



Status of Managing the Organic Waste in the U.S.: The 2013 Columbia Survey and Beyond

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Gershman, Brickner & Bratton, Inc.

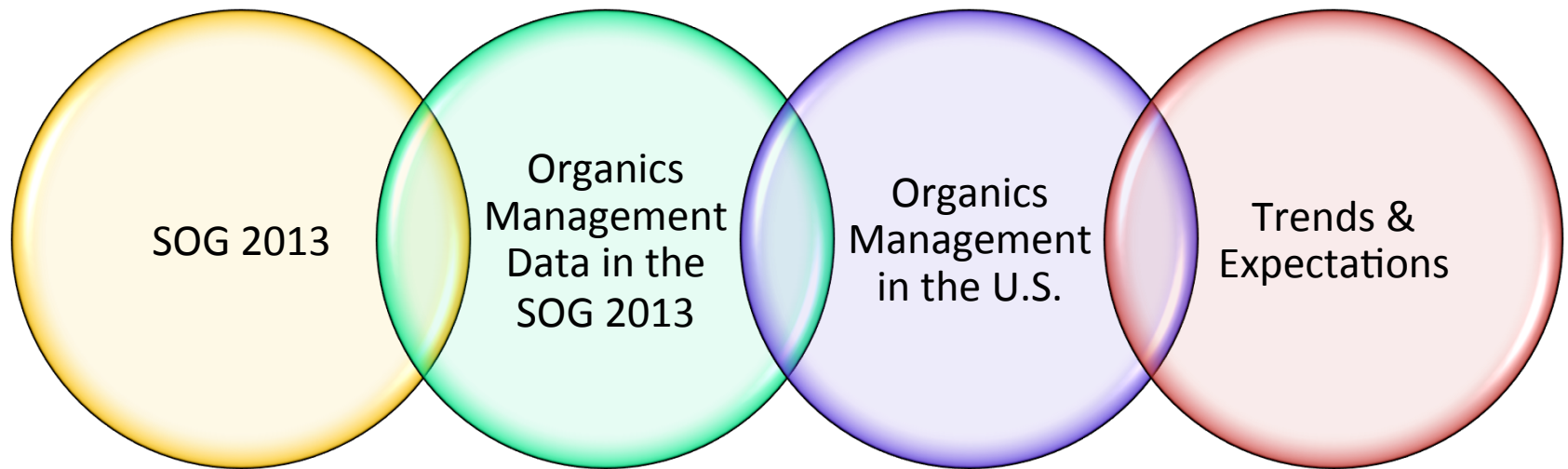
Presented at the WTERT Bi-Annual Meeting

October 9, 2014



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Outline





“STATE OF GARBAGE IN AMERICA” 2013 SURVEY



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“State of Garbage in America”



Initiated in 1989 and Earth Engineering Center (EEC) joined in 2004

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17th NATIONWIDE SURVEY OF MSW MANAGEMENT IN THE U.S.

THE STATE OF GARBAGE IN AMERICA

Latest national data on municipal solid waste management find estimated generation is 389.5 million tons in 2008 — 69 percent landfilled, 24 percent recycled and composted, and 7 percent combusted via waste-to-energy.

*Rob van Haaren,
Nickolas Themelis and
Nora Goldstein*

*A joint study by BioCycle and the
Earth Engineering Center of Columbia University*

BIOCYCLE, in collaboration with the Earth Engineering Center (EEC) of Columbia University, conducts the biennial State of Garbage In America survey on the generation and management of municipal solid waste (MSW) in the United States. The State of Garbage In America Report, launched by BioCycle in 1989, is unique in that actual tonnage data is collected from each individual state, with waste characterization studies solely used for validation of the numbers. This is the 17th nationwide survey, reporting data from calendar year 2008.

The data was gathered during the spring of 2010, using an Excel form that was e-mailed to the solid waste management departments in all 50 states and the District of Columbia. All entries were checked and validated using results of former State of Garbage in America reports, EPA waste characterization studies, and also a survey of Materials Recovery Facilities (MRF) carried out by Eileen Berenyi of Government Advisory Associates (GAA). We greatly appreciate the time spent and the contributions made by the solid waste and recycling officials listed at the end of this report. Thanks to their help and expertise, we can present the 2010 edition of “The State of Garbage in America.” All tonnages are reported in U.S. tons (1.1 U.S. ton = 1 metric ton).

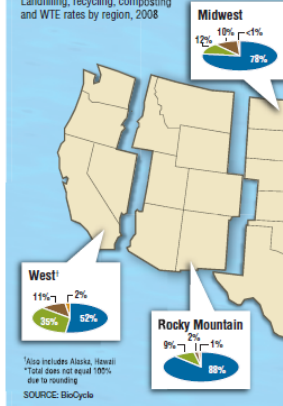
SURVEY METHODOLOGY

In 2004, the EEC was invited by BioCycle to collaborate on a streamlined version.

such requirement and another 12 states did not respond to this question. Only five states did not complete the 2010 State of Garbage survey. For states where companies and local agencies are not required to report to the state, disposal data can and, in most cases, are still collected from waste management facilities. This is especially true for landfills and waste-to-energy

Figure 1. Regional Breakdown

Landfilling, recycling, composting and WTE rates by region, 2008



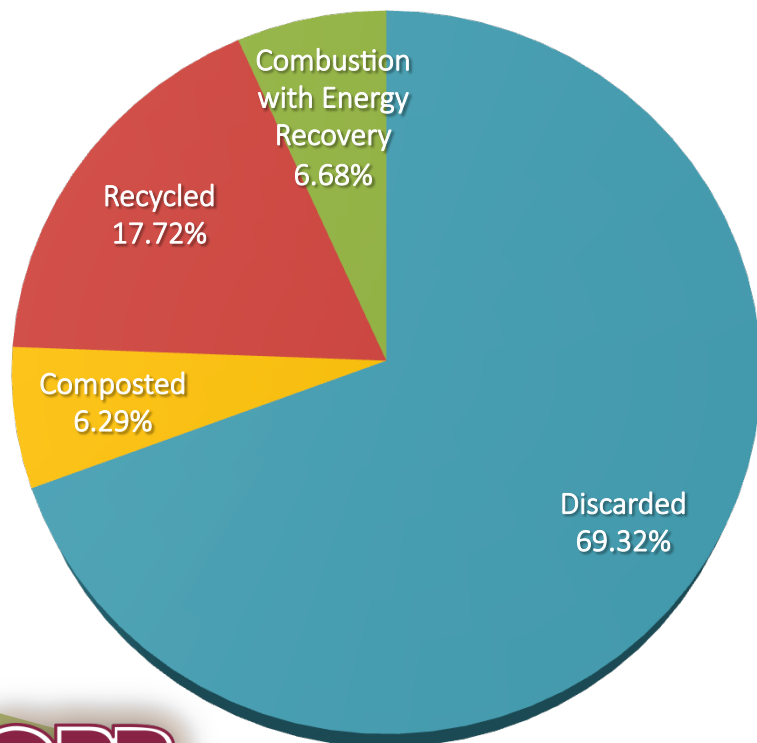
SOG 2013



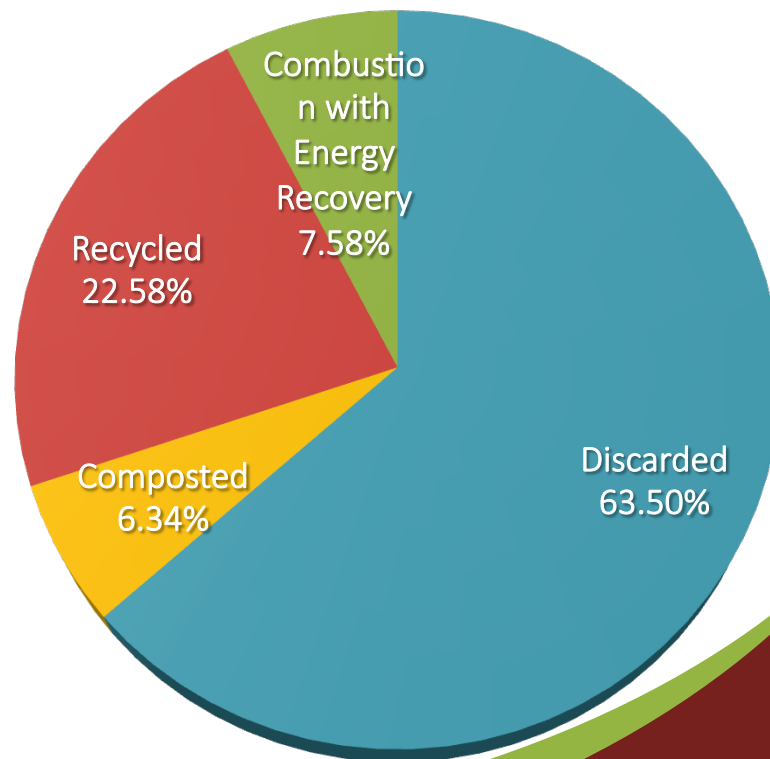
- Conducted solely by EEC- Dolly Shin, MS in Earth Resource Engineering
- Guidance provided by US-EPA Office of Resource Conservation and Recovery
- Collected 2011 data from state waste management agencies in Fall 2012 and Spring 2013
- “Thanks!” to the American Chemistry Council and National Science Foundation for supporting the research

MSW Disposition in the U.S.

**SOG 2010 results:
 389 million tons (2008)**



**SOG 2013 results:
 389 million tons (2011)**



ORGANIC WASTE MANAGEMENT DATA IN THE SOG 2013



Questions in the Survey

- Number of communities with curbside collection of yard waste and/or food waste
- Tonnages of the curbside collected organic waste composted
- Number of aerobic composting and anaerobic digestion facilities in state
- Amount of organics composted and/or processed at the AD plants



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Results (Based on 21 reporting states)

24.6 million tons (yard and food waste combined) were composted

Collection

11 states reported yard and food waste separately

6 states reported combined yard + food waste

Almost none have separate data for yard or food waste from curbside or drop-off sites

Results - continued

Processing

Composting

21 states, provided only the amount of yard waste composted, and

8 states (AR, DE, KS, KY, NC, ND, RI, and WY) and Washington D.C. said only yard waste is collected for composting

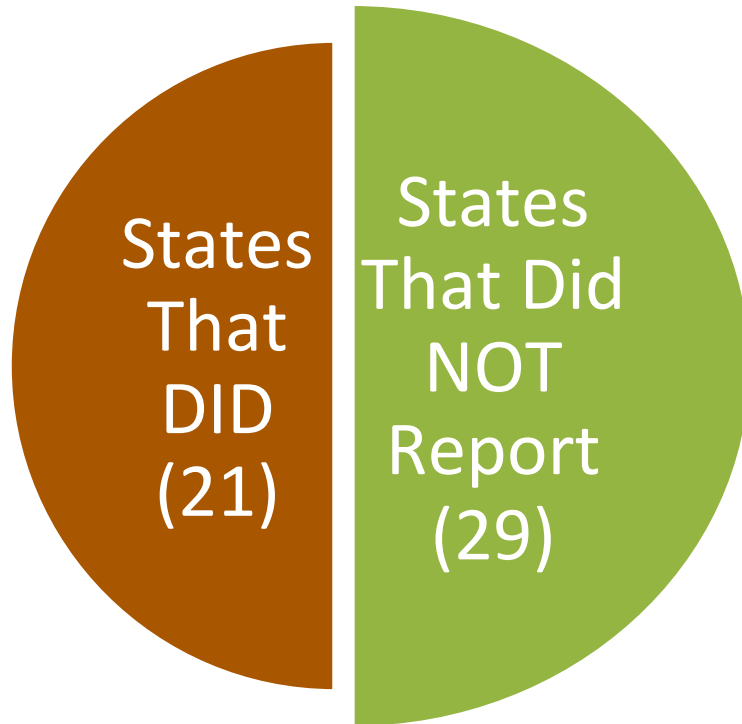
Anaerobic digestion

3 states reported AD plants: CA (1), DE (2), NY(3)

7 states reported existing AD plants: MA, MS, NC, OH, TN, VT, and WA

No information on the amount and type of organic waste processed

Data Challenges

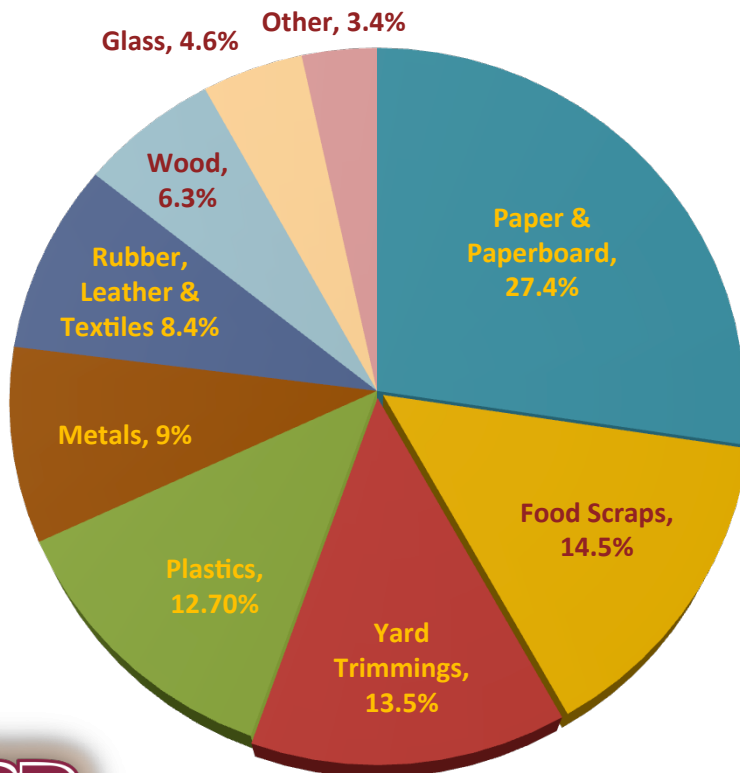


- Composting facilities are not required by the states to report amount and type of waste processed
- Anaerobic digestion for organics from MSW is a novel approach in the U.S.

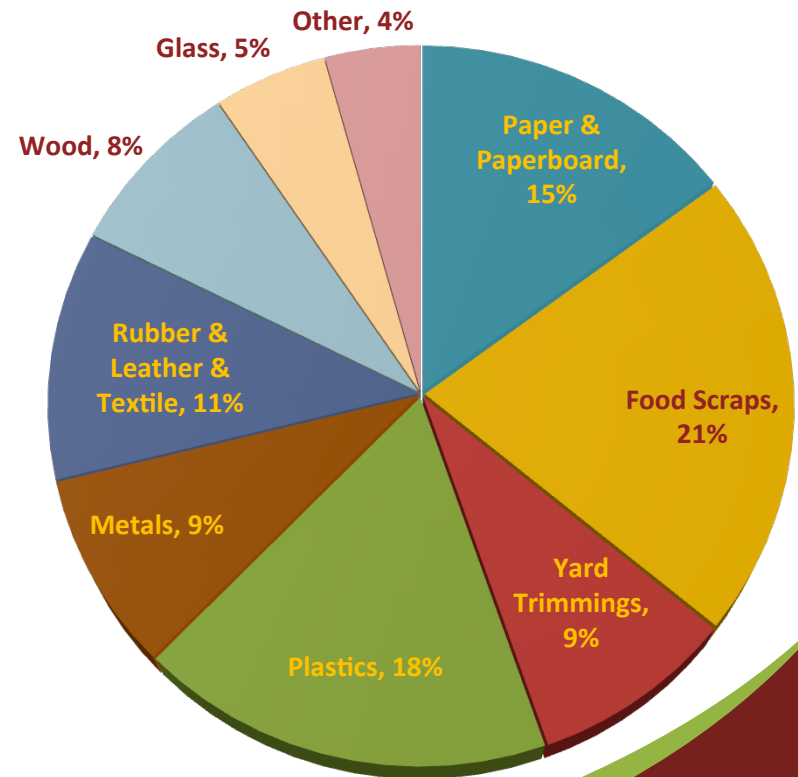
ORGANICS WASTE MANAGEMENT IN THE U.S.

Organics in the U.S. MSW

Composition of the MSW as generated, before recycling

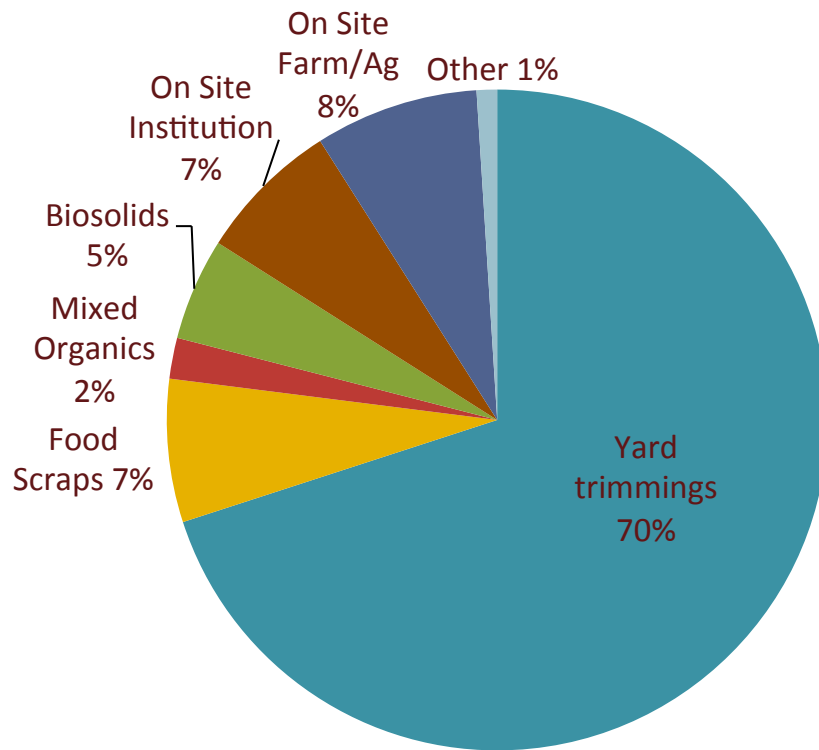


Composition of the MSW as disposed, after recycling



Source: US EPA, 2014

State of the Composting in the US



Composting Facilities by Type

- 4,914 composting operations in 43 states
- 19,4 million tons of organics diverted for composting (reported by 33 states)
- CA is the leader followed by FL, IA, WA and NY
- Average amount of organics processed at a composting plant: 5,155 TPY
- >20 states have yard waste bans from landfills

Source: Institute for Local Self-Reliance & BioCycle, July 2014

Residential Food Waste Collection Interest

183 communities offer curbside
collection of residential food waste

18
states

2.55 million
households

726,250 tons in
2012*

* 79% of programs reporting

Source: BioCycle Magazine, March 2013

Anaerobic Digestion

Biological
degradation of
organic material in
absence of oxygen



CR&R Eisemann – Perris, CA (under construction)

- Biogas fuel for electricity and/or heat production; can be conditioned to pipeline quality
- Digestate for soil amendment, animal bedding, or rolled into a composting process
- ~ 20 plants operating in the U.S. (Source: GBB, 2014)



Companies in U.S. at Work with AD



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- US company founded in 2008 in Waltham, MA
- Licensed European AD technologies
- More than 10 composting plants
- Three commercial AD plants
 - Richmond Energy Garden, Canada- 40,000 TPY of food and yard waste
 - London Ontario Energy Garden, Canada- 65,000 TPY of mixed organic waste
 - Energy Garden in Bay Lake, FL (Disney World) - 100,000 TPY of Mixed organic waste



Richmond Energy Garden



London Energy Garden

- US company established in 2006 in Cleveland, OH
- Initially European technology, now more than 98% of the components are purchased in the U.S. and more than 76% of those are from Ohio-based companies
- Integrated Anaerobic Digestion System (iADs) is patent pending technology developed at Ohio State University
- Projects:
 - 8 operating commercial AD projects in the US
 - 3 commercial projects under construction



Cleveland, Ohio- 42,600 TPY of Biosolids, FOG and food waste



Wooster, OH- 20,000 TPY, Pumpable and high solids organic biomass

- US company based in Lafayette, CA
- Dry Anaerobic Digestion licensee for:
 - KompoFERM
 - SmartFERM
- Plants:
 - Monterey Regional Waste Management District- 5,000 TPY of food and green waste
 - City of San Jose (start-up November 2013)- 90,000 TPY of commercial food waste
 - Operator for Infinitus in Montgomery, AL
 - 3 plants under construction and development



Monterey, CA



San Jose, CA

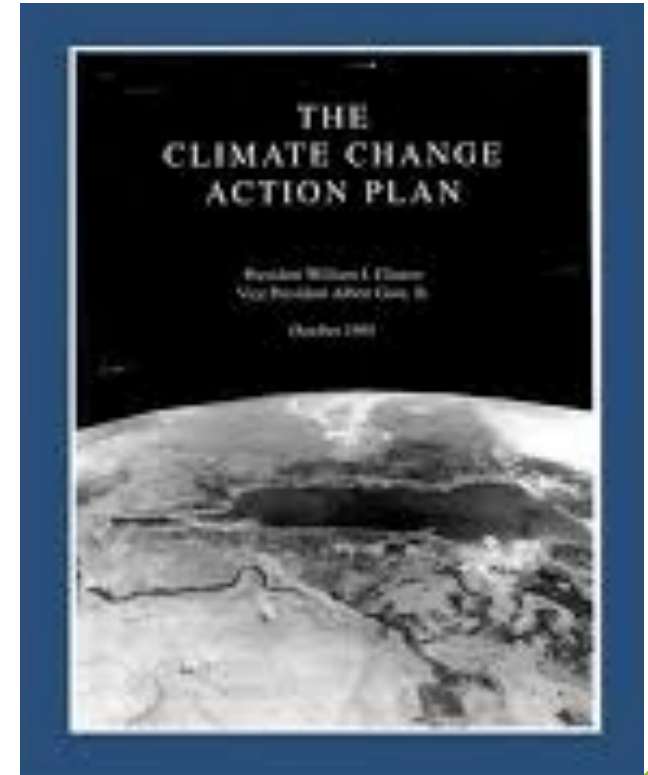
TRENDS & EXPECTATIONS

Trends

- Recognition of the food waste as a feedstock for AD plants and biogas production
 - Biogas as a fuel from organic waste included in the RFS2 under advanced fuel qualifying for the D3/D5 RINs
- Organic waste disposal bans-VT, CT, MA and RI
- Higher recycling and diversion goals
- Financial support for infrastructure development
- Wastewater treatment plants interested in using excess AD capacity for food waste

Biogas Opportunities Roadmap

- USDA, US-EPA, USDE- August 2014
- Part of the White House Climate Action Plan- Strategy to Reduce Methane Emissions
- Voluntary actions to reduce methane emissions and increase energy independence
- Estimations
 - >11,000 additional biogas systems (including farms, agriculture and WWTP) could be deployed in the US
 - Energy to power 3 million homes



Expectations

- AD plants currently under development:

Monticello, IN- Waste No Energy LLC

City of Portland, OR -
Columbia Biogas

Perris, CA - CR&R/
Eisenmann

County of Santa Barbara, CA –
Mustang Renewable



Town of Brunswick, ME

Town of Bourne, MA - Harvest Power

Johnson, Rhode Island- Blue Sphere

Prince William County, VA – TBD

City of Charlotte, NC - Blue Sphere

City of Columbia, SC - W2E

- Mixed waste processing plants with integrated AD capacity (MBT concept from EU)
- WTE facilities will have room for more waste due to increased organics diversion



Renewable Energy from Waste

RENEWABLE
Energy
FROM WASTE
CONFERENCE



NOVEMBER 17-20, 2014 >> SAN JOSE, CALIFORNIA

Food Waste or Fuel Source?

DEPARTMENTS - CRITICAL THINKING

Harvey Gershman

OCTOBER 16, 2013

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Hahvee...take out the gahbidge...it stinks!" my mom used to remind me of my household chore growing up in Pawtucket, R.I., in the '60s. We had a 30-gallon can for food waste in the back corner of our lot waiting to be collected by the city and delivered to pig farmers for feed. Neighboring Providence did it a little differently: It had to be bundled in newspapers and set out for collection, eventually to find its way to pig farmers.

Fast-forward to the new millennium. We are serious about increasing recycling even more by going after organics. The U.S. Environmental Protection Agency reports that food waste accounts for approximately 21 percent of landfilled municipal solid waste (MSW), or around 35 million tons per year (TPY). This waste is a resource that can be used to produce biogas, for power production or



HARVEY W. GERSHMAN

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Questions and comments?

Thank you!

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