# Understanding Your Waste Stream to Develop Methane Reduction Strategies

**May 16, 2024**

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

Global Methane Initiative

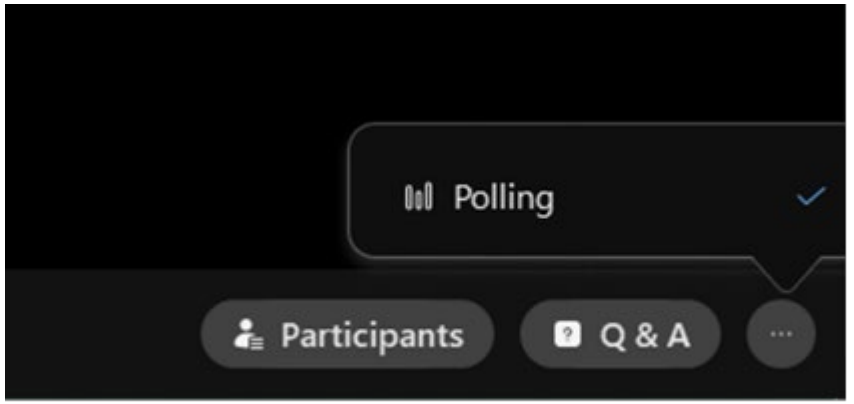
# Webinar Panels

## 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

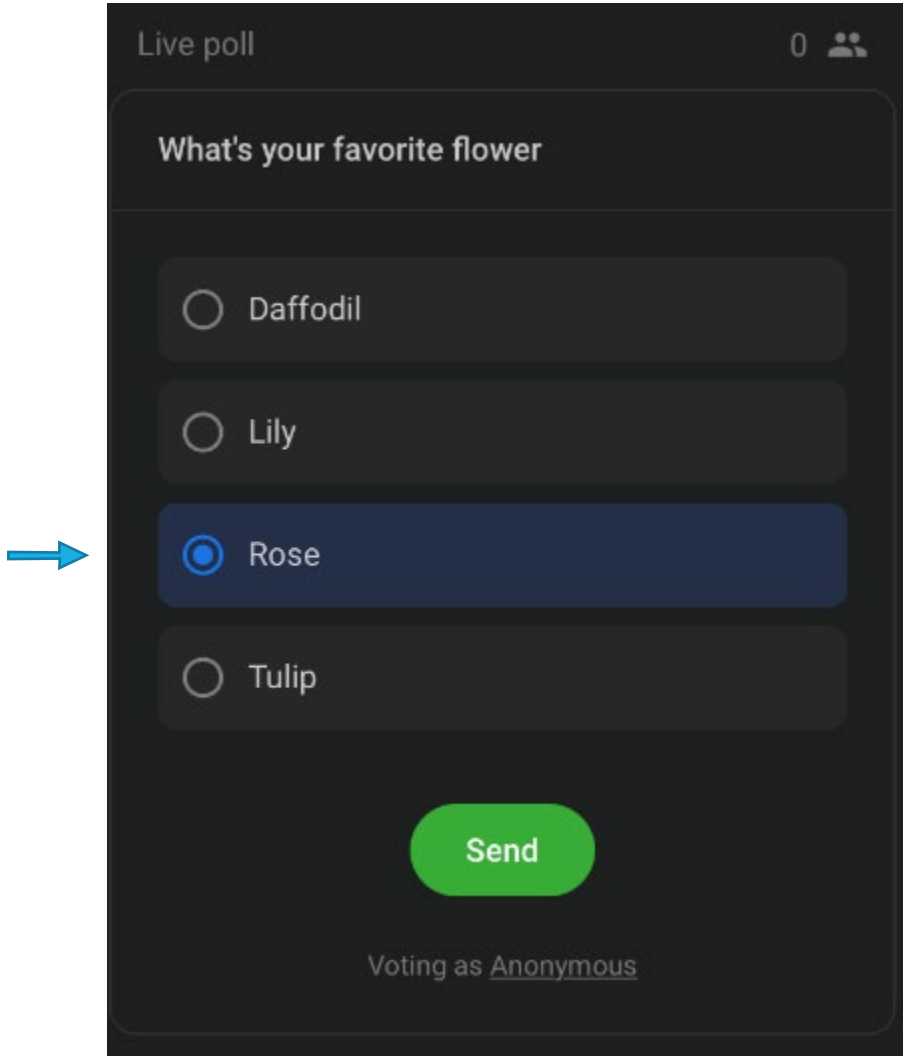




**Participants** **Q&A** **More polling options**

# 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"

# 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

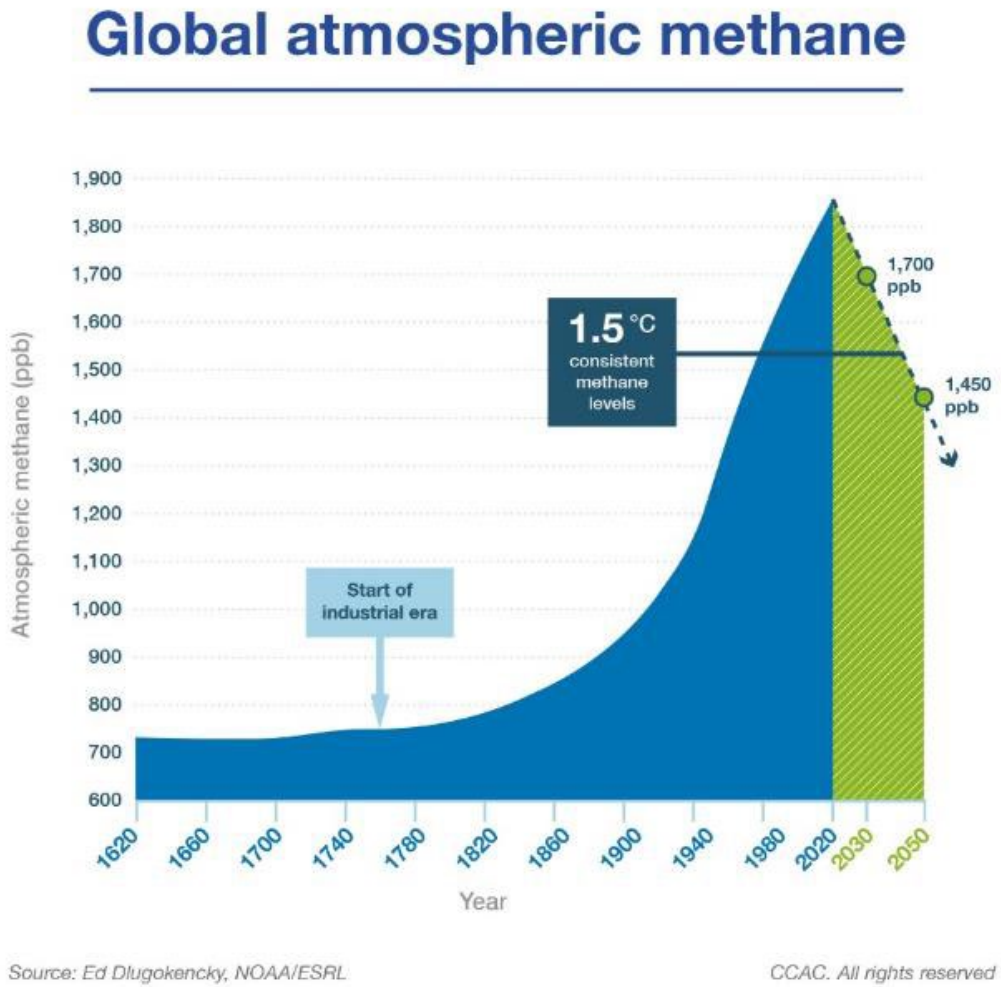
# Agenda

- 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




***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

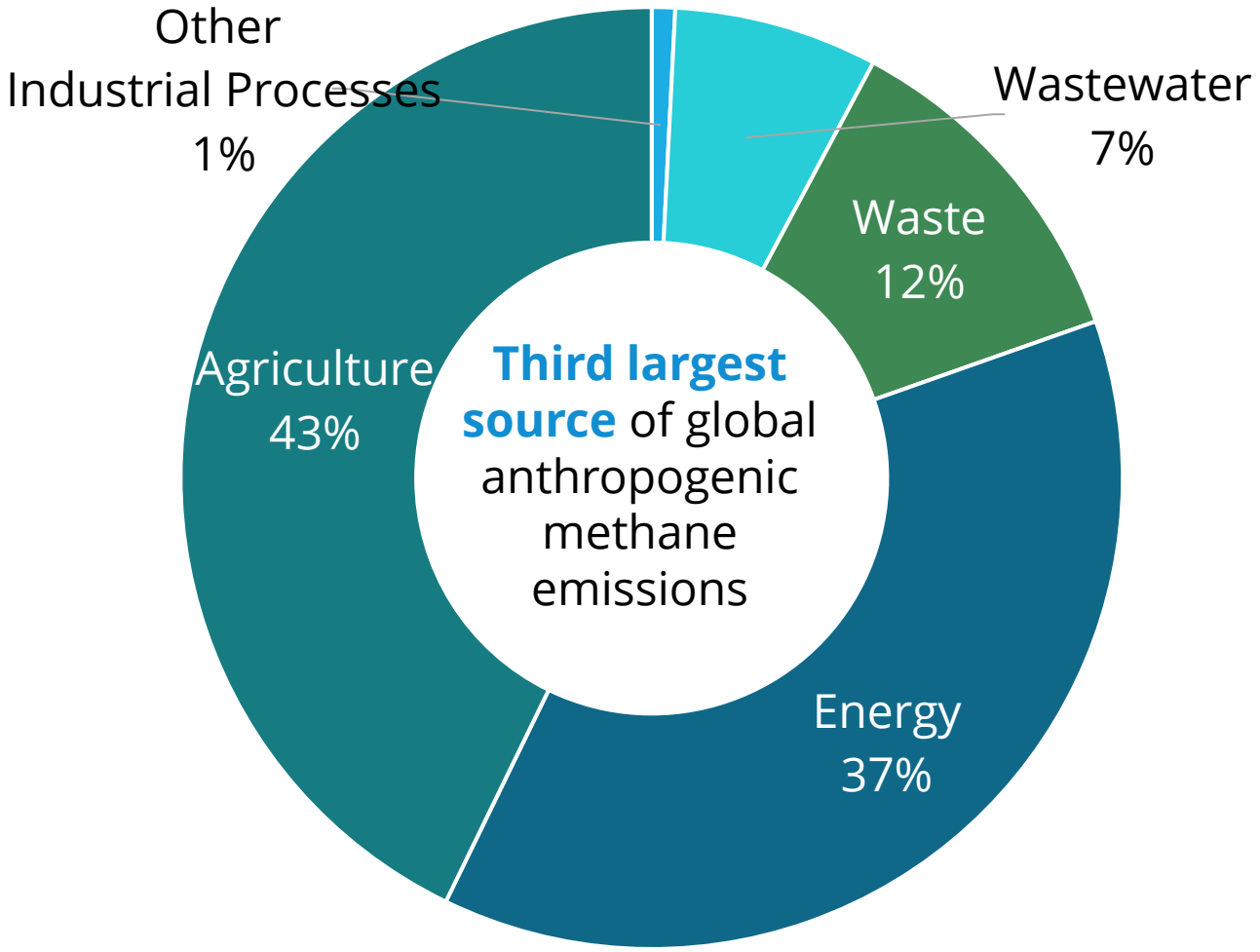
**globalmethane.org**

Global Methane Initiative

- 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?



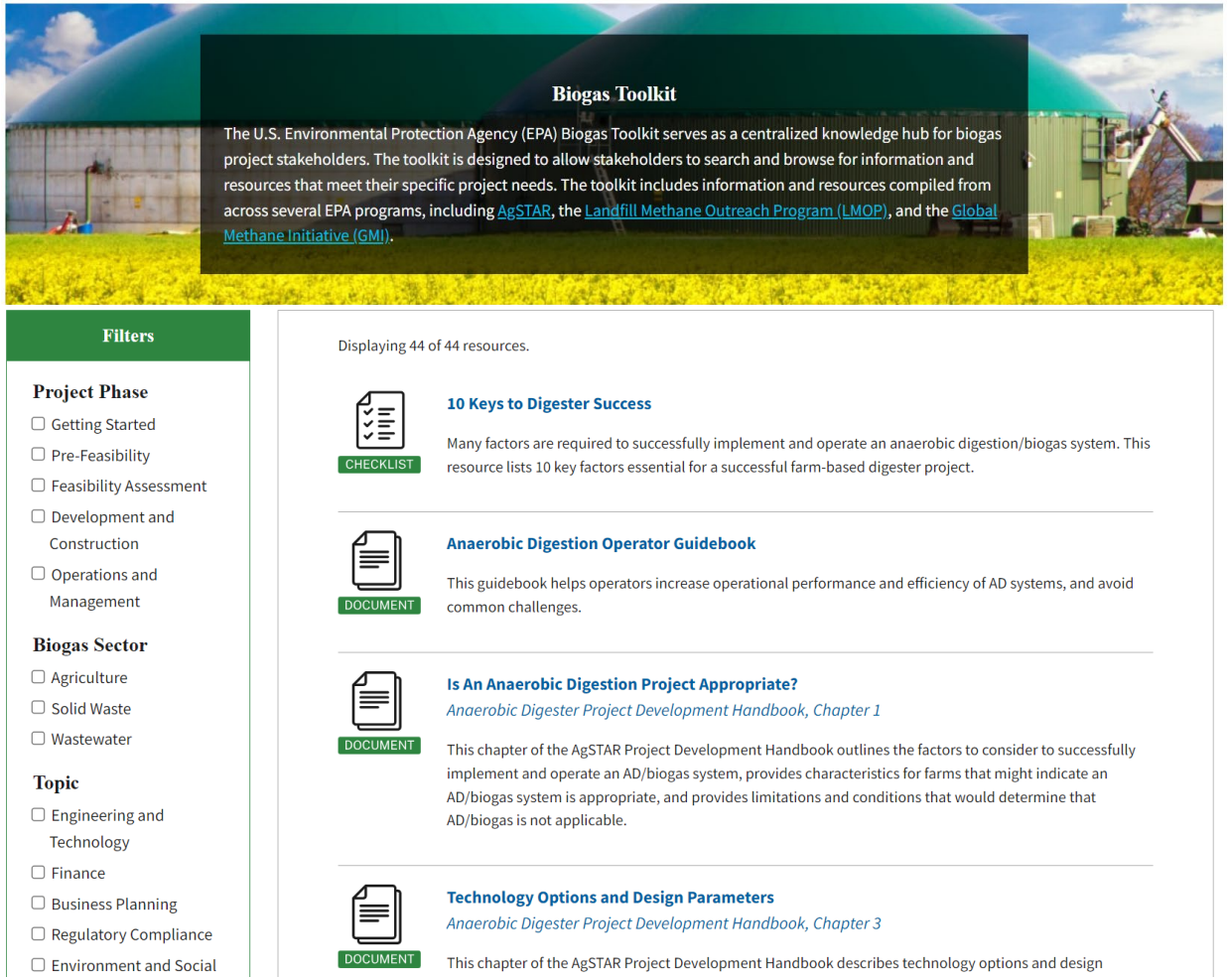

## Co-benefits of Waste Methane Mitigation

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

*Source: U.S. EPA's Global Non-CO2 Emissions Database*

# 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

# 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

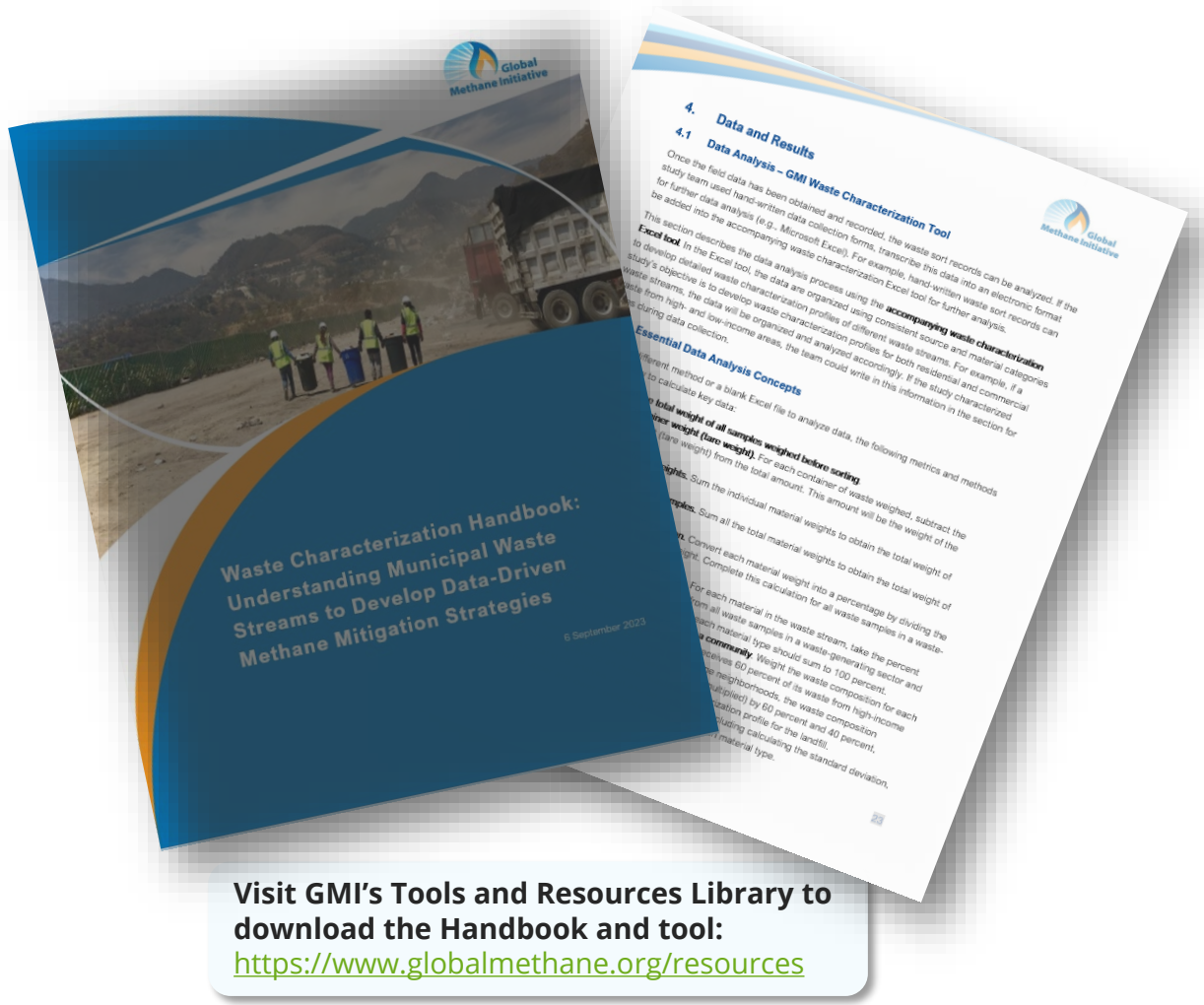
**Organics Economics (OrganEcs)**
Estimates costs, revenues, and profitability with composting and AD projects

**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

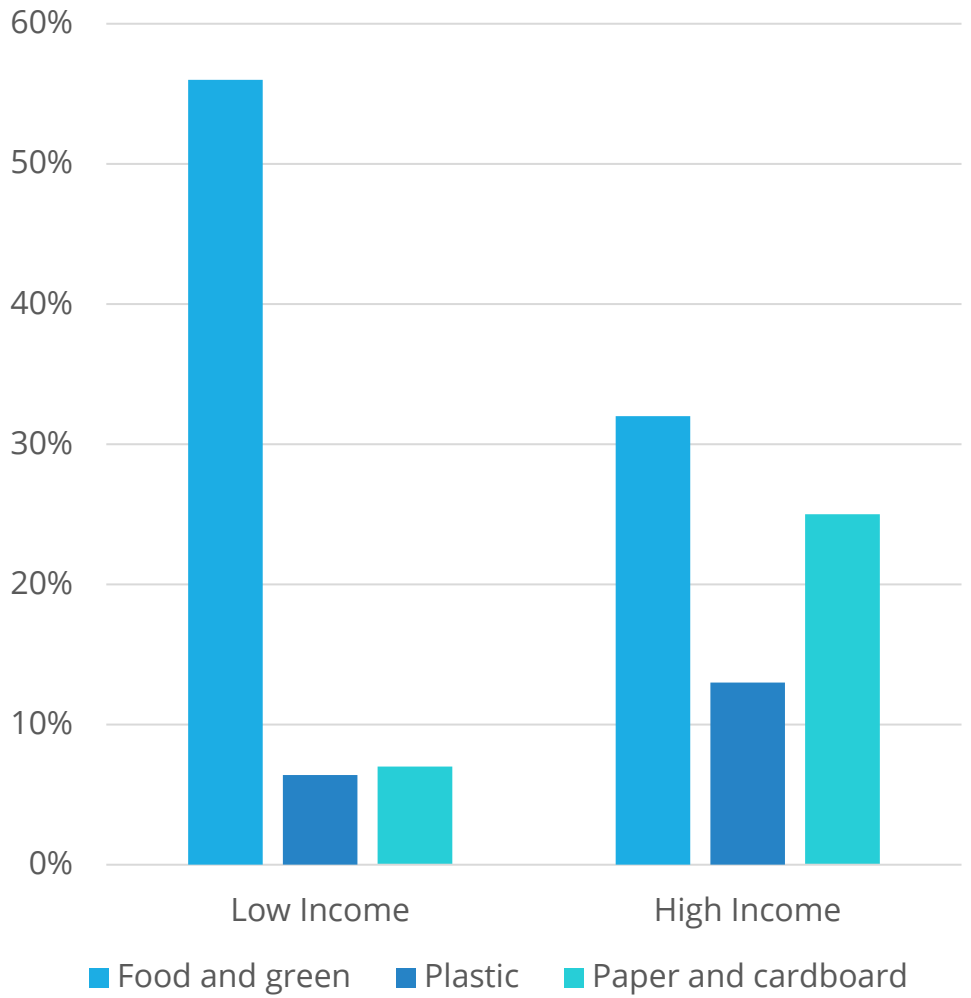
# Waste Characterization Handbook & Excel Tool

# 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

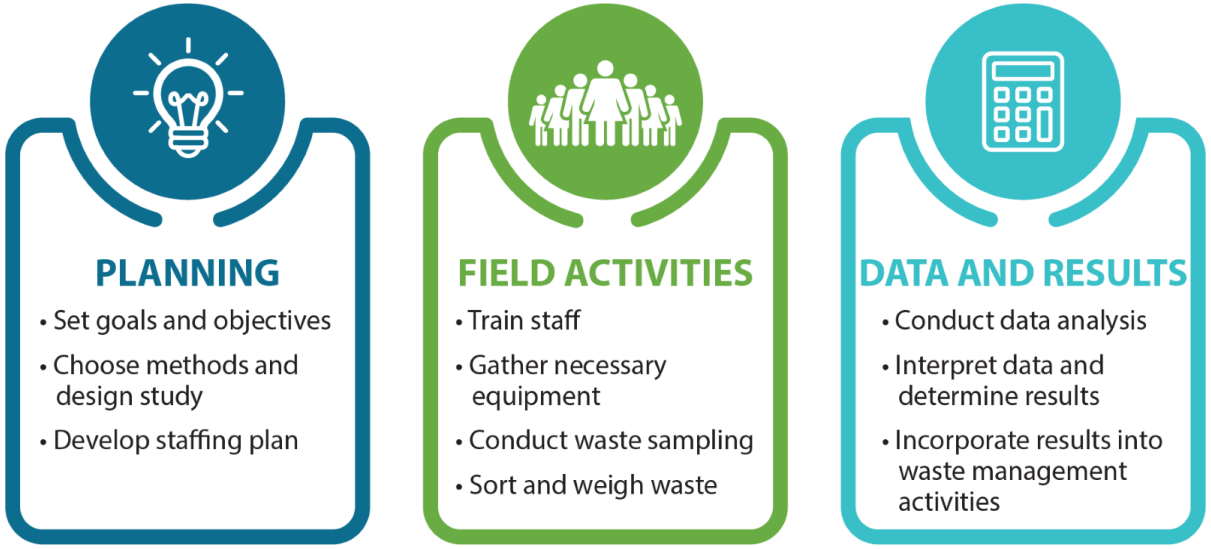
- Establishing baseline waste management conditions
- Developing reduction and diversion strategies
- Selecting appropriate technologies
- Understanding contamination
- Evaluating and improving programs

# 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

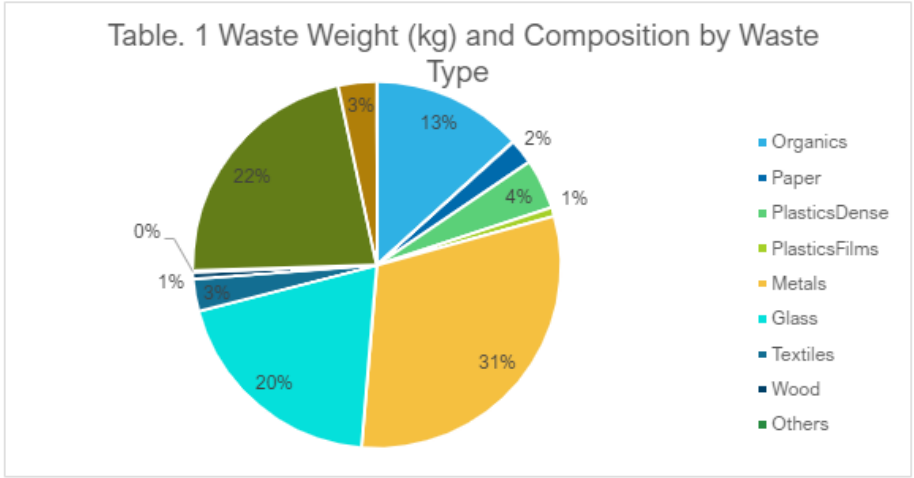
**Visit GMI's Tools and Resources Library to download the Handbook and tool:**
https://www.globalmethane.org/resources

# Overview of the Excel Tool

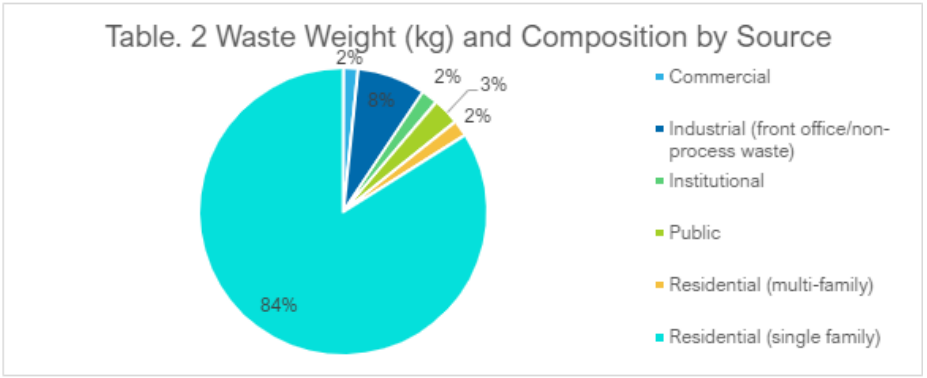

| Tab |
| --- |
| Definitions |
| Site and Staff Requirements |
| Supplies |
| Tare Weights |
| Sampling Plan & Pre-Sort Weight |
| Record Sort Data |
| Data Analysis |

# 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% |
| **Total** | **1,856.5** | **1,645.5** | **1,858.5** | **1,669.5** | **3,181.5** | **10,211.5** | **100%** |

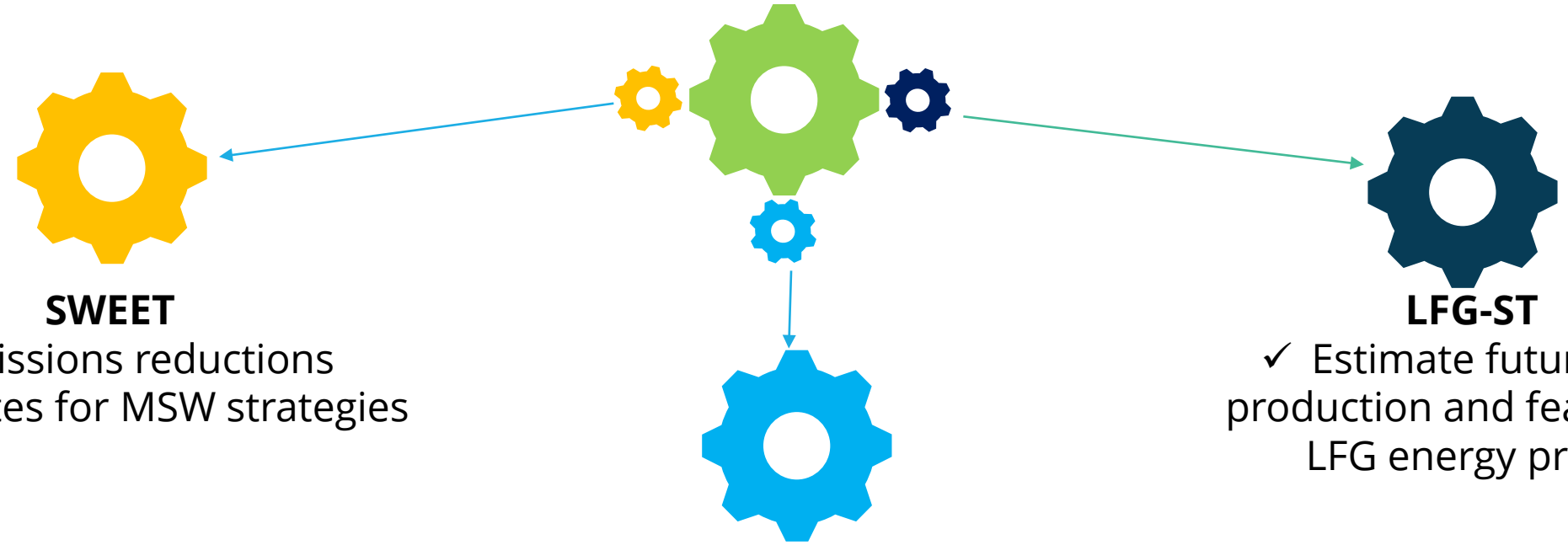



| Table. 2 Waste Weight (kg) and Composition by Source | | | | | | | |
|---|---|---|---|---|---|---|---|
| Source | Weight (Day 1) | Weight (Day 2) | Weight (Day 3) | Weight (Day 4) | Weight (Day 5) | Total (All Days) | % Composition (All Days) |
| Commercial | 55.0 | 50.0 | 0.0 | 0.0 | 63.0 | 168.0 | 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% |
| **Total** | **1,856.5** | **1,645.5** | **1,858.5** | **1,669.5** | **3,181.5** | **10,211.5** | **100%** |



# Using Study Data with Other GMI Resources

**Waste Characterization Tool**



**SWEET**

✓ Emissions reductions estimates for MSW strategies

**AD-ST**

✓ AD project feasibility for organic materials (feedstocks)

**LFG-ST**

✓ Estimate future LFG production and feasibility for LFG energy projects.

# 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


**National Waste Characterization Study (2020)**

Publication of updated report and dataset in 2024

ICI = industrial, commercial, institutional; CRD = construction, renovation, demolition

# 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)

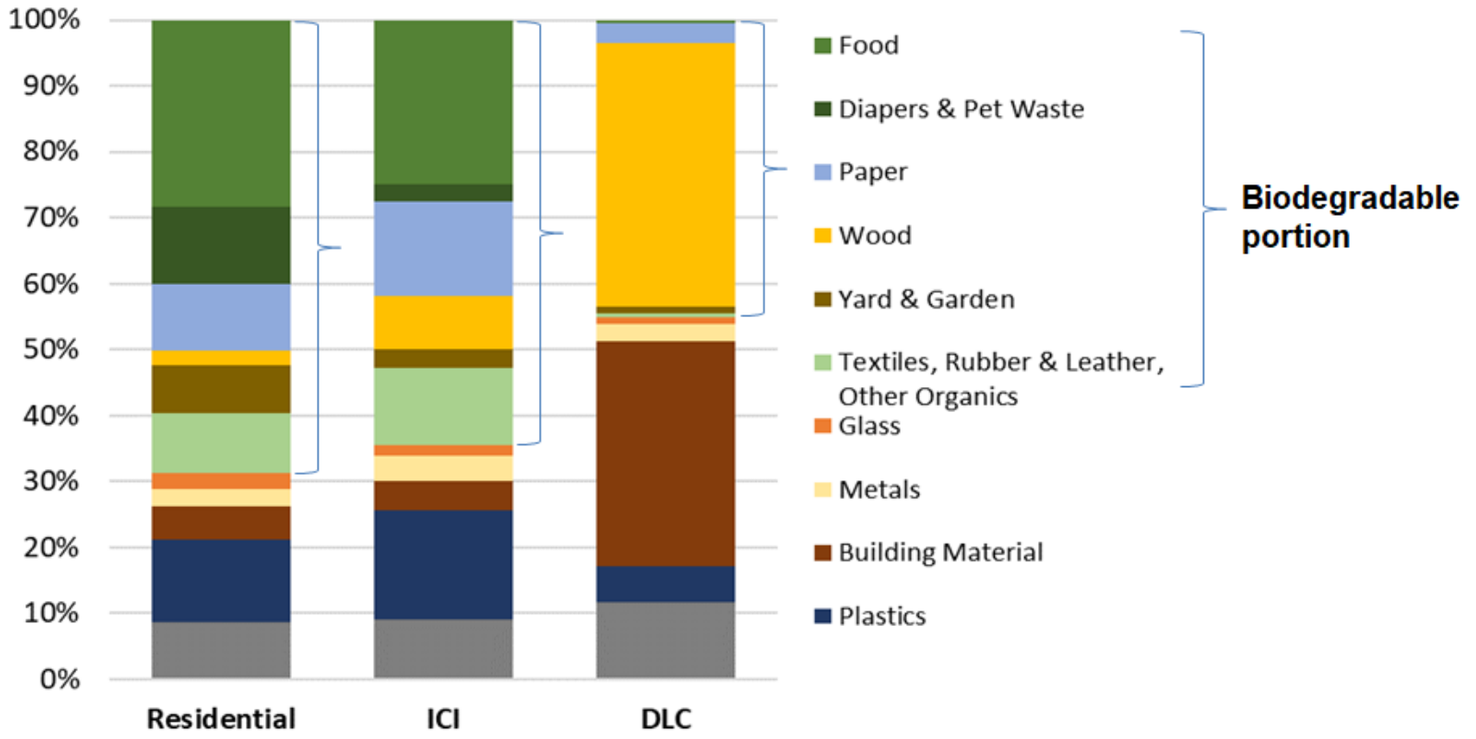



**Figure 1 National Average % Composition of residual MSW, by sector (2016)**

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



# 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

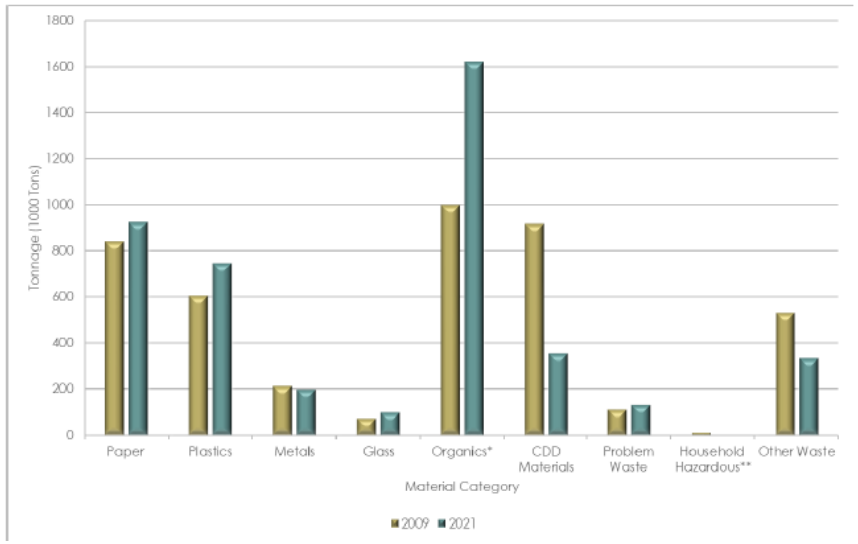
- Representative of whole
  - Regional differences
  - Sector differences
- 85 sort categories
  - Standardized terms
  - Comparable across past studies
  - Regs & disposal options
- Avoid seasonality
  - (hit COVID instead)

# Analyzing the Results

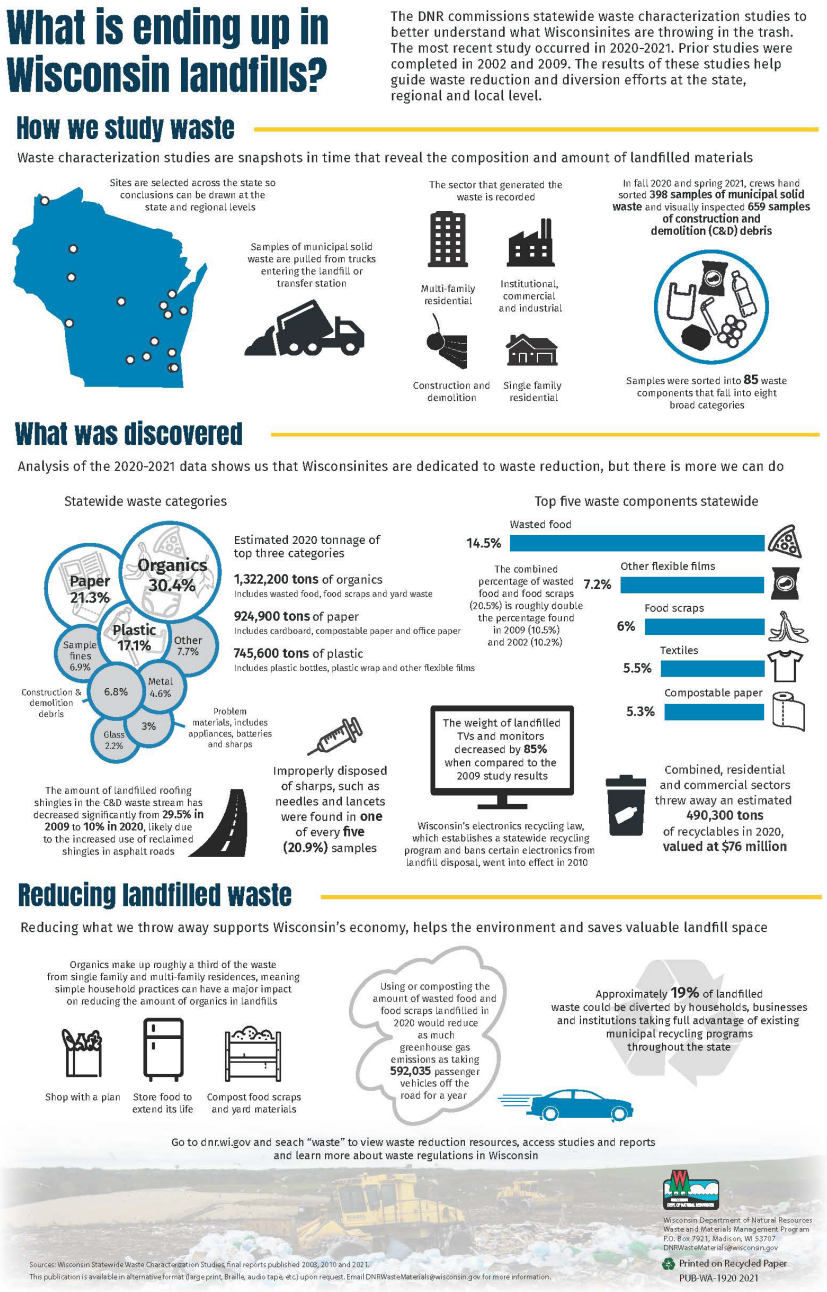
**GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$):** **(2,343,621.60)**

| Material | Tons Source Reduced | Tons Recycled | Tons Landfilled | Tons Combusted | Tons Composted | Tons Anaerobically Digested | Total $MTCO_2E$ | Change (Alt - Base) $MTCO_2E$ |
|---|---|---|---|---|---|---|---|---|
| Food Waste | 632,100.00 | NA | - | - | 262,100.00 | - | (2,343,621.60) | (2,788,483.96) |

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

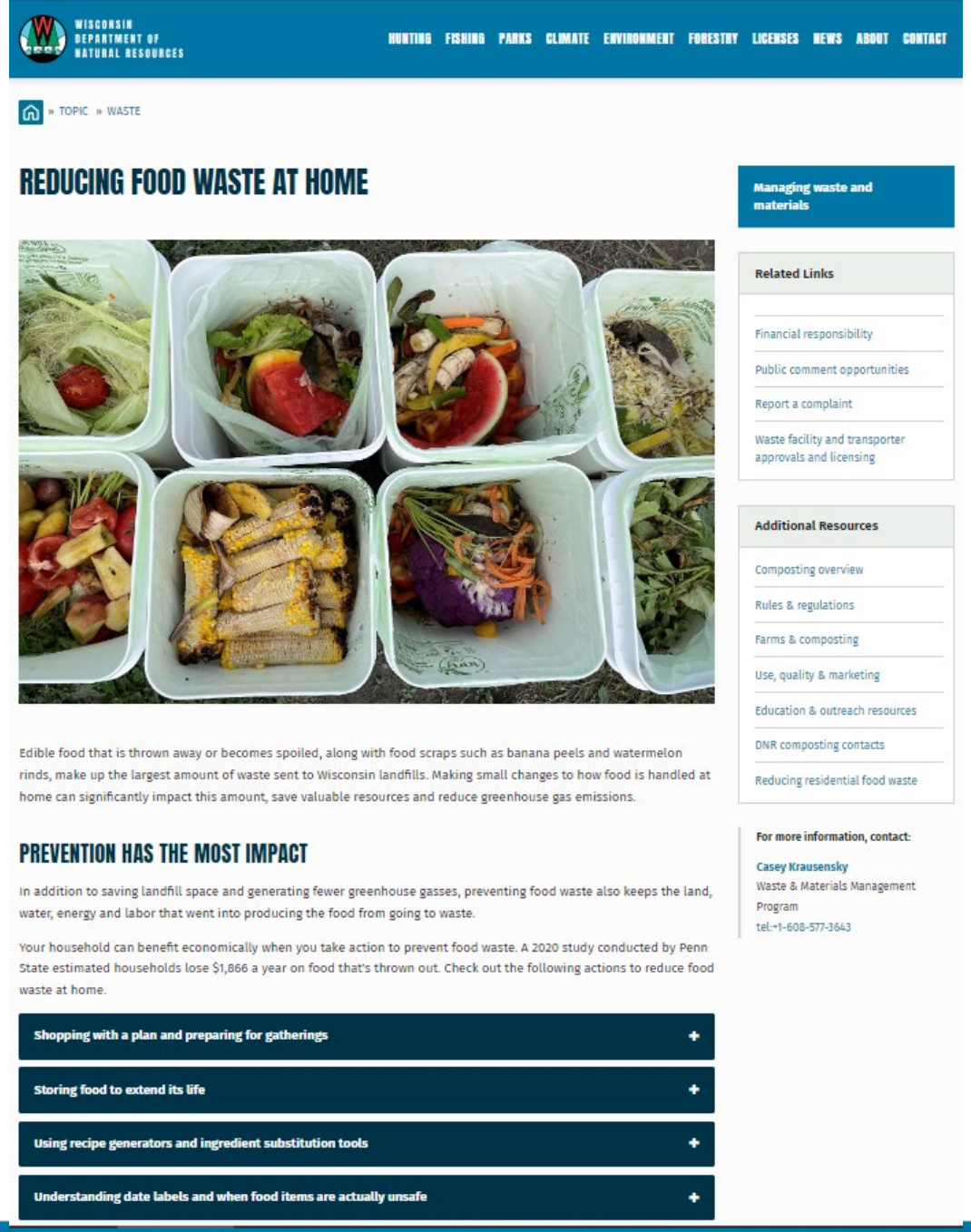



DNR.WI.gov search “waste sort”



# 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 wase characterization in 2026



# CONNECT WITH US


## Casey Krausensky

Wisconsin Department of Natural Resources

Solid Waste Coordinator

Casey.Krausensky@Wisconsin.gov


@WIDNR

@WI_DNR

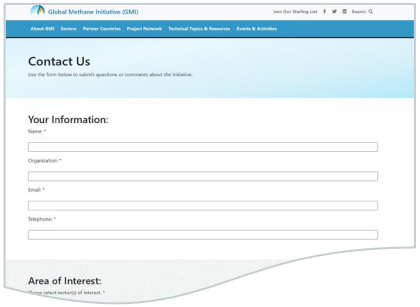
/WIDNRTV

"WILD WISCONSIN:
OFF THE RECORD"

# Q&A

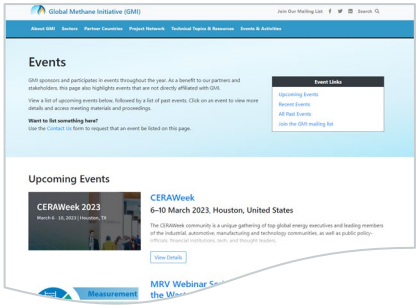
# Conclusion

# Engage with GMI




## Submit a Contact Us Request

Let us know how we can help you:
globalmethane.org/contact-us/




## Share Events or Resources

Recommend items to publish on the GMI website:
globalmethane.org/resources/recommend.aspx


## Join the GMI Mailing List

Receive updates from GMI by joining at:
eepurl.com/ggwT3T

## Follow GMI

www.facebook.com/globalmethane/

twitter.com/globalmethane

www.linkedin.com/company/global-methane-initiative-gmi-/

# Thank You!

Global Methane Initiative
Leading methane action since 2004

**Final materials will be posted to:**

www.globalmethane.org

**Questions?**

secretariat@globalmethane.org