

Measuring Methane Emissions from the Waste Sector

Part 2 in the Global Methane Initiative's (GMI) MRV Webinar Series



16 March 2023

11:00 AM – 12:00 PM EDT (UTC -4)

globalmethane.org

Submit your questions during the presentation!

- Participants are muted
- **To ask a question:**
 1. Select “All Panelists” from the drop-down menu
 2. Enter your question in the question and answer (Q&A) box
 3. Select “Enter”
- Questions will be moderated at the end
- Recording and webinar slides will be posted to the GMI website (www.globalmethane.org)



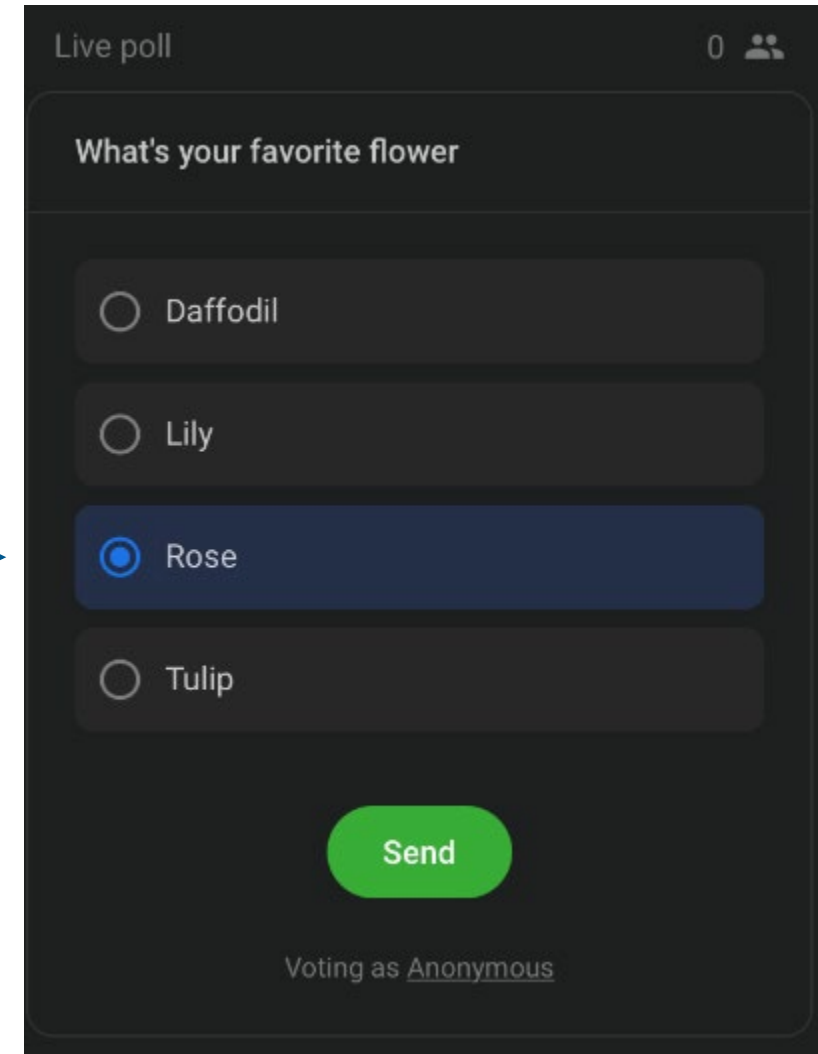
Polling and feedback

Polling

- We'll ask a poll question during the webinar
- The Slido panel will appear when we open the first poll
- Select your desired response and hit "Send"

Webinar Feedback

- A feedback form will pop-up in the Slido panel near the end of today's webinar with several questions
- Please make your selections and select "Send"



Live poll 0

What's your favorite flower

Daffodil

Lily

Rose

Tulip

Send

Voting as Anonymous

Speakers



Klara Zimmerman
Physical Scientist
U.S. Environmental Protection
Agency



Kait Siegel
Waste Sector Manager
Clean Air Task Force



Tom Frankiewicz
Lead, Waste Methane Practice
Rocky Mountain Institute



Mackenzie Huffman
Director of Strategy and
Partnerships
Carbon Mapper

Agenda



Importance and Challenges of Measuring Waste Methane Emissions – Klara Zimmerman



The Waste Methane Assessment Platform – Kait Siegel and Tom Frankiewicz



Measuring and Managing Methane Using Satellites – Mackenzie Huffman



Closing remarks and key takeaways – Klara Zimmerman



Q & A

Part 1 of GMI's MRV Webinar Series

1

Measurement, reporting, and verification (MRV) involves collecting and tracking greenhouse gas emissions data, reporting data in a standardized format, and verifying data for accuracy and completeness






2

MRV for biogas projects is critical for building national inventories to meet transparency requirements of the Paris Agreement

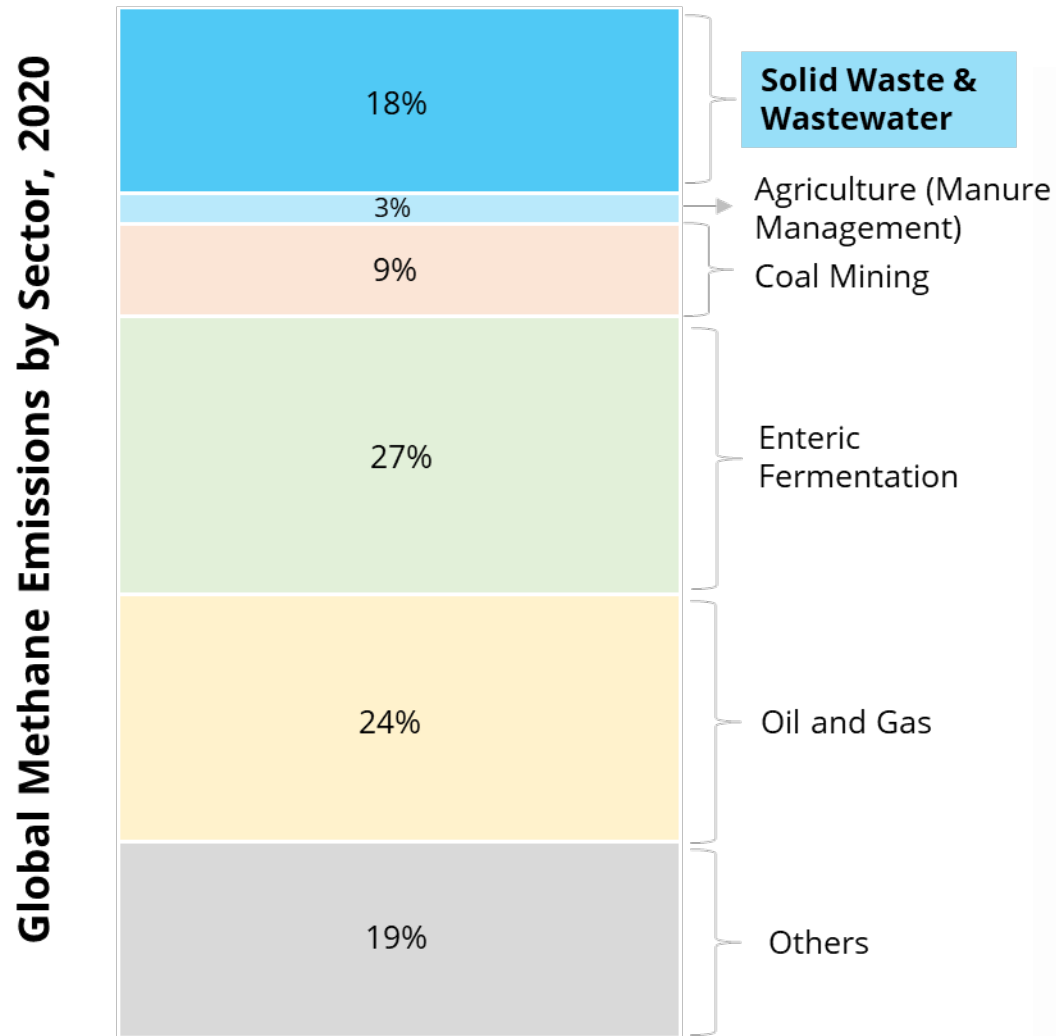
3

GMI is a resource hub for countries seeking to develop robust MRV frameworks



-  Global Methane Initiative and Biogas Overview - Nick Elger
-  Basics of MRV - Neelam Singh
-  Importance of Biogas MRV for National Inventories and the Paris Climate Agreement - Lisa Hanle
-  Global Methane Initiative's MRV Tools and Resources - Nick Elger
-  Q&A

Importance of Measuring Waste Methane Emissions



Source: GMI, 2020

- **The Global Methane Pledge (GMP)** is an agreement signed by 150 countries to collectively cut global methane emissions by at least 30 percent from 2020 levels by 2030
- **Achieving the GMP** will require substantial mitigation action across all methane emitting sectors
- The waste sector—including municipal solid waste and wastewater—is the **third largest source of human-related methane emissions** globally
- **You can't manage what you don't measure**—measurement is the most important component of MRV

Challenges of Measuring Waste Methane

- Methane emissions from the waste sector are **difficult to measure and track** because they are emitted from dispersed and unpredictable sources
- **Established methodologies and tools are available** to estimate waste methane emissions:
 - U.S. Environmental Protection Agency's (EPA) Solid Waste Emissions Estimation (SWEET) tool
 - EPA's Anaerobic Digestion Screening Tool

Solid Waste Emissions Estimation Tool
Version 4.0.2
July 2022
Developed by U.S. Environmental Protection Agency

Tool Support: biogastoolkit@epa.gov



Download the Tool: <https://globalmethane.org/SWEET>

Anaerobic Digestion Screening Tool
Version 2.2
March 2022
Developed by U.S. Environmental Protection Agency

Tool Support: biogastoolkit@epa.gov

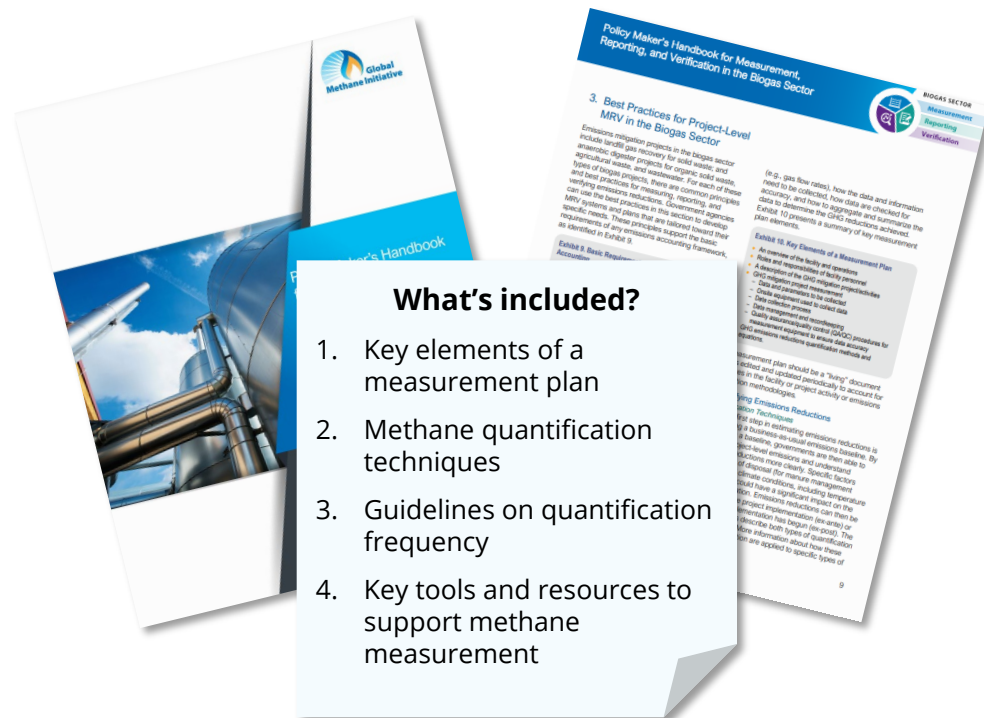


Download the Tool: <https://globalmethane.org/resources/>

GMI Resources for Methane Measurement

The **Policy Maker's Handbook for Measurement, Reporting, and Verification in the Biogas Sector** offers guidance and best practices for measuring methane emissions from biogas projects.

The **MRV Resource Center** includes a summary of the best practices for measuring methane emissions discussed in the Handbook.



Measurement

From a bottom-up perspective, the most important component of MRV is the measurement of data. This core component provides the basis for claiming emissions reductions from the action(s) taken.

- **Develop a measurement plan**
The main activity for measurement is the collection and implementing a comprehensive measurement plan of key steps, including defining what data and inform how data are checked for accuracy, and how to aggregate.
- **Use established methodologies and tools**
Using established methodologies – such as those based on IPCC GHG inventory guidelines – is considered a best practice for measuring emissions and emissions reductions for the biogas sector. Links to these tools are provided.
- **Keep accurate records and project documentation**
In addition to emissions reductions data, it is important to document:
 - Methodologies used to quantify emissions reductions
 - GHGs included in the project's scope
 - Activity data and how they are measured
 - Baseline and any other underlying assumptions
 - Sources of uncertainty
 - Data sources
 - Any data gaps associated with the period for which biogas mitigation efforts are quantified
- **Resolve data gaps and identify accurate data substitutes**
Monitoring and data collection equipment will often fail or have interruptions during a monitoring period. Frequently, emissions mitigation programs will have specific requirements and methods to substitute for missing data.
Without specific guidance, projects should seek to use methods that are reasonable, supported by other data during the measurement period, and are conservative in nature.
IPCC Guidelines for National Greenhouse Gas Inventories include methods for resolving data gaps using techniques such as overlap, surrogate data, interpolation, and trend extrapolation.

What's featured?

1. Easy to follow best practices for methane measurement
2. Key tools and resources to support methane measurement

Download the Handbook:
<https://globalmethane.org/resources/details.aspx?resourceid=5182>

Visit the MRV Resource Center: globalmethane.org/mrv

New Global Methane Pledge (GMP) Waste Pathway

- Launched at COP27, the **GMP Waste Pathway** will focus on enhancing the measurement and tracking of waste methane emissions
- There is a growing wave of **methane-detecting satellites** and **data platforms**
- Clean Air Task Force, Rocky Mountain Institute, and Carbon Mapper are key actors in this space



Waste Methane Assessment Platform

Tom Frankiewicz

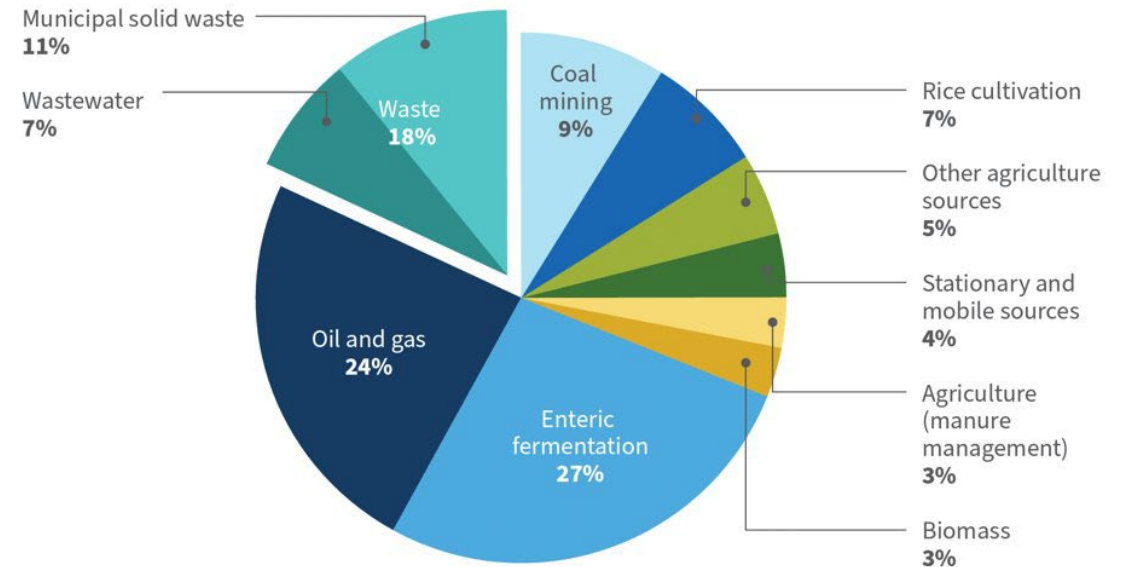
Waste Methane Subject
Matter Expert
Rocky Mountain Institute

Kait Siegel

Waste Sector Manager,
Methane Pollution Prevention
Clean Air Task Force

Global Waste Methane Emissions

- The waste sector is the third largest source of global anthropogenic methane emissions
- Barriers to tackling waste methane include:
 - Identifying sources of methane from landfills and dumpsites
 - Accessing best practices and evidence-based measures to mitigate methane from organics prevention to landfill management
- An accessible platform that highlights emissions, opportunities, and best practices will help provide a clear pathway toward achieving the Global Methane Pledge and other ambitious national and subnational greenhouse gas targets.



Source: Global Methane Initiative, "Global Methane Emissions and Mitigation Opportunities," <https://www.globalmethane.org/documents/gmi-mitigation-factsheet.pdf>

Two-Pronged Approach to Waste Methane Mitigation

WASTE MAP



Open-Source Platform

Designed to collect and improve availability and robustness of global waste sector data, enable methane emissions transparency, and identify priority interventions



Decision Support Tools

The platform will leverage decision support tools that allow users to evaluate different waste treatment scenarios and include case studies and strategic playbooks for methane mitigation



COUNTRY ENGAGEMENT



On-the-Ground Support

Subnational and national engagement to support a pathway for waste methane management, improve public health, and reduce environmental impact



Information Sharing

Creating and convening a network of waste experts and peer-to-peer exchange to share global waste methane management practices.

Waste MAP: A Central Platform to Inform Action



Open-access knowledge repository

- Codifies and synthesizes knowledge gained from on-the-ground support and experiences
- Allows countries/cities to access knowledge platform to structure, accelerate and improve impact on waste methane
- Includes: case studies, policy playbook, overall strategy playbook



Global Emissions Heat Map

- Quantification of waste emissions across the globe
- Allows GMH and other stakeholders to prioritize mitigation efforts



Decision Support Tool

- Integrated tool to help cities establish a baseline of emissions and recommend alternative treatment scenarios
- Integrate data and recommend resources for users

- **Open access data and resources fills information sharing void**
- **Tools can accelerate and improve impact**

Waste MAP (Methane Assessment Platform)



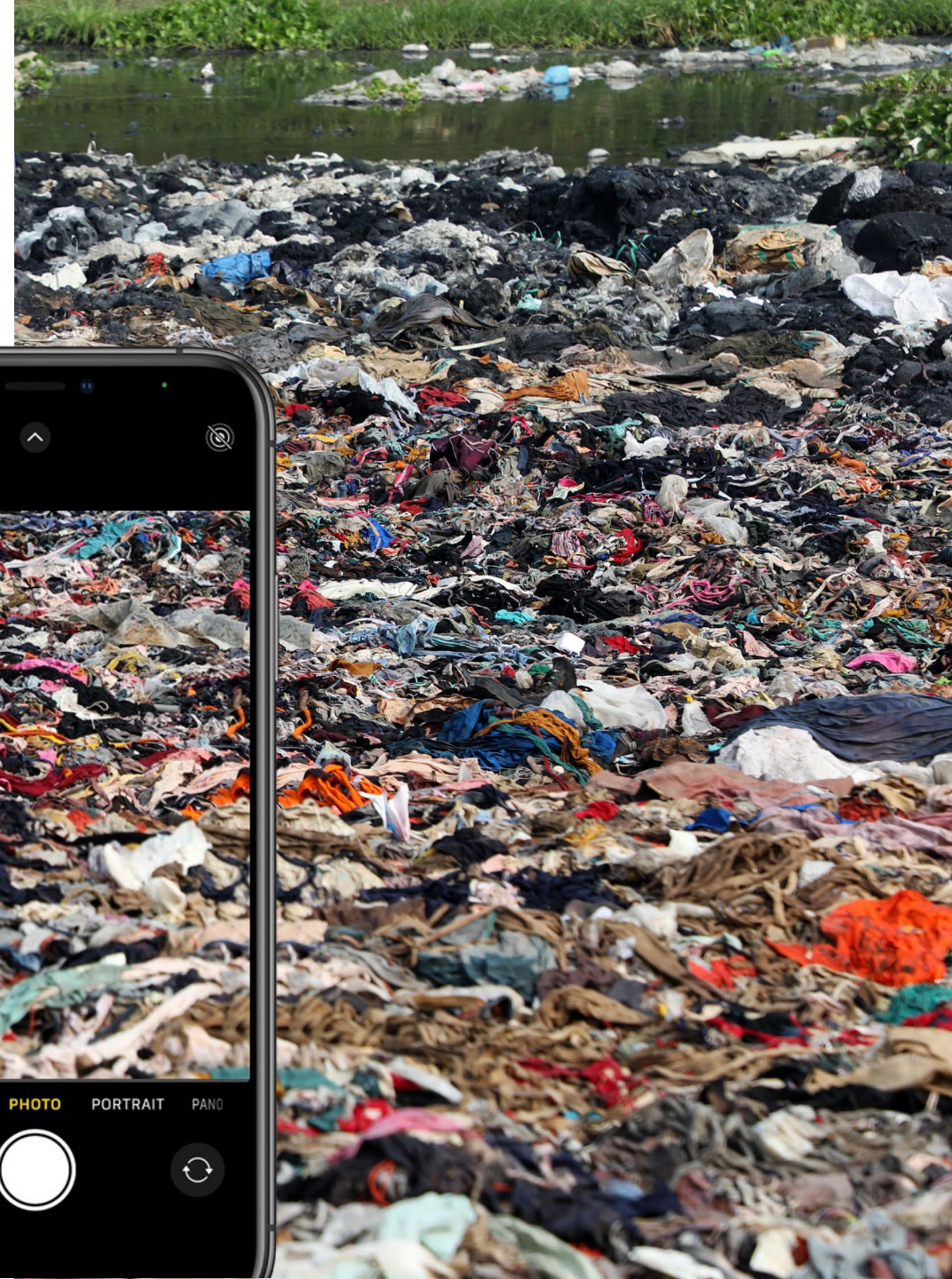
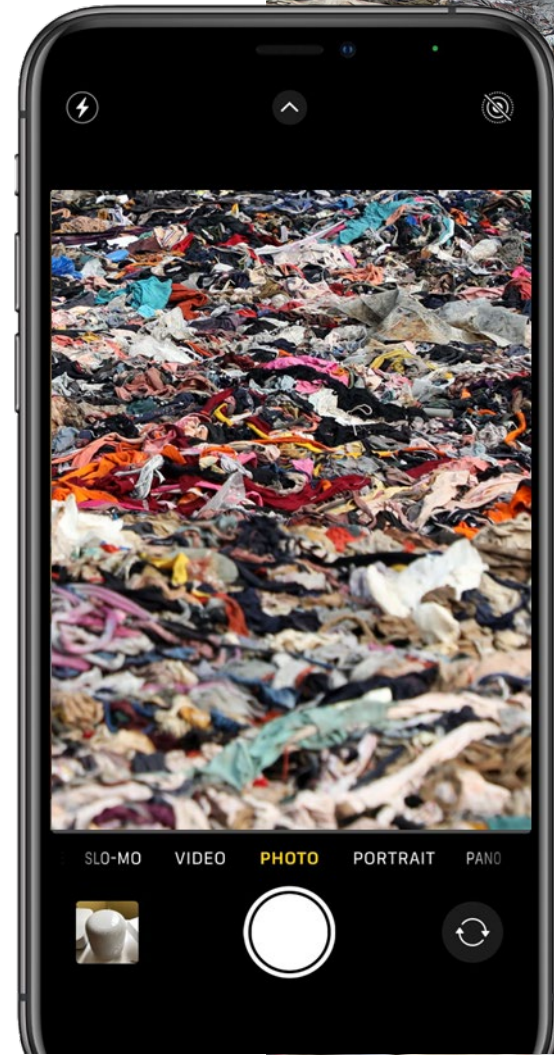
Citizen Engagement on Waste

Waste MAP will pilot a tool that incorporates community-level feedback to help catalog open and “unmanaged” dumpsites.

The goal of pilot is to:

- Increase awareness of improperly managed waste
- Accelerate and improve the adoption of effective waste management strategies in select communities

Waste MAP will work with the appropriate national and subnational authorities and stakeholders in designing and rolling out this pilot program.



Country Engagement

Provide an ongoing mechanism for **data gathering** and **engagement** at national and subnational levels in select countries

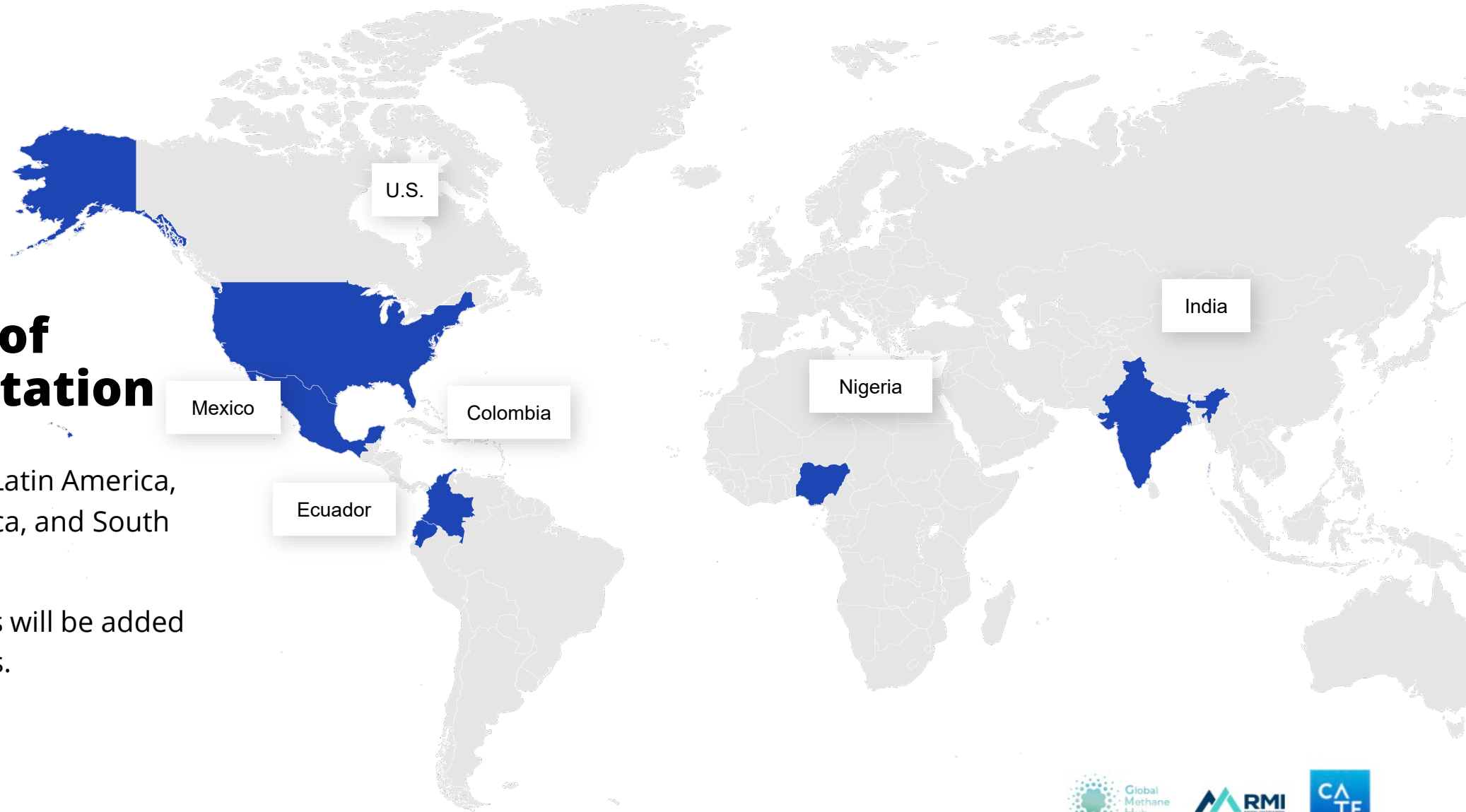
- **National and Subnational Level**
 - Supporting policymakers in setting and meeting waste methane reduction targets
 - Engagement with subnational governments, waste officials, and waste management staff
- **Subnational Level**
 - Providing technical assistance, facilitating peer-to-peer exchanges, and improving site specific data and understanding



First Year of Implementation

Target countries in Latin America, North America, Africa, and South Asia.

Additional countries will be added in subsequent years.



Project Milestones - Tentative Timeline

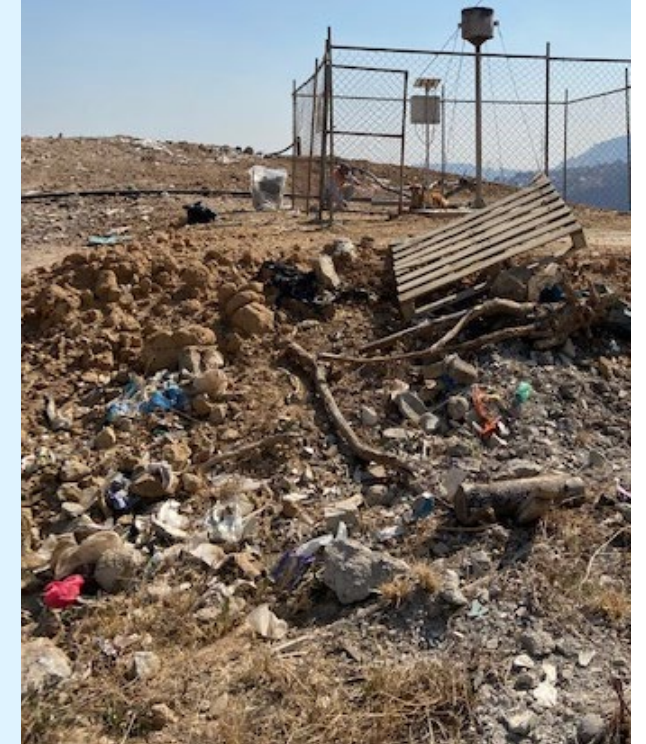
Activities	Description	Timeline
<ul style="list-style-type: none"> Landscape Assessment 	<ul style="list-style-type: none"> Evaluate regulatory framework and market incentives Identify cities/municipalities for deep dive 	March
<ul style="list-style-type: none"> Stakeholder Engagement 	<ul style="list-style-type: none"> Meet with key stakeholders to socialize project and secure buy-in 	March - April
<ul style="list-style-type: none"> Workshops 	<ul style="list-style-type: none"> National-level awareness raising and capacity building workshop Subnational peer-to-peer workshop to share best practices and provide access to technical experts 	June September – October
<ul style="list-style-type: none"> Waste MAP Beta testing 	<ul style="list-style-type: none"> Test platform with select users for feedback 	September
<ul style="list-style-type: none"> Waste MAP Launch 	<ul style="list-style-type: none"> Official public release of Waste MAP Coordinate logistics and media outreach for COP 28 launch 	November
<ul style="list-style-type: none"> Report Publication 	<ul style="list-style-type: none"> Publish strategic playbook for country deep dives 	December

Naucalpan - Mexico



- Identification of needs **with** Municipality
- Policy strengthening support
 - Climate Action Program
 - 10-year plan update
- Technical Assistance
 - 7-year MBT Plant project (1,300 ton/day)
 - Updated waste characterization study of Naucalpan landfill
 - Methane estimates for MBT plant and of landfill
- Case study in platform and peer-to-peer workshops

Data to Action





Chennai- India

- Cooperating with Government of Tamil Nadu Environment, Climate Change – Forest Department, and Tamil Nadu Green Climate Company
- Assessing value chain of organic waste to gain insight and identify areas of technical assistance
- Peer-to-peer exchange and capacity building at regional level in partnership with state and municipal governments
- Prioritizing commercial/institutional organic waste – including ~200tpd from Koyambedu fresh market



Regional Approach to Organics Treatment

Thank You!

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Measuring and Managing Waste Methane

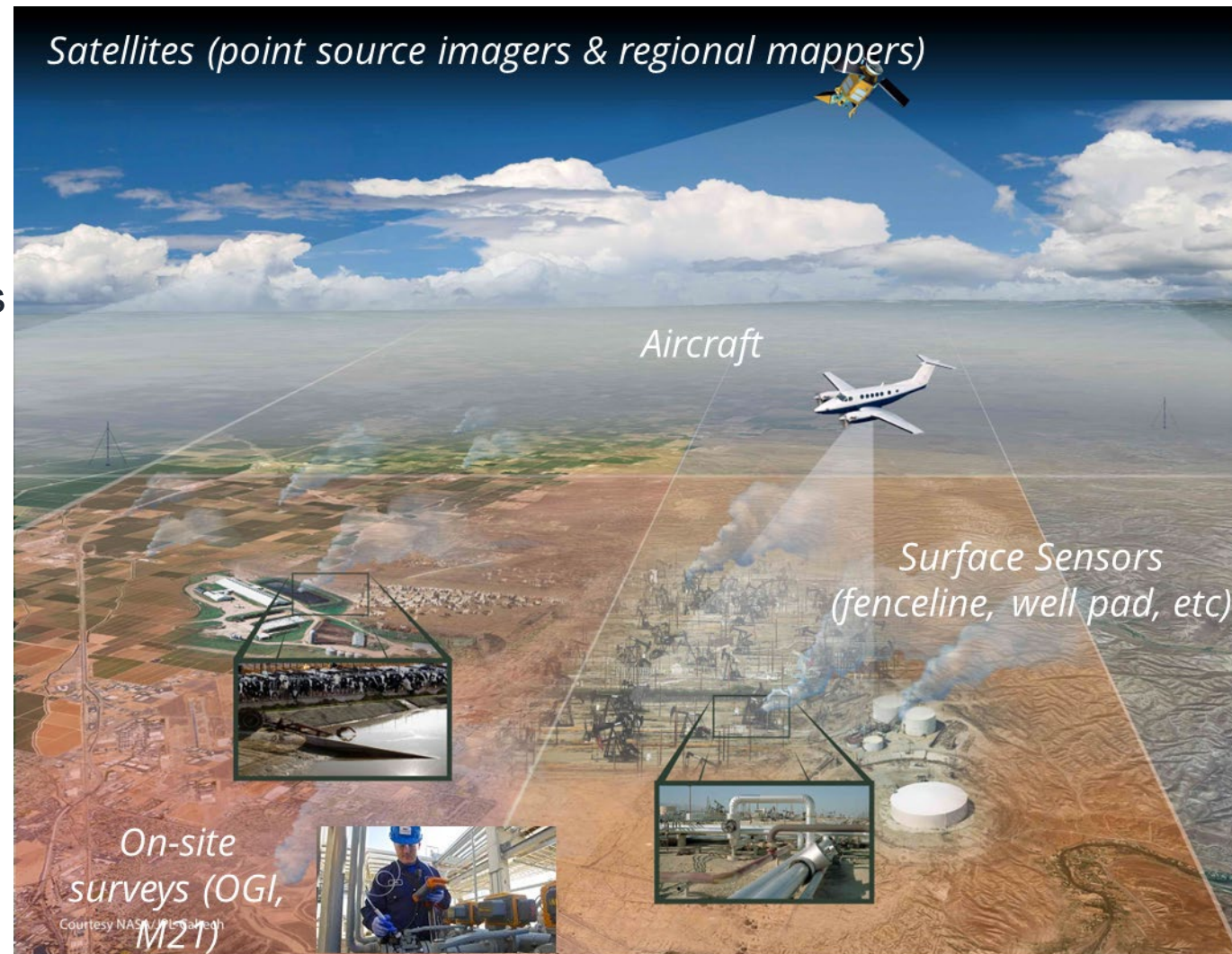


Mackenzie Huffman
Director of Strategy and Partnerships
Carbon Mapper

Emerging System of Systems for Monitoring

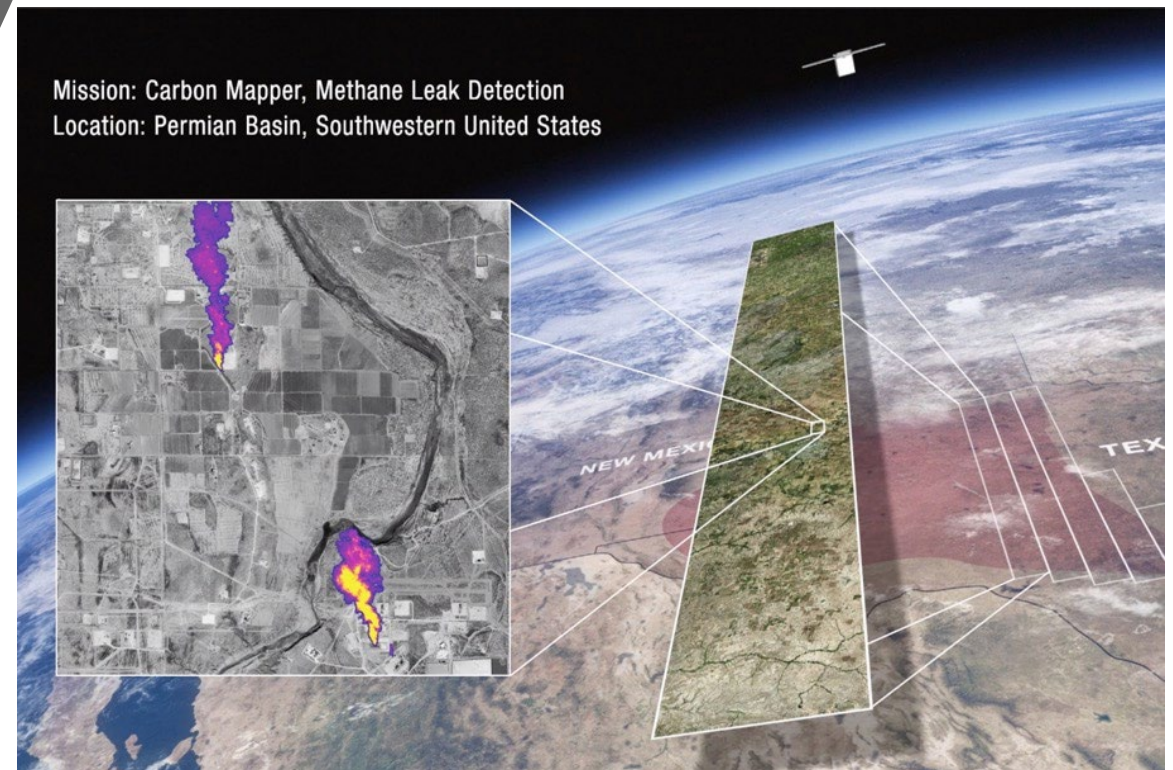
No single system can measure all methane emissions; need a portfolio of methods

- Two Main Types of Monitoring
 - Type 1: aggregate accounting, inventories
 - Type 2: direct mitigation guidance
- Rapid technological progress
 - Diverse actors
- Key gaps
 - Timeliness (latency)
 - Completeness (space, time)
 - Data transparency/trust
 - Stakeholder awareness, capacity
 - Finance (scale-up and sustain)



What is Carbon Mapper?

- Carbon Mapper the non-profit: public good mission to deliver actionable, localized CH₄ and CO₂ data
- Carbon Mapper leads a public-private partnership to build & use constellation
- Phase 1: Launch first 2 satellites targeting late 2023/early 2024
- Phase 2: Goal to expand full constellation with daily to bi-weekly monitoring
- Track 90% of high emitting CH₄ & CO₂ point sources globally
- All CH₄ & CO₂ data publicly available

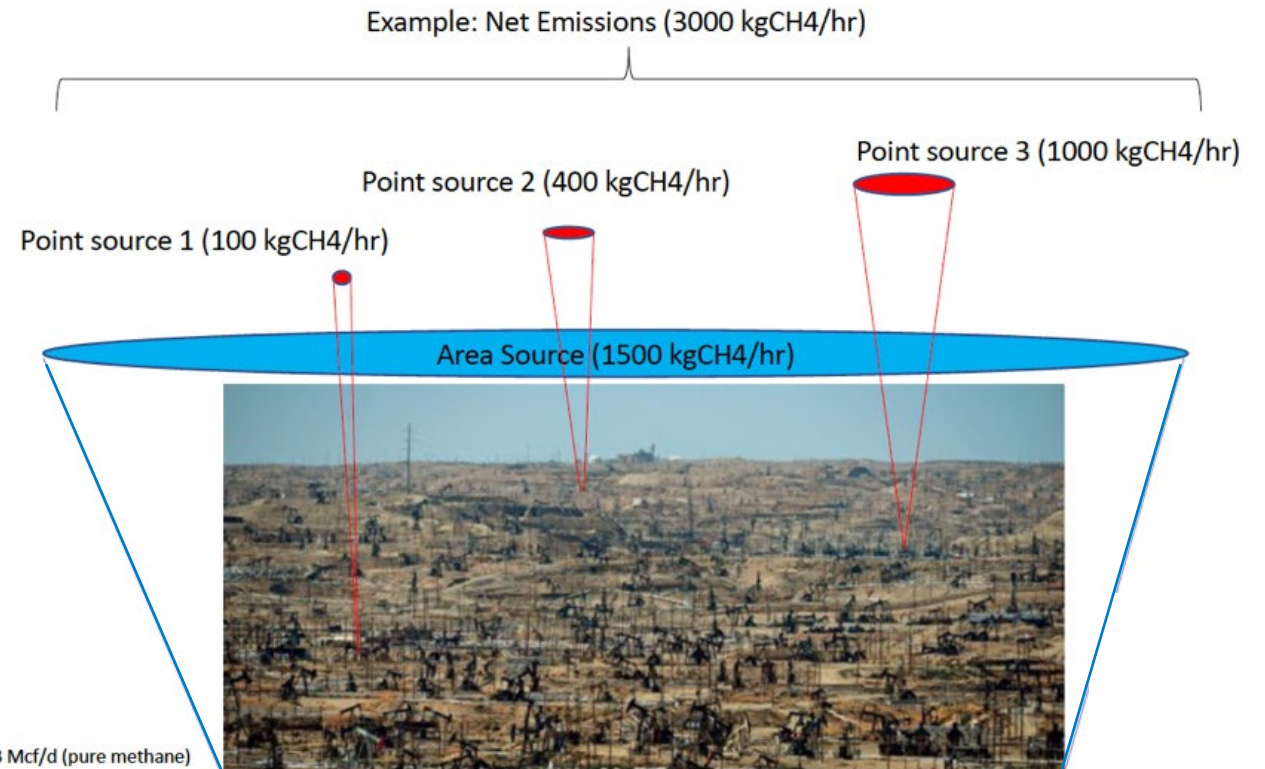
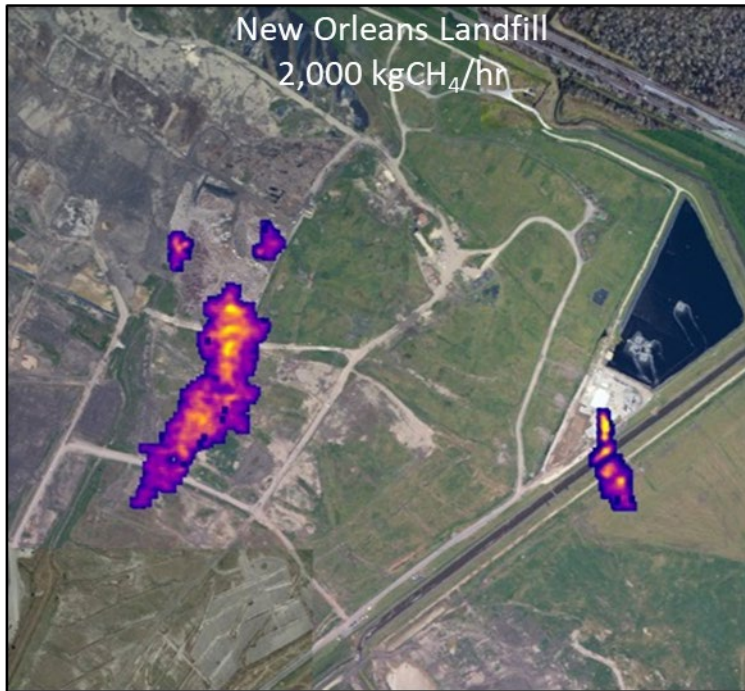


Why address high emission point sources?

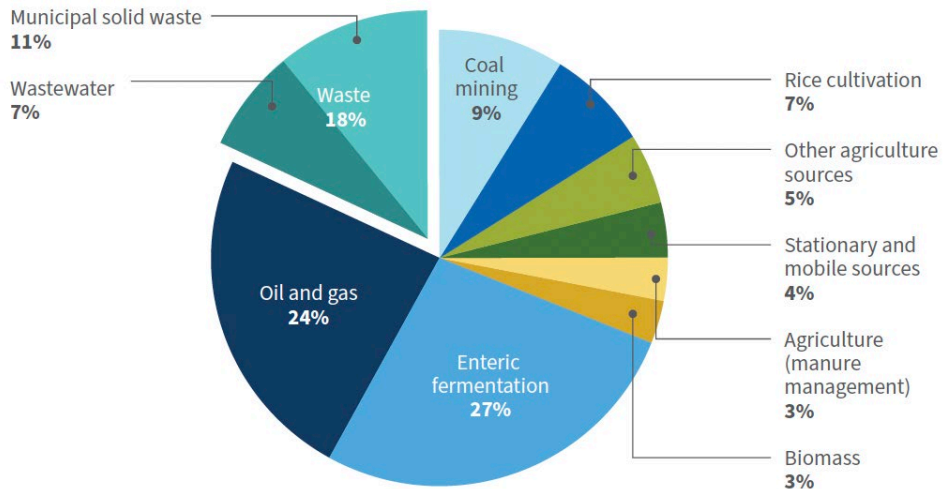
High emissions methane sources can **contribute between 20-60% of regional emissions**

These high emission events occur **especially oil and gas, agriculture and waste management**

Focusing on methane can also **address climate, environmental justice, air quality and health concerns**



Methane emissions data can inform improvements and prioritize investments in the waste sector



Source: Global Methane Initiative, "Global Methane Emissions and Mitigation Opportunities," <https://www.globalmethane.org/documents/gmi-mitigation-factsheet.pdf>

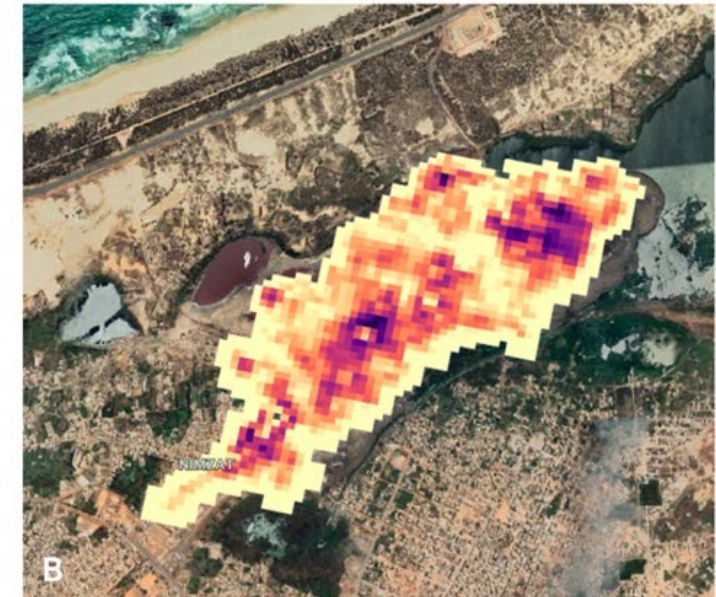
Waste sites emit large amounts of methane and are located all over the world.

There is limited information about these sites and about the root causes of these emissions.

Pirana, India



Dakar, Senegal



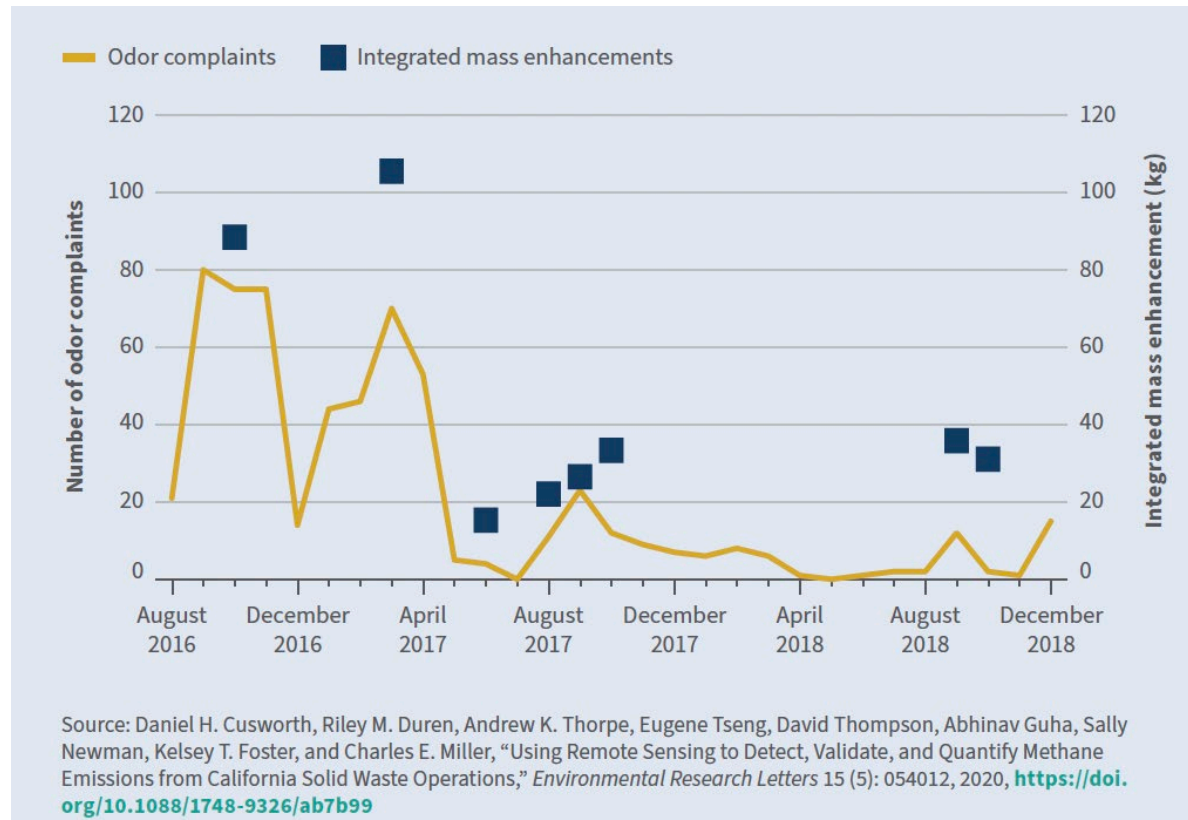
Methane concentration (ppm-m)

A vertical color scale legend for methane concentration in ppm-m. The scale ranges from 0 (yellow) to 3000 (dark purple), with intermediate markers at 500, 1000, 1500, 2000, and 2500.

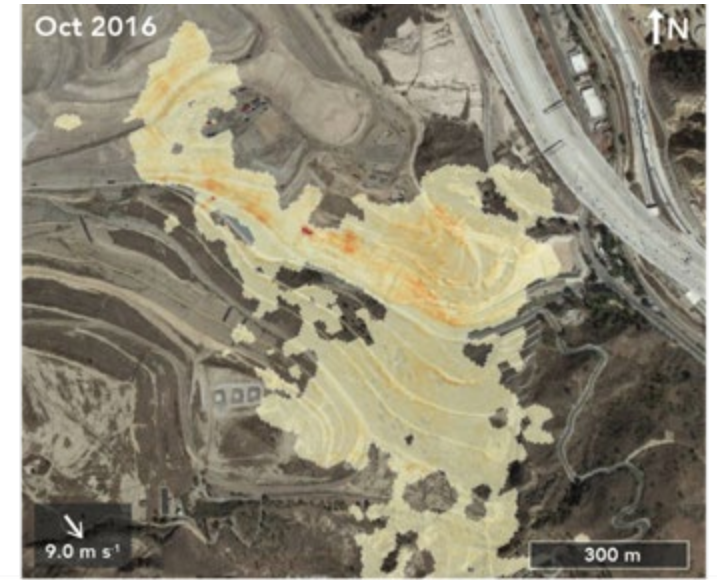


Case Study: Sunshine Canyon

Pilot studies have shown that, in collaboration with operators, emissions monitoring can be used to identify root causes of methane emissions and validate improvements to infrastructure.



Before



After



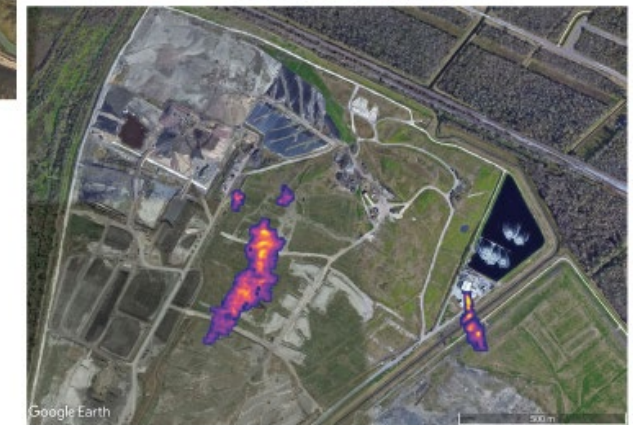
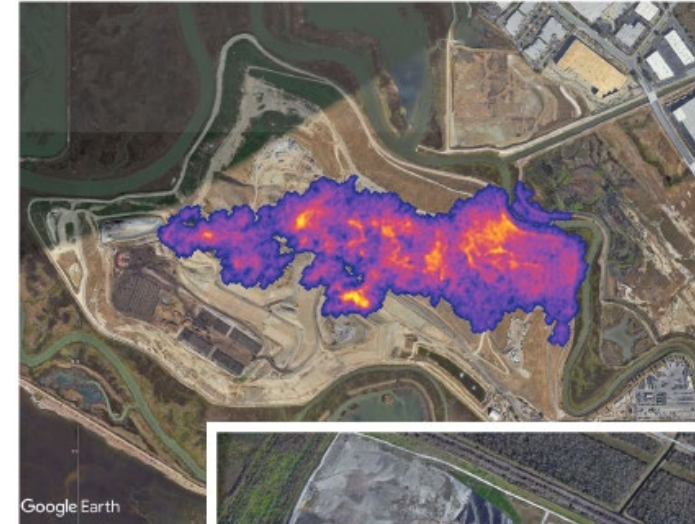
Making the invisible visible drives mitigation action

Carbon Mapper's waste methane initiative will use remote sensing to assess thousands of high-emitting solid waste sites and work with partners to get that data to guide action

Deliver a global baseline of high-emitting solid waste sector sites

Fill gaps in societal and scientific understanding of methane emission from solid waste sites

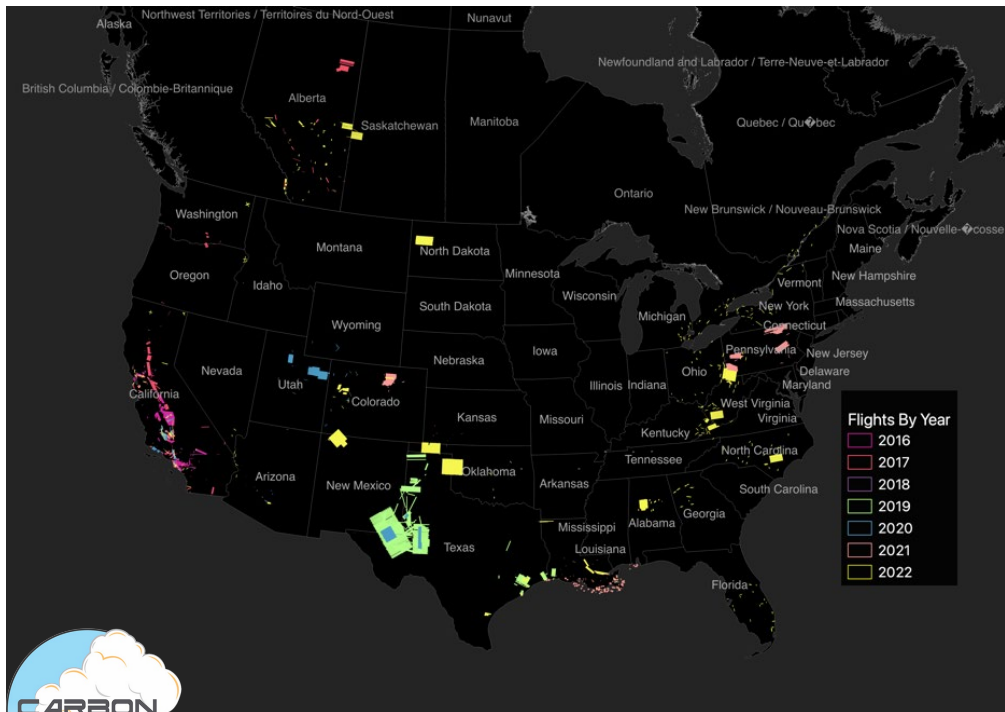
Inform regulations, operational monitoring, investment priorities, and collaboration



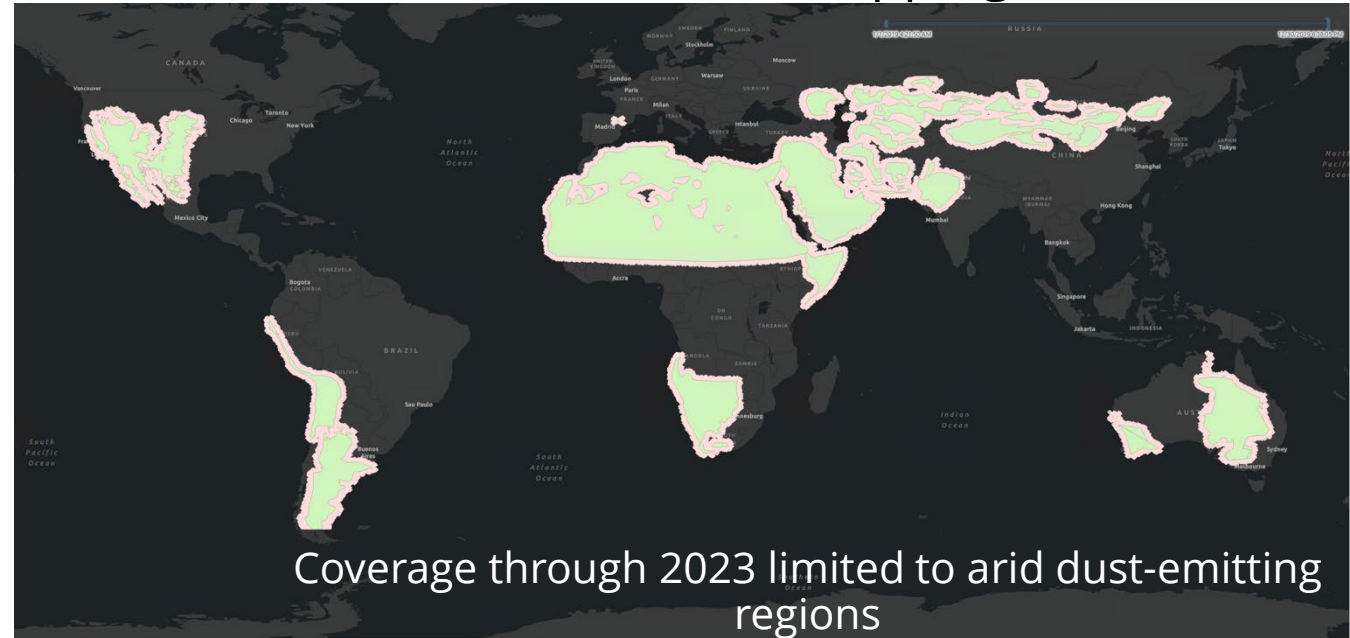
Our Observational Approach

Improving satellite detection capabilities will enable identification of persistent high-emission landfills globally

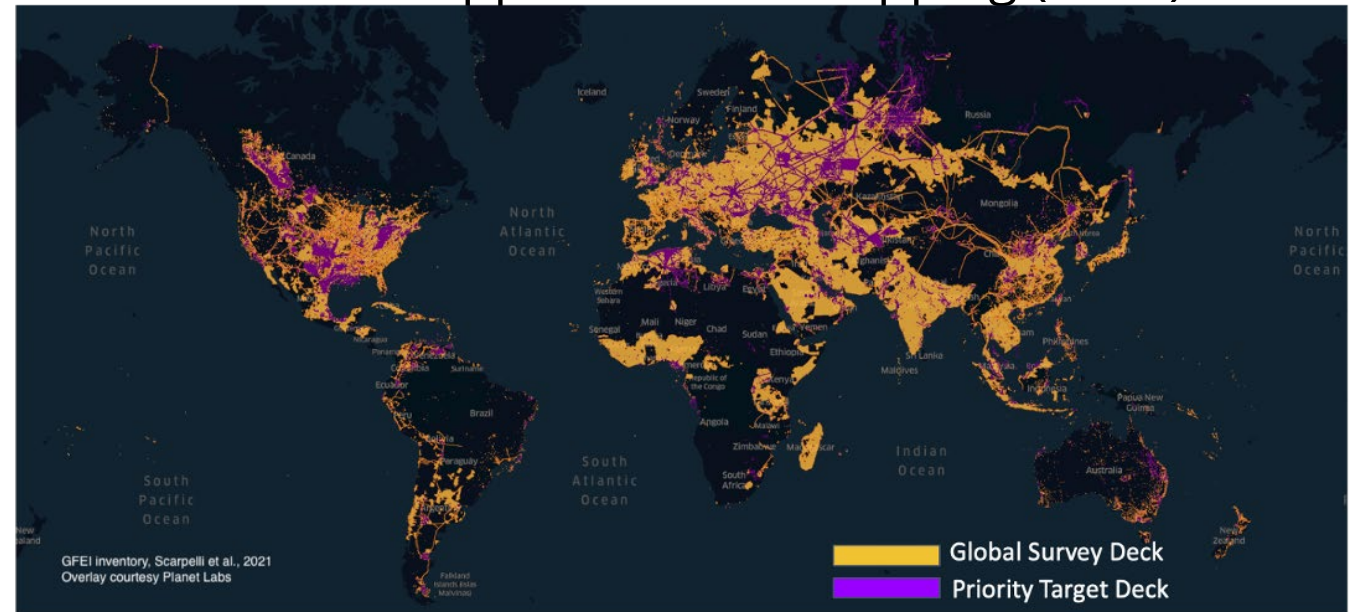
Regional aerial surveys



NASA EMIT satellite mapping (2023)



Carbon Mapper satellite mapping (2024)



Thank You!

Mackenzie Huffman

Director of Strategy and Partnerships

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Key Takeaways



- **GMI's MRV Handbook and MRV Resource Center** offer guidance for measuring methane emission in the biogas sectors
- **Waste MAP** highlights waste methane emissions, reduction opportunities, and best practices to provide a clear pathway toward achieving the Global Methane Pledge
- **Satellite detection capabilities** will enable the identification of persistent high-emission landfills globally
- **Please stay tuned** for the next webinar in the series, which will explore MRV best practices and case studies

Q&A Session



Enter your questions in the Q&A box!

Thank You!



Klara Zimmerman

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The slide deck and webinar recording will be made available on GMI's website.