

# **Understanding Your Waste Stream to Develop Methane Reduction Strategies**

**May 16, 2024**

**Call in Details: 1-415-655-0002, ID 2424 134 0113**



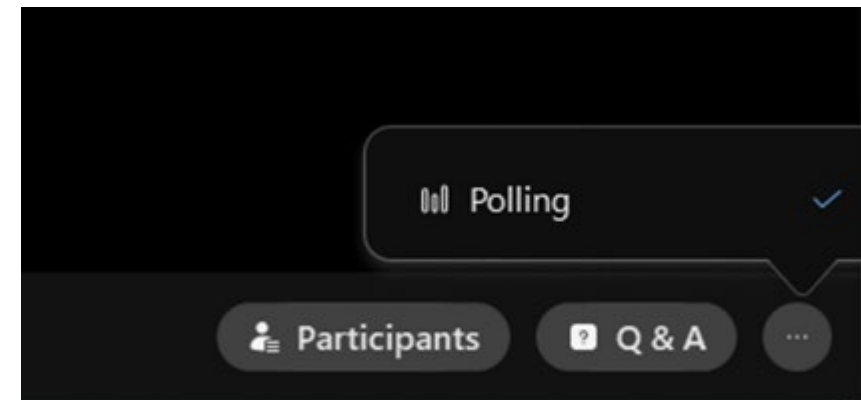
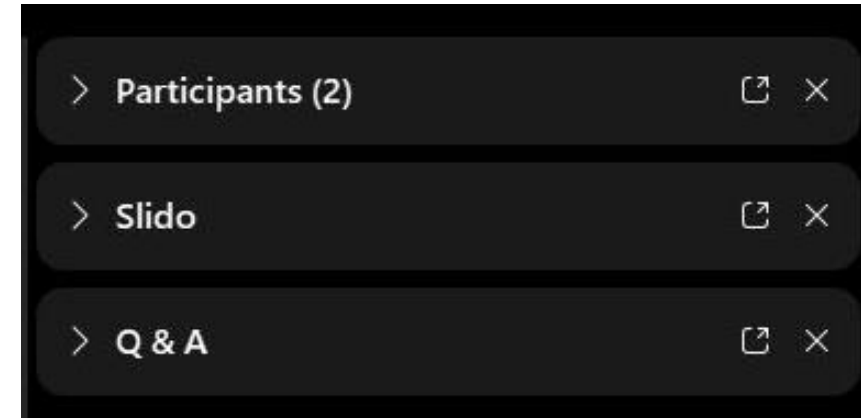
# Webinar Panels

We'll use three panels

- Participants, Slido, and question and answer (Q&A)
- Use the arrow to expand or collapse the panels

## Adding Panels

- If some panels don't appear, hover over the bottom of the screen and select the desired panels
- Select More Options (...) for additional panels
- Highlighted backgrounds indicate active panels



↑  
**Participants**

↑  
**Q&A**

↑  
**More polling options**

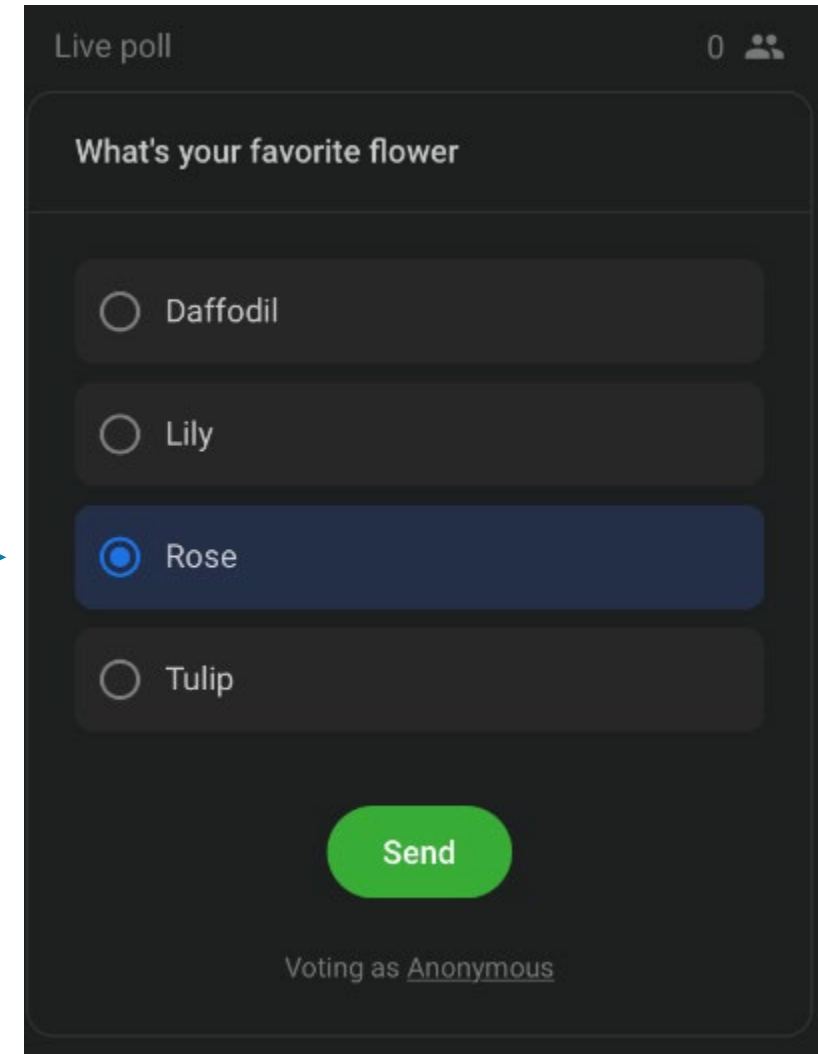
# Polling and Feedback

## Polling

- We'll ask poll questions 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

# Q&A

- Participants are muted
- Questions will be moderated at the end of the webinar
- To ask a question:
  - Select “All Panelists” from the drop-down menu
  - Enter your questions in the Q&A box
  - Hit “Send”



- Final materials will be posted to the GMI website: [www.globalmethane.org](http://www.globalmethane.org)

# Agenda

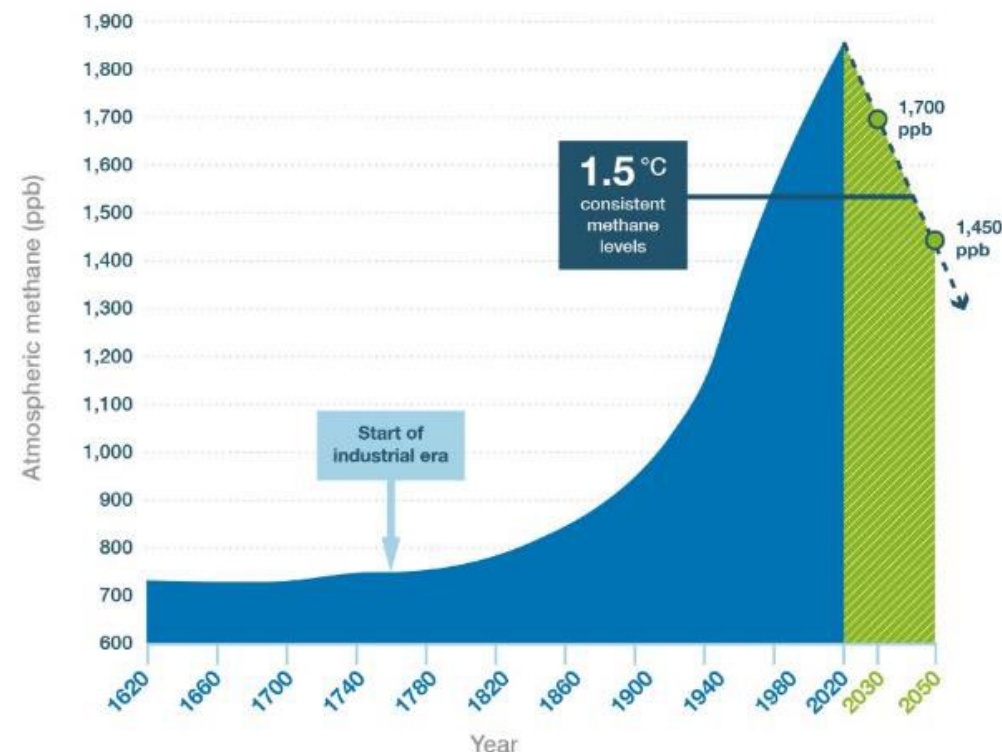
- Introduction to GMI and the Biogas Toolkit
  - Klara Zimmerman, Physical Scientist, U.S. EPA
- GMI Waste Characterization Handbook and Tool
  - Sandra Mazo-Nix, Solid Waste Management Senior Associate, Abt Global
- Waste Characterization in Canada
  - Hussein Zaki, Manager, Project Engineer, Waste Reduction and Management Division, Environment and Climate Change Canada
- Case Study in Wisconsin, United States
  - Casey Krausensky, Solid Waste Coordinator, Wisconsin Department of Natural Resources
- Questions and Answers

# **Introduction to GMI and the Biogas Toolkit**

# Why Methane?

- **Powerful greenhouse gas (GHG).** One ton of methane can trap 28-34 times more heat than one ton of carbon dioxide over a 100-year period
- **Precursor to tropospheric ozone,** an air pollutant and GHG
- **Short-lived climate pollutant** with an atmospheric lifetime of 12 years
- **Opportunity for fast climate action**
  - Cutting methane now delivers substantial, immediate climate benefits
  - Capturing and converting methane into clean energy can enhance energy security

## Global atmospheric methane



Source: Ed Dlugokencky, NOAA/ESRL

CCAC. All rights reserved

Source: UNEP and Climate and Clean Air Coalition. *Global Methane Assessment.*

# Global Methane Initiative (GMI)

- International public-private partnership focused on advancing:
  - Cost-effective, near-term methane abatement
  - Recovery and use of methane as a valuable energy source
- Provides cost-free technical support to deploy methane mitigation and methane-to-energy projects around the world
- Supports three key sectors:
  - **Biogas (municipal solid waste, agriculture, wastewater)**
  - Coal mines
  - Oil & gas



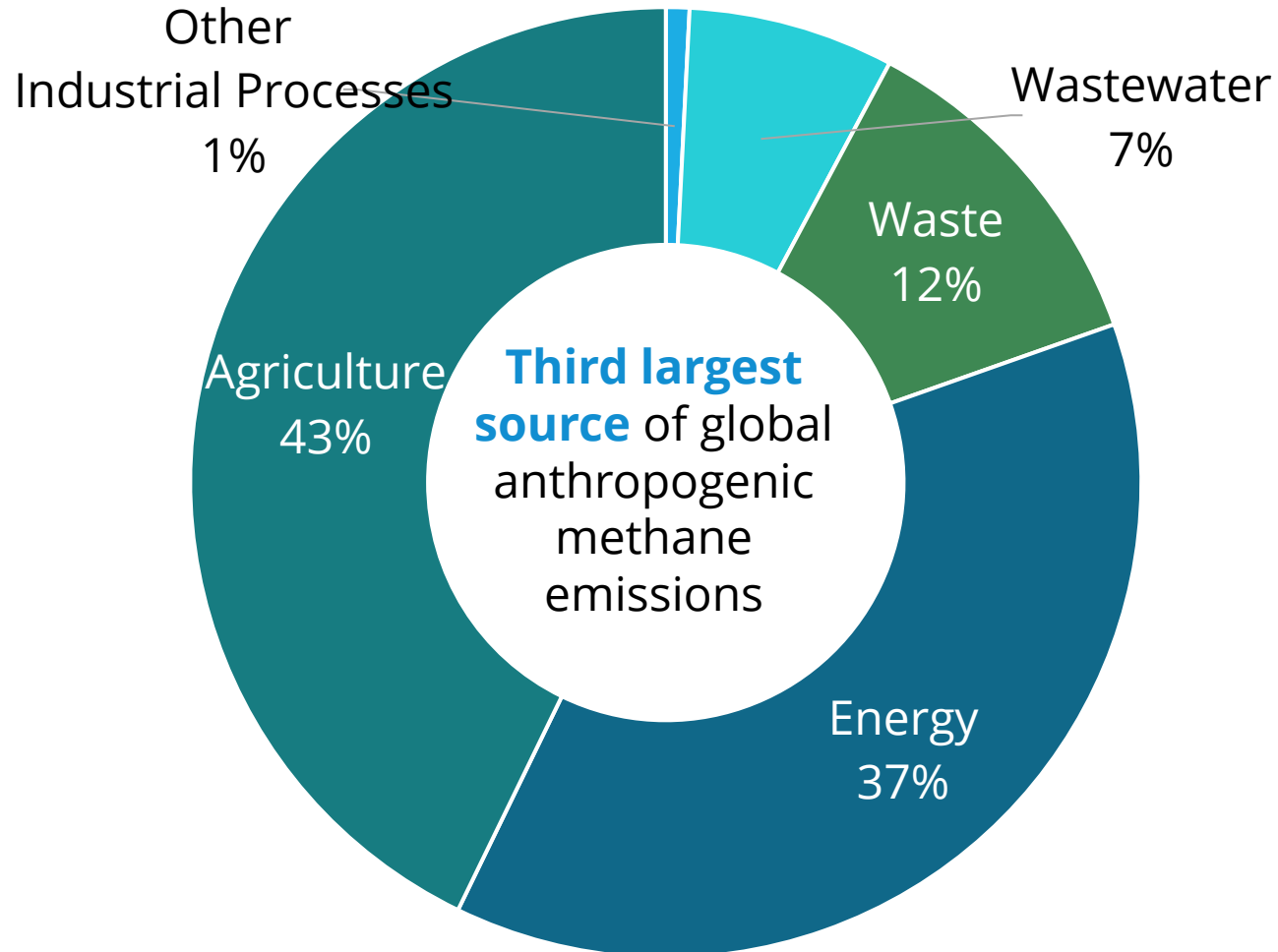
- 49 Partner Countries
- 700+ Project Network members
- Alliances with international organizations focused on methane recovery and use

GMI Partner Countries represent approximately 75% of methane emissions from human activities.





# Why Focus on the Municipal Solid Waste (MSW) Sector?



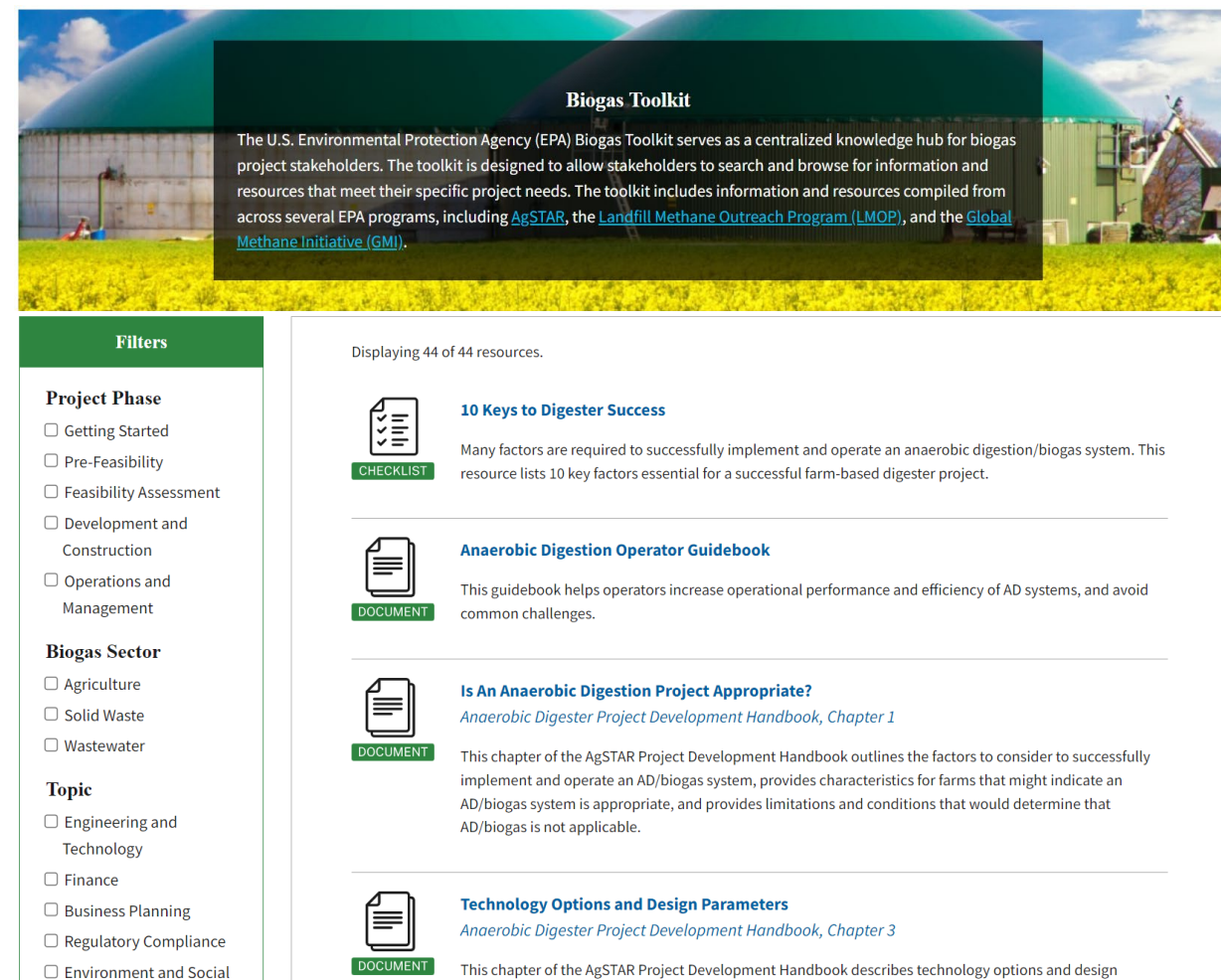
## Co-benefits of Waste Methane Mitigation

- ✓ Improved air and water quality
- ✓ Improved public health
- ✓ Increased worker safety
- ✓ Enhanced energy security
- ✓ Increased agricultural productivity
- ✓ Reduced odors

# EPA Biogas Toolkit

- A web-based toolkit with 38 tools and resources
- Cross-agency collaboration
- Roadmap for planning and implementing projects and quantifying economic and environmental impacts
- Audience: Project implementers, developers, financiers, and policymakers

<https://www.epa.gov/agstar/biogas-toolkit>



**Biogas Toolkit**

The U.S. Environmental Protection Agency (EPA) Biogas Toolkit serves as a centralized knowledge hub for biogas project stakeholders. The toolkit is designed to allow stakeholders to search and browse for information and resources that meet their specific project needs. The toolkit includes information and resources compiled from across several EPA programs, including [AgSTAR](#), the [Landfill Methane Outreach Program \(LMOP\)](#), and the [Global Methane Initiative \(GMI\)](#).

Filters

**Project Phase**

- Getting Started
- Pre-Feasibility
- Feasibility Assessment
- Development and Construction
- Operations and Management

**Biogas Sector**

- Agriculture
- Solid Waste
- Wastewater

**Topic**

- Engineering and Technology
- Finance
- Business Planning
- Regulatory Compliance
- Environment and Social

Displaying 44 of 44 resources.

**10 Keys to Digester Success**  
CHECKLIST  
Many factors are required to successfully implement and operate an anaerobic digestion/biogas system. This resource lists 10 key factors essential for a successful farm-based digester project.

**Anaerobic Digestion Operator Guidebook**  
DOCUMENT  
This guidebook helps operators increase operational performance and efficiency of AD systems, and avoid common challenges.

**Is An Anaerobic Digestion Project Appropriate?**  
DOCUMENT  
*Anaerobic Digester Project Development Handbook, Chapter 1*  
This chapter of the AgSTAR Project Development Handbook outlines the factors to consider to successfully implement and operate an AD/biogas system, provides characteristics for farms that might indicate an AD/biogas system is appropriate, and provides limitations and conditions that would determine that AD/biogas is not applicable.

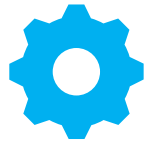
**Technology Options and Design Parameters**  
DOCUMENT  
*Anaerobic Digester Project Development Handbook, Chapter 3*  
This chapter of the AgSTAR Project Development Handbook describes technology options and design

# GMI Biogas Tools



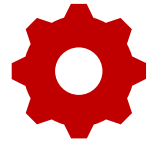
## **Solid Waste Emissions Estimation Tool (SWEET)**

Quantifies emissions of greenhouse gases and other air pollutants from the MSW sector



## **Anaerobic Digestion (AD) Screening Tool**

Estimates the quantity of biogas and digestate produced by AD systems and methane emissions reductions



## **Organics Economics (OrganEcs)**

Estimates costs, revenues, and profitability with composting and AD projects



## **Landfill Gas (LFG) Screening Tool**

Estimates LFG recovery rate and provides potential project type and size

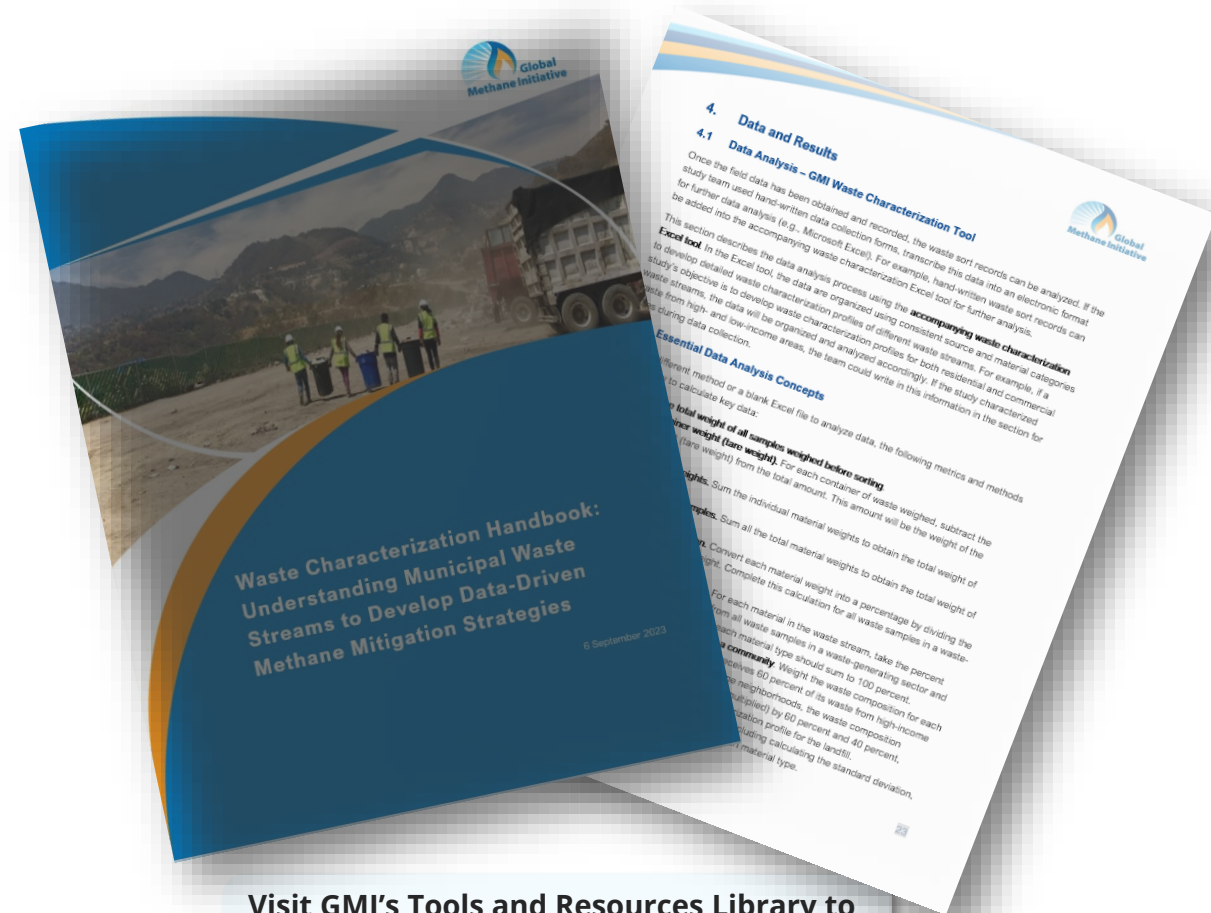


## **Waste Characterization Tool**

Calculates and analyzes waste characterization study data by material types

# Waste Characterization Handbook & Excel Tool

- **Handbook** for planning and conducting waste characterization studies
  - Resources for study design, field activities, data collection, and analysis for solid waste programs
- **Excel-based tool** that streamlines data entry and analyzes the composition of waste streams
  - Designed for field use
  - Analyzes material types and amounts



Visit GMI's Tools and Resources Library to download the Handbook and tool:

<https://www.globalmethane.org/resources>

# Gurugram, India

## Background

- Gurugram needed waste data to plan appropriate treatment facilities
- 5-day study sorting 30 samples into six broad materials categories

## Results

- 32% organic waste by weight
- Demonstrates need for organics treatment rather than recycling plants or incineration facilities



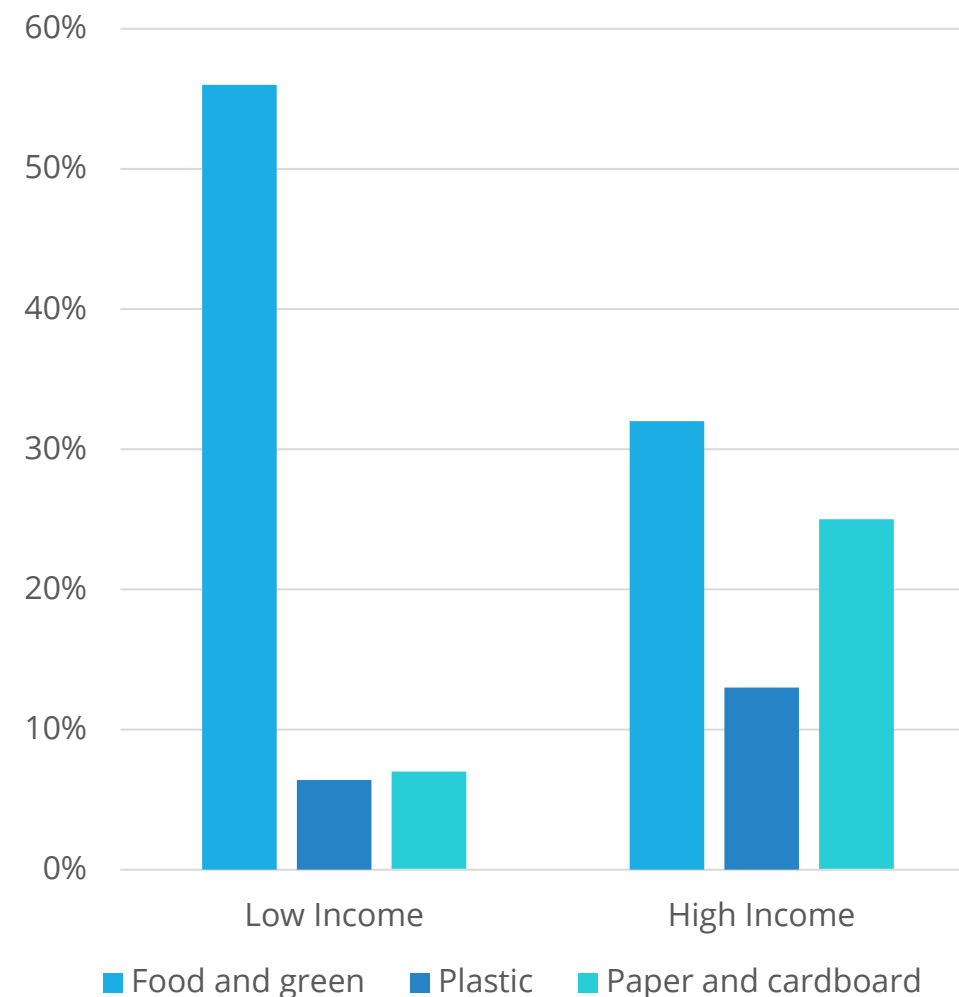
# **Waste Characterization Handbook & Excel Tool**

# Poll Questions

- What is your primary industry/field of work:
  - Waste facility operator or employee (landfill, composting, recycling, incinerator, transfer station, hauler)
  - Municipal employee
  - State employee
  - Federal employee
  - Academic/ researcher/ NGO
  
- Rate your current knowledge of waste characterization studies (1-5)
  - 1 = no knowledge, 5 = expert knowledge

# Municipal Solid Waste (MSW)

- MSW can vary significantly by country, region, and local demographics
- Effective MSW treatment strategies can mitigate methane emissions from organic waste
- Accurate and current local data is needed
- Waste characterization studies provide high-quality waste stream data



Source: Kaza et al., 2018



# Waste Characterization Studies

- Identifies the **specific types of materials** in a waste stream
- Samples, weighs, and sorts MSW according to material and product type to calculate the material proportion
- Can range in scope and duration from one facility at one time or may include multiple sites/locations over multiple seasons.

# Applications for Waste Characterization Data

- Establishing baseline waste management conditions
- Developing reduction and diversion strategies
- Selecting appropriate technologies
- Understanding contamination
- Evaluating and improving programs



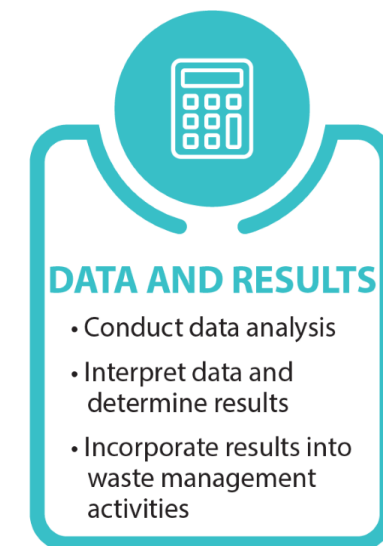
# Waste Characterization Studies - Types

- Waste generation vs collected
  - Generation: Households, industry, commerce, institutions
  - Waste collection sites: Transfer stations, landfills, incineration plants, treatment facilities (e.g., composting, anaerobic digestion), other (e.g., beaches, waterways, mangroves).
- Materials: Organics, plastics (e.g., packaging, single-use), contaminants
- Product brands



# Waste Characterization Handbook & Excel Tool

- The **Handbook** includes recommended activities and resources to:
  - Plan an appropriate study for specific site conditions
  - Conduct field activities to collect the data
  - Analyze the data to help make informed solid waste planning decisions
  
- **Excel-based tool** that streamlines data entry and analyzes the composition of waste streams
  - Designed for field use
  - Analyzes material types and amounts



Visit GMI's Tools and Resources Library to download the Handbook and tool:  
<https://www.globalmethane.org/resources>



# Overview of the Excel Tool

## Waste Characterization Planning and Data Tool

April 2024

Developed by U.S. Environmental Protection Agency

Tool Support: [biogastoolkit@epa.gov](mailto:biogastoolkit@epa.gov).



### Tab

Definitions

Site and Staff Requirements

Supplies

Tare Weights

Sampling Plan & Pre-Sort Weight

Record Sort Data

Data Analysis





# View Results Using the Excel Tool

Table. 1 Waste Weight (kg) and Composition by Waste Type								
Waste Type	Weight (Day 1)	Weight (Day 2)	Weight (Day 3)	Weight (Day 4)	Weight (Day 5)	Total (All Days)	% Composition (All Days)	
Organics	365	231	252	253	254	1,355.0	13%	
Paper	54	36	46	46	46	228.0	2%	
PlasticsDense	104	68	93	93	93	451.0	4%	
PlasticsFilms	16	11	11	16	26	80.0	1%	
Metals	662	617	642	603	603	3,127.0	31%	
Glass	421.5	376.5	401.5	401.5	401.5	2,002.5	20%	
Textiles	55	46	51	51	90	293.0	3%	
Wood	7	3	3	42	3	58.0	1%	
Others	0	13	0	0	0	13.0	0%	
Electronics	99	180	290	95	1594	2,258.0	22%	
Hazardous	73	64	69	69	71	346.0	3%	
<b>Total</b>	<b>1,856.5</b>	<b>1,645.5</b>	<b>1,858.5</b>	<b>1,669.5</b>	<b>3,181.5</b>	<b>10,211.5</b>	<b>100%</b>	

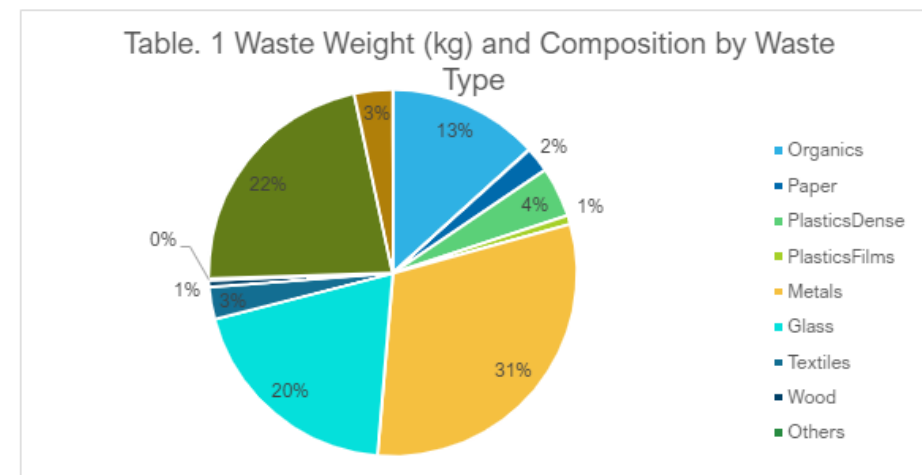
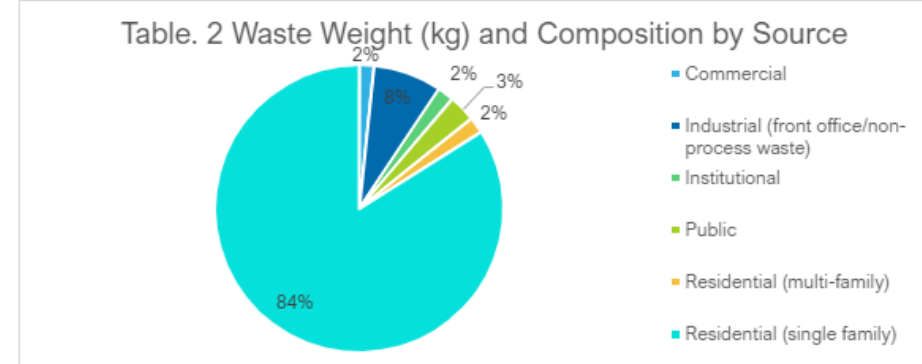
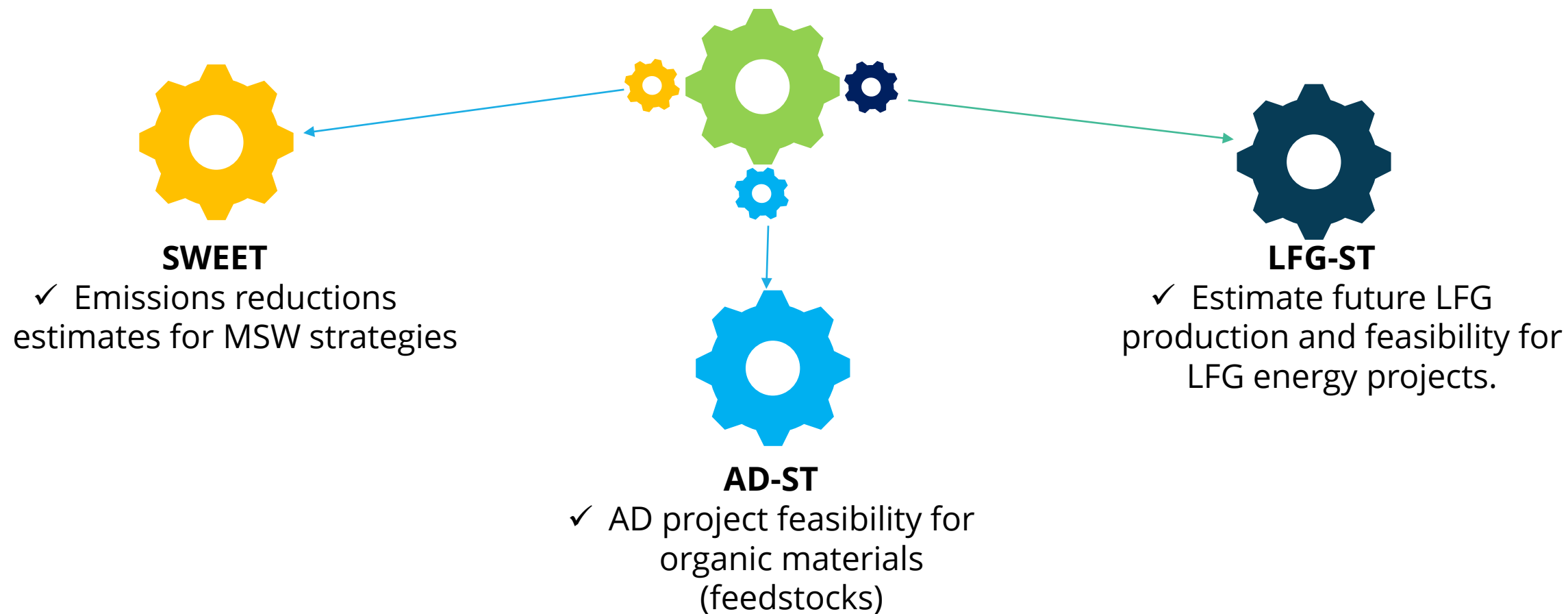


Table. 2 Waste Weight (kg) and Composition by Source								
Source	Weight (Day 1)	Weight (Day 2)	Weight (Day 3)	Weight (Day 4)	Weight (Day 5)	Total (All Days)	% Composition (All Days)	
Commercial	55.0	50.0	0.0	0.0	63.0	168.0	2%	
Industrial (front	180.0	470.5	69.0	3.0	62.0	784.5	8%	
Institutional	54.0	0.0	39.0	95.5	2.0	190.5	2%	
Public	57.0	0.0	243.0	0.0	7.0	307.0	3%	
Residential (multi-family)	73.0	0.0	0.0	115.0	0.0	188.0	2%	
Residential (single family)	1,437.5	1,125.0	1,507.5	1,456.0	3,047.5	8,573.5	84%	
<b>Total</b>	<b>1,856.5</b>	<b>1,645.5</b>	<b>1,858.5</b>	<b>1,669.5</b>	<b>3,181.5</b>	<b>10,211.5</b>	<b>100%</b>	



# Using Study Data with Other GMI Resources

## Waste Characterization Tool



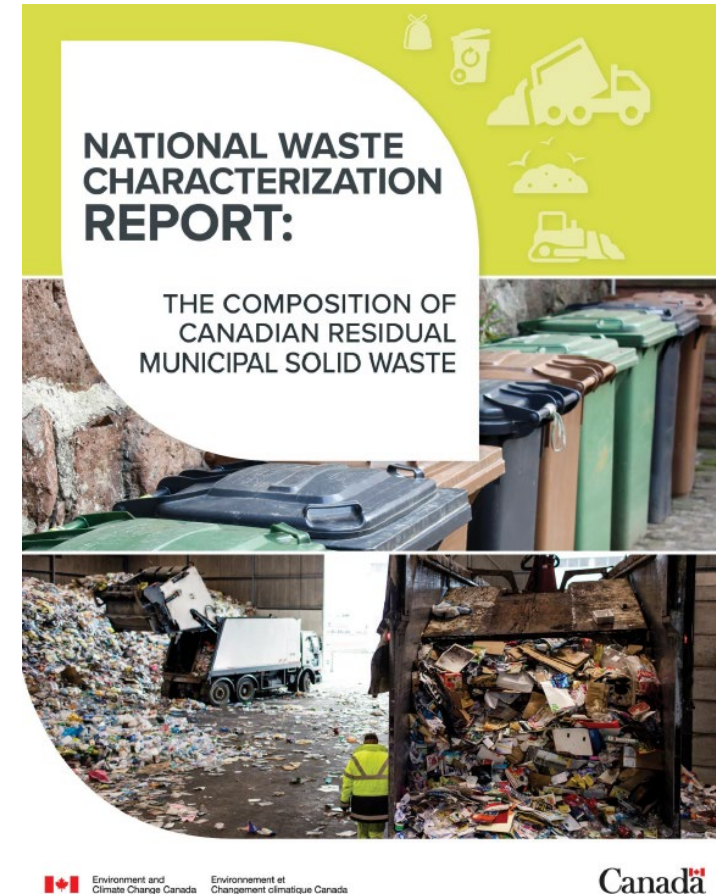
# Case Studies



# National Waste Characterization Program

1. Environment and Climate Change Canada (ECCC) compiles data from municipal waste audits and other available data to produce a national waste characterization study
2. Key information to support modeling of landfill methane generation
3. Key metric to track success in reducing disposal of biodegradable waste

Publication of updated report and dataset in 2024



National Waste Characterization Study (2020)

# Data Compilation Process

1. Municipal and regional waste audits are reviewed.
2. Relevant information is extracted and organized into a standard format.
3. Materials are reclassified into material categories included in the report.
4. Process conducted for each sector:
  - Residential
  - Industrial, Commercial, and Institutional (ICI)
  - Demolition, Land Clearing and Construction (DLC)



# Sample Results

## National Waste Characterization Study (2020)

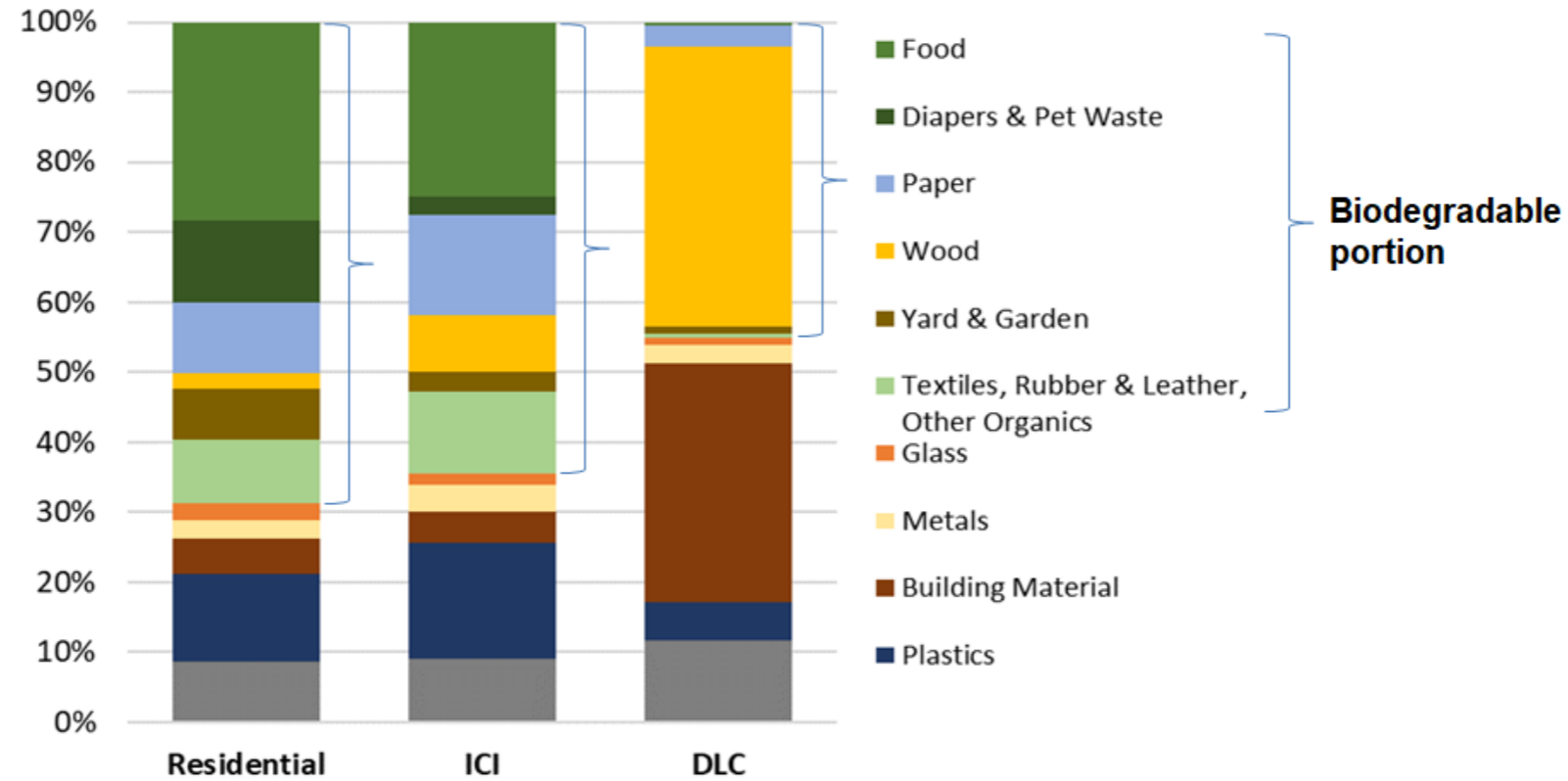


Figure 1 National Average % Composition of residual MSW, by sector (2016)

Composition of the national waste stream, by material type.

# Wisconsin's Waste Characterization Study and Next Steps

Casey Krausensky  
Solid Waste Coordinator, WI Dept. of Natural Resources  
GMI Biogas Workshop #3  
May 16, 2024

# Wisconsin: an Overview

- 5.9 million people
- Mandatory recycling law
  - 86% at least “somewhat committed”
- Mandatory yard waste diversion law
- Mandatory electronics recycling
- No food waste diversion requirements
  - 81% landfill or put down drain
  - 18.5% compost in some manner



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# Why?

- Identify the biggest problems
- Identify the easiest fixes
- Identify the success of past efforts
- Back up any assumptions with data
- Collect baseline data
- See trends overtime
- Bring awareness to waste



# Study Considerations and Planning

- Representative of whole
  - Regional differences
  - Sector differences
- 85 sort categories
  - Standardized terms
  - Comparable across past studies
  - Regs & disposal options
- Avoid seasonality
  - (hit COVID instead)



# Analyzing the Results

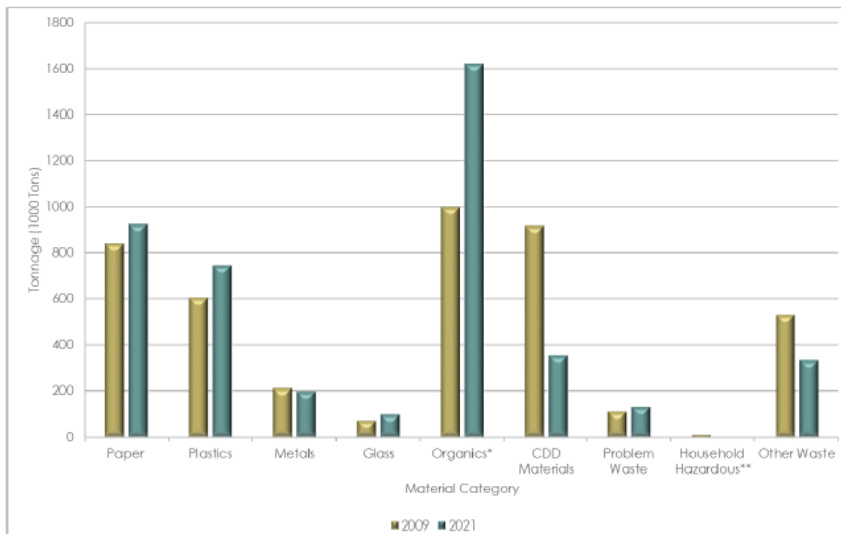
GHG Emissions from Alternative Waste Management Scenario (MTCO<sub>2</sub>E):

(2,343,621.60)

Material	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MTCO <sub>2</sub> E
Food Waste	632,100.00	NA	-	-	262,100.00	-	(2,343,621.60)

Change (Alt - Base) MTCO <sub>2</sub> E
(2,788,483.96)

Exhibit 35. Comparison of Material Category Tonnage Disposed 2009 vs. 2020-2021

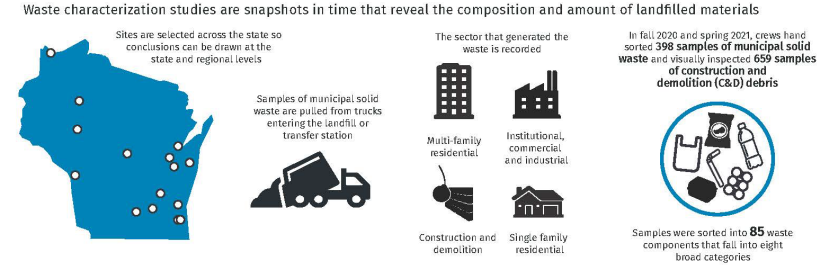


DNR.WI.gov search “waste sort”

## What is ending up in Wisconsin landfills?

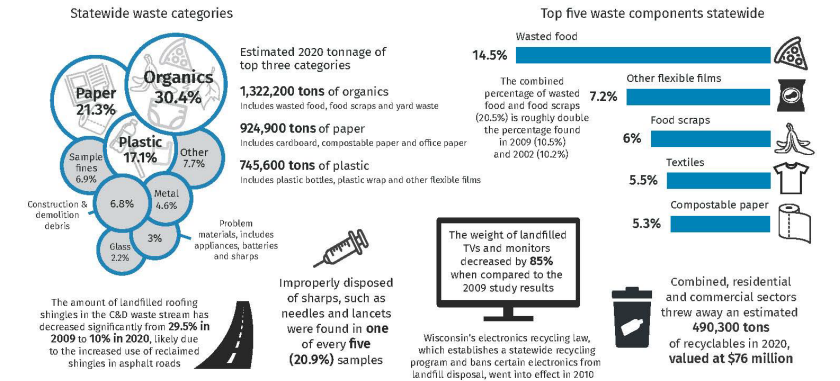
The DNR commissions statewide waste characterization studies to better understand what Wisconsinites are throwing in the trash. The most recent study occurred in 2020-2021. Prior studies were completed in 2002 and 2009. The results of these studies help guide waste reduction and diversion efforts at the state, regional and local level.

### How we study waste



### What was discovered

Analysis of the 2020-2021 data shows us that Wisconsinites are dedicated to waste reduction, but there is more we can do



### Reducing landfilled waste

Reducing what we throw away supports Wisconsin's economy, helps the environment and saves valuable landfill space





# Acting on Results

- Residential food waste reduction webpage
- Statewide food waste evaluation
- Program position to focus full time on food waste reduction
  - Creating an education campaign
  - Implementing
- Non regulatory technical assistance for generators
- Food waste specific waste characterization in 2026

## REDUCING FOOD WASTE AT HOME



Edible food that is thrown away or becomes spoiled, along with food scraps such as banana peels and watermelon rinds, make up the largest amount of waste sent to Wisconsin landfills. Making small changes to how food is handled at home can significantly impact this amount, save valuable resources and reduce greenhouse gas emissions.

### PREVENTION HAS THE MOST IMPACT

In addition to saving landfill space and generating fewer greenhouse gasses, preventing food waste also keeps the land, water, energy and labor that went into producing the food from going to waste.

Your household can benefit economically when you take action to prevent food waste. A 2020 study conducted by Penn State estimated households lose \$1,866 a year on food that's thrown out. Check out the following actions to reduce food waste at home.

- Shopping with a plan and preparing for gatherings +
- Storing food to extend its life +
- Using recipe generators and ingredient substitution tools +
- Understanding date labels and when food items are actually unsafe +

#### Managing waste and materials

#### Related Links

- Financial responsibility
- Public comment opportunities
- Report a complaint
- Waste facility and transporter approvals and licensing

#### Additional Resources

- Composting overview
- Rules & regulations
- Farms & composting
- Use, quality & marketing
- Education & outreach resources
- DNR composting contacts
- Reducing residential food waste

#### For more information, contact:

Casey Krausensky  
Waste & Materials Management Program  
tel+1-608-577-3643

# CONNECT WITH US

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Solid Waste Coordinator

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@WIDNR



@WI\_DNR



/WIDNRTV

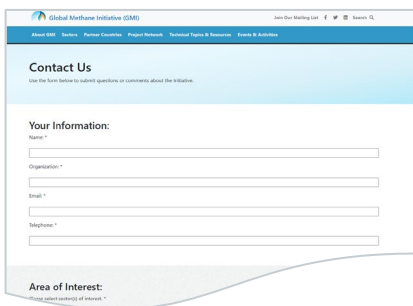


"WILD WISCONSIN:  
OFF THE RECORD"

# Q&A

# Conclusion

# Engage with GMI

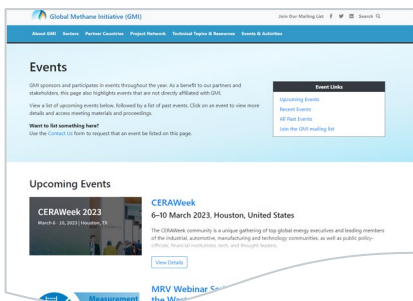


A screenshot of the 'Contact Us' page on the Global Methane Initiative website. The page has a blue header with navigation links: 'About GMI', 'Sector', 'Partner Countries', 'Program Initiatives', 'Technical Topics & Resources', and 'Events & Activities'. Below the header, there's a 'Contact Us' section with a sub-header 'Send the form below to submit questions or comments about the Initiative.' The form includes a 'Your Information:' section with fields for Name, Organization, Email, and Telephone. Below that is an 'Area of Interest:' section with a dropdown menu.

## Submit a Contact Us Request

Let us know how we can help you:

[globalmethane.org/contact-us/](http://globalmethane.org/contact-us/)



A screenshot of the 'Events' page on the Global Methane Initiative website. The page has a blue header with navigation links: 'About GMI', 'Sector', 'Partner Countries', 'Program Initiatives', 'Technical Topics & Resources', and 'Events & Activities'. Below the header, there's an 'Events' section with a sub-header 'GMI sponsors and participates in events throughout the year. As a benefit to our partners and stakeholders, this page also highlights events that are not directly affiliated with GMI.' There's a 'View a list of upcoming events below, followed by a list of past events. Click on an event to view more details and access meeting materials and proceedings.' Below that is an 'Event Links' section with links for 'Upcoming Events', 'Recent Events', and 'All Past Events'. There's also a 'Join the GMI mailing list' link. Below the event links, there's an 'Upcoming Events' section with a card for 'CERAWeek 2023' (6-10 March 2023, Houston, United States) and a 'View Details' link. Below that is an 'MRV Webinar Series' section with a 'View Details' link.

## Share Events or Resources

Recommend items to publish on the GMI website:

[globalmethane.org/resources/recommend.aspx](http://globalmethane.org/resources/recommend.aspx)



A screenshot of the 'Join the GMI Mailing List' form. The form has a blue header with the GMI logo and the text 'Global Methane Initiative'. Below the header, there's a sub-header 'Consider the form below to join GMI's mailing list. A confirmation email will be sent to you. You must click the link provided in the email to complete the process.' There's a paragraph of text: 'We email our newsletter about once or twice a month. If you do not wish to, please check your organization's name or signature field. Please email [communications@globalmethane.org](mailto:communications@globalmethane.org) if you have not received the confirmation after 24 hours.' Below that is an 'Email Address' field. Below that are 'First Name' and 'Last Name' fields. Below that is an 'Organization' field. Below that is a 'Sector of Interest (Check all that apply)' section with a dropdown menu.

## Join the GMI Mailing List

Receive updates from GMI by joining at:

[eepurl.com/ggwT3T](http://eepurl.com/ggwT3T)

[globalmethane.org](http://globalmethane.org)

## Follow GMI



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# Thank You!



**Final materials will be posted to:**

[www.globalmethane.org](http://www.globalmethane.org)

**Questions?**

[secretariat@globalmethane.org](mailto:secretariat@globalmethane.org)