 works and to create a data-based prioritization strategy to support our member cities in the areas where they have the largest opportunities.

This process has led to the creation and implementation of the Transforming Waste Management in African and Indian Cities Program, funded by the Global Methane Hub, focused on addressing data gaps to improve decision making and to identify and accelerate high-impact projects that reduce and avoid methane emissions and enable C40 Mayors to deliver cleaner, healthier and more inclusive cities in line with the Pathway Towards Zero Waste. The Program is currently supporting 10 cities in Africa and India to advance their organic waste management strategies.

5. Action prioritization – City-level Climate Action Planning

Contributed by the Rocky Mountain Institute (RMI).

The LOW-M Data Solutions Team utilizes the WasteMAP Decision Support Tool to support jurisdictions in quantifying methane emissions, evaluating mitigation scenarios, and prioritizing investments in waste sector interventions. This approach was integral to the development of the LOW-Methane Portfolios for Lagos, Nigeria, and Santo Domingo, Dominican Republic, enabling both cities to establish data-driven methane mitigation strategies.

Case Study: Lagos, Nigeria

Lagos has committed to reducing methane emissions from its waste sector by at least 30% by 2030, in alignment with its Climate Action Plan and Pathway Towards Zero Waste commitments. WasteMAP's Decision Support Tool was used to prioritize high-impact interventions: (1) expanding organic waste treatment capacity to 2,000 tons per day by 2030, and (2) decommissioning five existing dumpsites, including an accelerated closure plan for Olusosun.

Project emission reduction potential: LOW-M's analysis estimated that implementing these interventions would reduce methane emissions by 24,900 tons per year by 2030, with the highest impact expected from organic waste diversion.

Case Study: Santo Domingo, Dominican Republic

Santo Domingo's waste sector mitigation efforts are guided by the Nationally Determined Contributions (NDCs) and the National Plan for Integrated Waste Management (PLANGIR). LOW-M data solutions team's modeling supported the city in:

Planning landfill closure and transformation including the progressive closure of La Duquesa dumpsite and enabling the design of a new sanitary landfill with landfill gas capture and energy recovery.

Quantifying projected methane reductions: Scenario modeling indicated that the planned landfill gas capture system and organic waste diversion efforts could reduce 1,700 tonnes of annual methane emissions by 2030 (Figure 5).

By applying WasteMAP's Decision Support Tool, LOW-M has helped Lagos and Santo Domingo quantify their emissions baselines and design targeted methane mitigation strategies. These methodologies enhance

governments' capacity to implement effective waste sector interventions, attract investment, and achieve measurable methane reductions.

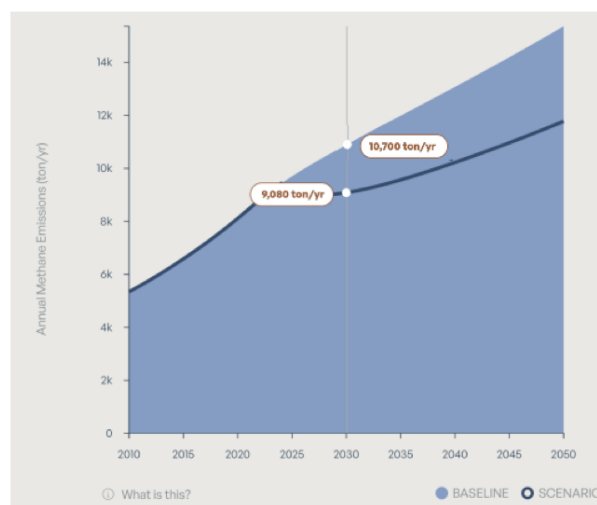


Figure 5. Projected Impact of Priority Goal #2 for Santo Domingo.

6. Monitoring results – impact and co-benefits of diverting food to direct human consumption

Contributed by the Global Foodbanking Network (GFN).

GFN has collaborated with the Global Methane Hub to develop and implement the FRAME methodology ("Food Recovery to Avoid Methane Emissions") for calculating avoided emissions and associated co-benefits in food recovery and redistribution through food banks offer significant advantages. By providing a structured framework to quantify the environmental impact and the co-benefits of diverting food to direct human consumption, the methodology enables food banks to demonstrate their contributions to reducing food waste, mitigating greenhouse gas emissions and supporting adaptation plans for countries. The methodology defined a monitoring, reporting, and validation scheme, so that stakeholders can track the effectiveness and efficiency of food recovery activities, leading to informed decision-making,

resource optimization, and potential scaling of successful interventions. FRAME methodology also contributes measuring different Sustainable Development Goals: Zero Hunger, Responsible Consumption and Production, and Climate Action, while enhancing the credibility and accountability of food recovery initiatives.

Nowadays the methodology is being ran in the following countries: Mexico, Ecuador, Costa Rica, Colombia, Guatemala, Honduras, Paraguay, Thailand, Cote D'Ivoire and South Africa.

7. Baseline – Developing a Zero Waste Model in Dar es Salaam

Contributed by Global Alliance for Incinerator Alternatives (GAIA).

Dar es Salaam is the third fastest growing city in Africa and the ninth fastest growing in the world, with a population projected to be nearly 11 million by 2030. The city generates an estimated 5,600 tonnes of solid waste daily, with only between 900 and 1,500 tonnes taken to the dumpsite. The only official dumpsite, Pugu-Kinyamwezi, has no landfill gas collection or other mitigation measures. The rest of the waste is dumped onto vacant land or waterways, and much is burned in the open. Due to the lack of proper organic waste management systems, the biggest source of greenhouse gas emissions is methane from organic waste.

Nipe Fagio, a member of Global Alliance for Incinerator Alternatives (GAIA), has built cooperative-led zero waste systems in Dar es Salaam since 2019.⁴ The zero waste system was first implemented in Bonyokwa, an administrative ward of Ilala district which is the

most populous district in Dar es Salaam. The Wakusanya Taka Bonyokwa Cooperative locally implements the system and collects 1.74 tonnes per day and serves 12,000 people from 2,998 households. The cooperative manages an average of 40.65 tonnes of waste per month, including 31.4 tonnes of organic waste, 3.8 tonnes of recyclable waste, and 6.45 tonnes of residual and domestic hazardous waste.

Together with Nipe Fagio, the cooperative collects data through a bottom up approach⁵ involving local communities and waste pickers. They found that on average the zero waste model in Bonyokwa manages 1,089 tonnes of waste per year with 77.97% consisting of organic waste. They also found that the waste composition and per capita generation data are similar throughout different neighbourhoods. Using the IPCC's Mass Balance model with default emission factors and data based on Nipe Fagio's in situ measurements of organic waste collected, the zero waste model in Bonyokwa has successfully reduced 16.4 tonnes of methane emissions per year in a community of 12,000 people. While direct measurements of methane emissions from the city's dumpsites are not available, using the same IPCC default methodology, it is estimated that even a partially successful implementation at the city level, with 80% segregation, would result in 19,200 to 29,600 tonnes per year less methane emissions.

Compared to using satellites to gather the waste data, the bottom-up approach used by Nipe Fagio and the cooperative invites local support and participation which then drives implementation on the ground. Supported by the continuous bottom-up data collection work

⁴ A complete case study can be found at <https://www.no-burn.org/resources/zero-waste-model-dar-es-salaam-case-study/>

⁵ See Nipe Fagio's Waste Assessment and Brand Audits (WABA) here: <https://nipefagio.co.tz/waste-assessment-and-brand-audits-waba/>

along with implementation, Nipe Fagio is expanding this model in a decentralized manner to the remaining 102 wards in 5 municipalities in Dar es Salaam. With the integration of waste pickers cooperatives, Nipe Fagio has replicated the model in more than 20 communities, not only in Dar Er Salaam but also in the cities of Arusha, Zanzibar, Tanga, Dodoma and Mwanza. This expansion supports the Tanzanian government pledge to scale-up zero waste implementation

throughout the country. In 2024, the World Bank also supported the model in Kinondoni Municipality's Mabwepande Composting facility where food waste from the city's markets are converted into insect protein (Black Soldiers Fly) and compost⁶. The program in Dar es Salaam is one of the many zero waste programs of GAIA that shows the power of working together with the community to drive lasting systems change in waste management.

⁶ Read more about this story here:
<https://www.worldbank.org/en/news/feature/2024>

[/05/16/tanzania-afe-greener-future-reducing-methane-in-waste-and-livestock-sectors](https://www.worldbank.org/en/news/feature/2024/05/16/tanzania-afe-greener-future-reducing-methane-in-waste-and-livestock-sectors)

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Supporting organizations

