

STAKEHOLDER CONSULTATION WORKSHOP ON
**GHG EMISSIONS IN
MUNICIPAL SOLID WASTE:**

A Way Forward



1. INTRODUCTION

The Stakeholder Consultation Workshop on "GHG Emissions in Municipal Solid Waste," hosted by Waste Warriors Society in collaboration with the TERI School of Advanced Studies, brought together stakeholders to discuss methodologies for calculating GHG emissions in India. Despite being a major contributor to emissions, municipal solid waste lacks a standardized framework for assessment. This workshop sought to address this gap by fostering collaboration and identifying actionable solutions.

Discussions emphasized the importance of creating a narrative around solid waste management and climate change, focusing on why reporting GHG emissions is crucial. The absence of a universally accepted framework, especially for grassroots organizations, hampers efforts to tackle these emissions. Stakeholders acknowledged the need for collaboration and standardization to build a unified approach.

Critical challenges included:

- **Reporting Complexity:** The availability of numerous tools creates confusion and increases the burden of GHG emissions reporting.
- **Grassroots Challenges:** Organisations face difficulties due to non availability of methodologies tailored to their specific interventions, exclusion of informal waste workers interventions and lack of local governance of solid waste management in rural areas.
- **Low-Value Plastic (~40%):** High transportation costs and lack of market value make solid waste management projects economically non-viable.

By highlighting the true cost of externalities like low-value plastic sachet waste, participants emphasized the need for reliable data to secure funding and create awareness. Collaboration with research institutions and leveraging the expertise of research organizations like TERI SAS were identified as key steps in bridging existing gaps.

2. KEY CHALLENGES IDENTIFIED: WASTE SECTOR GHG ACCOUNTING & REPORTING

Data Gaps & Inconsistencies

- Lack of standardized, robust data collection methods.
- Inconsistent waste generation estimates and missing characterization data.
- Non-availability of granular data on waste sources and variations.

Methodological & Contextual Limitations

- Over reliance on IPCC guidelines due to the absence of India-specific emission factors.
- Limited integration of the Global South/Indian context in existing methodologies.
- Excessive focus on landfill emissions, neglecting other components of the waste value chain.

Challenges in Informal Sector & Community-Level Accounting

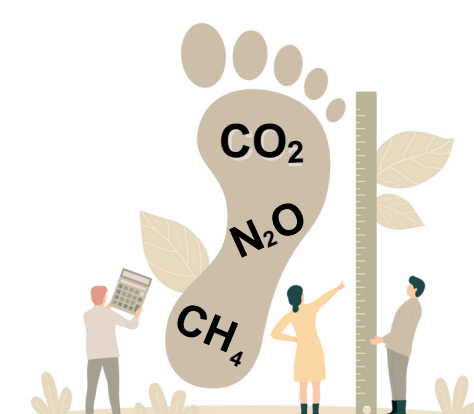
- Difficulty in accounting for emissions from informal recycling activities.
- Limited use and awareness of community-scale tools (e.g. Global Protocol for community (GPC) based on IPCC guidelines).

Lack of Policy Integration & Monitoring

- Municipal solid waste is often addressed indirectly in Nationally Determined Contributions (NDCs), mainly through energy-related emissions, rather than as a standalone priority.
- Minimal reporting and poor monitoring of emissions from sanitary landfills, open dumps and legacy waste sites.

Policy & Governance Gaps

- Insufficient Guidelines & Integration – Lack of clear government directives on waste-related GHG emissions accounting.
- Non availability of robust Data & Governance Systems – Absence of integrated frameworks for data collection and reporting.
- Unaccounted Emissions from Open Burning – Significant but poorly monitored contributor to GHG emissions.
- Poor Traceability in the Waste Supply Chain – Limited tracking of waste flows, leading to inefficiencies in reporting and mitigation strategies.



Technical Gaps & Capacity Limitations

- Limited Technical Expertise – Inadequate capacity for accurate reporting and methodology adoption, especially at grassroots levels.
- Gaps in Waste Composition Analysis – Issues with sample size, methodology, and frequency affecting data accuracy.
- Lack of Real-Time Monitoring – Limited use of advanced technologies (e.g., RS, GIS, IoT) for real-time tracking and emission estimation.
- Uncertain Emission Estimations – Reliance on emission factors that may not be representative of Indian context.
- Absence of Context-Specific Solutions – Need for methodologies tailored to India's unique waste generation patterns and management systems.

Additional Considerations for Improvement

- Standardized Sampling Techniques – Essential for accurate in situ and ex situ GHG measurements.
- Integration of Food Waste Recovery – Strengthening its role in GHG assessments and mitigation strategies.
- Inclusion & Formalization of Informal Waste workers – Enhancing efficiency, data accuracy, and social equity.
- Capacity Building for Stakeholders – Strengthening technical knowledge and operational capabilities across all levels.

3. TAKEAWAYS FROM STAKEHOLDER INSIGHTS

Tool Validation & Adaptation

- Need for Contextual Validation – Tools like WARM, SWEET, and EQT have potential but require adaptation to India's waste composition, management practices, and emission factors.
- Need for Stakeholder Consultations – Essential for refining and localizing methodologies to ensure practical applicability.

Sector-Specific Observations

- Urgency in Methane Mitigation – Landfill gas management and methane reduction strategies need immediate focus.
- Decentralized Approaches Over Centralized Systems – Greater emphasis on community-driven waste solutions rather than reliance on landfills and Waste-to-Energy (WtE) plants.

Grassroots Contributions & Social Equity

- Critical Role of Informal Waste workers – Their integration into formal systems can improve efficiency and data accuracy.
- Livelihood & Social Security – Formalizing the sector must prioritize the well-being, rights, and financial stability of informal waste workers.

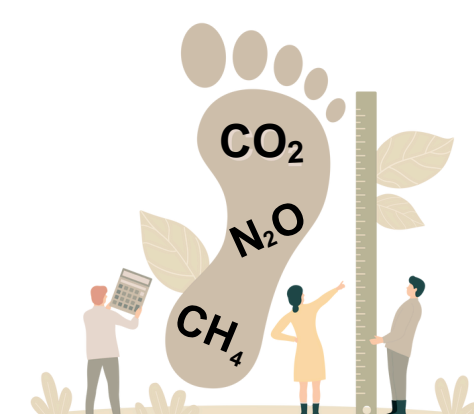
4. ACTIONABLE ROADMAP FOR WASTE SECTOR GHG ACCOUNTING & MANAGEMENT

A. Short-Term Actions (Immediate Implementation)

- Leverage Existing Tools – Utilize easy-to-use, accessible and open source tools like WARM for initiating basic GHG reporting.
- Capacity Building – Conduct training workshops for Urban Local Bodies (ULBs) and waste workers to enhance technical expertise.
- Policy Advocacy & Awareness – Increase awareness among policymakers about the significance of GHG emissions in solid waste management.

B. Long-Term Goals (Sustainable & Systemic Improvements)

- Develop India-Specific Methodologies – Establish standardized emission factors and context-relevant frameworks for accurate reporting.
- Integrate Advanced Technology – Utilize RS, GIS, and IoT for real-time monitoring and data-driven decision-making.
- Strengthen Cross-Sector Collaboration – Build a unified platform to consolidate efforts, foster partnerships, and enhance knowledge-sharing.



5. COLLABORATION OPPORTUNITIES

- Strengthen partnerships between grassroots organizations, academic institutions, policymakers and technology partners for tool development as a key action.
- Integrate informal waste workers into formal systems to address social equity and efficiency.
- Develop knowledge-sharing forums and initiate regular check-ins with ecosystem stakeholders.
- Secure funding for pilot projects and innovative approaches in municipal solid waste management emission reporting.

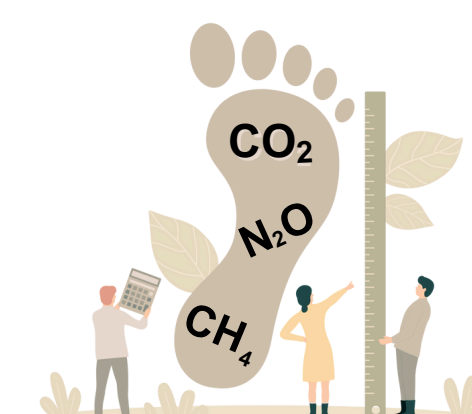
The following is collaboration matrix outcome from the workshop:

Category	Support Needed – Who Needs Help? (Count)	Support Offered – Who Can Help? (Count)	Key Observations
Data & Research	TERI SAS, IIT-B, CSE, WRI, Hasirudala, CSTEP, Everain Global, NEERI, GIZ, EES, Global Green Envirosystems, Everain Global Services Pvt. Ltd. (13)	UN Climate Team, ICLEI, Waste Warriors, Saahas, vRecycle, Global Green, Hasirudala, BORDA South Asia, Thanal Trust (9)	High demand for standardized data collection and validation
Methodology & Tools	Saahas Zero Waste, CEED, BORDA South Asia, Thanal Trust, vRecycle, CAG, CSE, CEEW, Waste Warriors Society (9)	IIT-B, ICLEI, CSTEP, Everain Global, WRI (5)	Need for refining GHG emissions tools for India
Funding, Policy & Governance	GIZ, Saahas Zero Waste, Global Green Envirosystems, CSTEP, Everain Global Services Pvt. Ltd. (5)	CSTEP, CAG, GIZ (3)	Limited policy advocacy in the waste-GHG sector
Capacity Building / Training	Waste Warriors, Saahas, Thanal, Hasirudala (4)	NEERI, ICLEI, EDF, Gangotree, EES, GAIA, UN High-Level Climate Change Team, Global Green Envirosystems, Saahas Zero Waste, CSE, CEEW, BORDA South Asia, EDF (Climate Corps) (13)	Strong interest in training waste sector workers, including employees of grassroots organizations.
Technology & Innovation	Gangotree, vRecycle, CAG, GAIA (4)	TERI SAS, IIT-B, Global Green, ICLEI, CSTEP, NEERI (6)	Equal balance—good foundation for tech adoption

Key Takeaways from Collaboration Matrix

Data Standardization is a Major Challenge

- 13 organizations need support, but only 9 are offering help.
- **Suggestion:** Collaborate with government agencies and standards bodies to develop uniform data collection and validation protocols.



Key Takeaways from Collaboration Matrix

Policy Engagement is Lacking

- 5 stakeholders need support in policy, funding, and governance, but only 3 organizations are offering help (CSTEP, CAG, GIZ).
- **Suggestion:** Actively involve policymakers and advocacy groups to strengthen this weak link.

Strong Demand for Capacity Building

- 4 organizations need support, while 13 organizations are capable of offering it.
- **Suggestion:** Leverage this surplus by scaling up training programs across cities—especially targeting municipal workers, informal sector workers and employees of grassroots organizations.

Methodology Development Needs More Collaboration

- 8 stakeholders are seeking better tools for emissions accounting, with 5 providers already working on solutions.
- **Suggestion:** Organize a co-creation workshop to align tools and methodologies specifically for India's waste-GHG context.

Tech Adoption Can Improve

- There's a healthy match: 4 organizations need technological support, and 6 can provide it.
- **Suggestion:** Use this balance to launch pilot innovation programs and document learnings to inform scale-up.

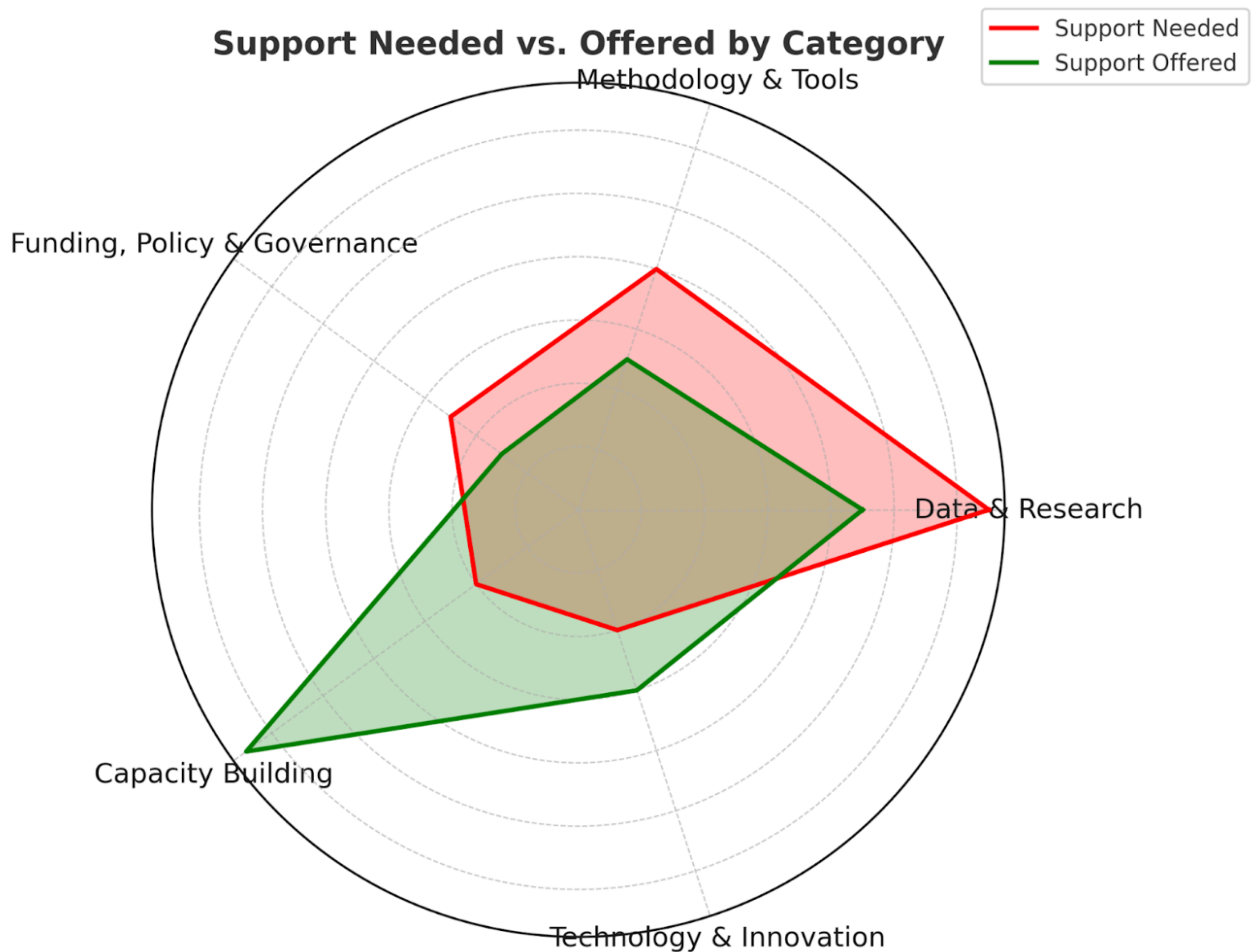
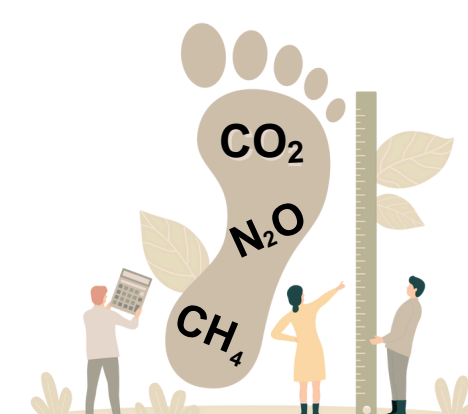


Figure 1: Support Dynamics Across Key Waste-GHG Categories: Needs vs. Offerings



6. CONCLUSION

This workshop was a crucial step in identifying the key challenges and gaps in GHG emissions accounting for municipal solid waste. While we have not yet arrived at concrete solutions, we have highlighted the urgent need for collaboration to develop context-specific tools, methodologies, and conversion factors suited to India's municipal solid waste sector.

Moving forward, it is essential that we align our efforts—academicians requiring data, grassroots organizations looking for tools, and policymakers relying on validated methodologies. The event revealed that many stakeholders are both offering and seeking support, presenting a unique opportunity for synergy. By working together, we can bridge these gaps and create practical, effective solutions for GHG emissions accounting in India.

CALL FOR COLLABORATION

We invite all stakeholders—academia, grassroots organizations, policymakers, and technology experts—to come forward and collaborate. If you need data, methodologies, or policy integration, reach out to the experts identified in this discussion. If you have expertise to offer, consider partnering with those who need support.

To move from discussion to action, we propose:

- A collaborative workshop to refine GHG emissions accounting tools.
- Strategic policy engagement to strengthen advocacy in the municipal solid waste-GHG sector.
- Capacity-building initiatives to train solid waste sector workers at the municipal level.
- Pilot projects to accelerate the adoption of innovative solid waste management technologies.

The momentum from this workshop must translate into action. We urge all stakeholders to take the next step—through direct collaboration, research contributions, or policy advocacy—to drive meaningful change in India's municipal solid waste sector.

If you're looking to collaborate, share expertise, or join ongoing initiatives, we encourage you to connect with us. Let's work together to build frameworks that are relevant, practical, and impactful.

7. ANNEXURES

- [List of Participants and Organizations](#)
- [Event Photos](#)
- [Presentations](#)
- [Feedback form](#) (In case you missed it earlier, we're resharing the feedback form. The link is embedded within the form itself. We would sincerely appreciate your reflections and feedback on the workshop.)

Contact Information

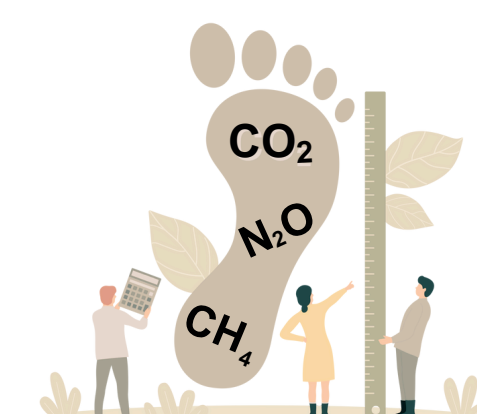
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