Global Methane Hub

PONTIFICIA UNIVERSIDAD CATÓLICA DE VALPARAÍSO

NBC Núcleo Biotecnología Curauma

Methane Emission Monitoring in Landfills: A Practical Approach

Rolando Chamy, Director of Núcleo Biotecnología Curauma

The Challenge

Methane in Heterogeneous Landfills

Landfills are dynamic and heterogeneous systems where methane generation and release vary significantly across space and time.
Emissions depend on:

- Waste composition and organic content
- Moisture and degradation conditions
- Operational practices (covering, compaction, gas capture)
- Climatic factors (temperature, wind, drought periods)

The Challenge

Methane in Heterogeneous Landfills

In many countries, methane emissions are primarily estimated using indirect approaches based on emission factors and modeling assumptions.

However, direct measurements show strong spatial variability, revealing hotspots that models alone cannot capture.

How do we move from estimation to actionable mitigation?

Current Approaches

to Estimating and Measuring Methane

Indirect Emissions Methods

Widely used for national inventories and policy design:

- IPCC emission factors
- Waste generation and composition models
- Life Cycle Assessment tools

Current methodologies (ACM0001, AMS-III.G) and IPCC Guidelines assume a **default methane oxidation factor of 10%** for landfill covers.

In practice, this can vary between <5% in compacted mineral soils and 40% in engineered bio-covers.

Current Approaches

to Estimating and Measuring Methane

Direct Surface Measurements

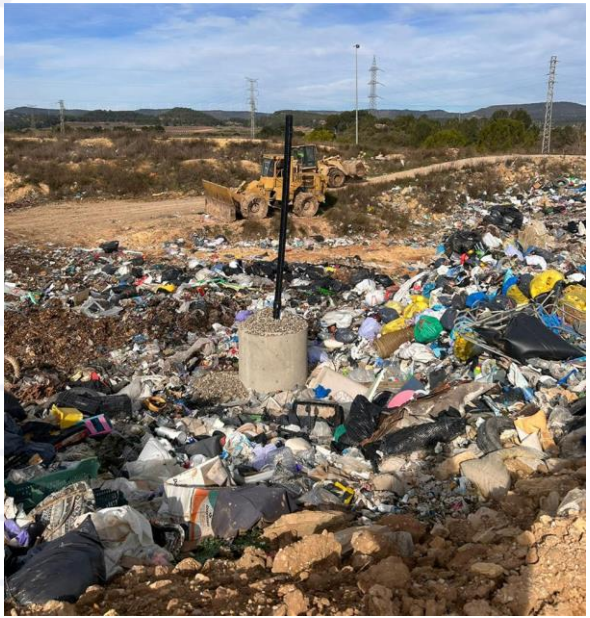
- Flux chambers
- Point-based methane concentration measurements
- On-site monitoring campaigns

Remote and Aerial Techniques

- UAV-based systems (drone-based monitoring platforms equipped with methane sensors)
- Satellite & Airborne Platforms (High-resolution plume detection, Spatial hotspot mapping)

Our Project

Determining GHG Reductions in Landfills Without Biogas Flaring



Through our new Global Methane Hub project, we are developing and validating a methodology to quantify greenhouse gas reductions in landfills that do not rely on biogas flaring systems.

Many landfills in developing regions:

- Do not have active gas capture or flaring systems
- Implement operational improvements without formal accounting frameworks

Our Project

Core Methodological Approach

We aim to quantify methane reductions generated through:

- Improved cover management (biocovers)
- Enhanced methane oxidation in soils
- Operational optimization
- Waste diversion strategies

The methodology integrates:

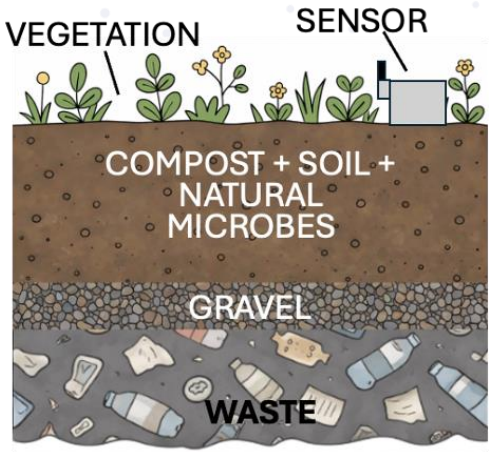
- Baseline emission estimation
- Targeted field measurements
- Oxidation assessment
- Scenario-based modeling of net GHG reduction

Strategic partners:

Our Project

Core Methodological Approach

StratX



Biocovers: are layers of soil, compost, and gravel that use naturally occurring microbes to destroy methane, and reduce odors, fires, and runoff.

- **Immediate methane reduction** without installing gas collection infrastructure
- **Improved community health** through reduced fires and odors, and improved water quality
- **No capital costs for installation**
- **New shared revenue stream** from verified carbon credits
- **Low-impact installation** with no disruption to ongoing landfill operations
- **Reduced operating costs** through lower litter, runoff, and fire management needs

Why this matter

- Most landfills in Latin America do not flare biogas.
- Mitigation actions exist but are rarely quantified.
- Credible accounting is essential for climate finance and policy

To accelerate climate action in waste management, we **must develop reliable methodologies that recognize and quantify methane reductions** even in landfills without advanced gas capture infrastructure.

Global Methane Hub

PONTIFICIA UNIVERSIDAD CATÓLICA DE VALPARAÍSO

NBC Núcleo Biotecnología Curauma

Methane Emission Monitoring in Landfills: A Practical Approach

Rolando Chamy, Director of Núcleo Biotecnología Curauma

PONTIFICIA UNIVERSIDAD CATÓLICA DE VALPARAÍSO

NBC
Núcleo Biotecnología Curauma








@nbcpucv /Núcleo Biotecnología Curauma

www.nbcpucv.cl