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FOOD WASTE DIVERSION PROGRAMS – WHAT YOU NEED TO KNOW

NC SWANA Spring 2016 Technical Conference
April 25-28, 2016
Greensboro, NC



SWANA Applied Research Foundation

- Founded in 2001
- 41 Local Government and Corporate Subscribers
- Conducts applied research on topics submitted by and voted on by Subscribers
- Four Research Groups – Collection, Recycling, WTE, and Disposal.



SWANA FY2016 ARF Disposal Group Subscribers

Chester County SW Authority (PA)	Robert Watts	Executive Director
Delaware County SW Authority (PA)	Joseph Vasturia, PE	Chief Executive Officer
Delaware Solid Waste Authority (DE)	Richard Watson, PE, BCEE	Chief Operating Officer
City of Denton, TX	Scott Lebsack	Assistant Director of Solid Waste
Illinois SWANA Chapter	Karen Rozmus	Village of Oak Park, IL
Iowa SWANA Chapter	Mike Classen	Solid Waste Engineer (HDR)
Kent County, MI	Darwin Baas	Solid Waste Division Director
King County, WA	Kevin Kiernan	Assistant Division Director
Lancaster County SWM Authority (PA)	Brooks Norris	Senior Manager, Technical Services
Los Angeles County San. Districts (CA)	Mario Iacoboni	Supervising Engineer
Mecklenburg County, NC	Joseph Hack, QEP	Contracted Operations Manager
Metro Waste Authority (IA)	Jeff Dworek	Director of Operations
New River Resource Authority (VA)	Joe Levine, PE	Executive Director
New River Solid Waste Assn .(FL)	Darrel O'Neal	Executive Director
North Carolina SWANA Chapter	Joe Readling, PE	Vice President - HDR Engineering, Inc.
Prince William County, VA	Tom Smith	Solid Waste Division Chief
SCS Engineers	Robert Gardner, PE, BCEE	Senior Vice President
Smith Gardner Inc.	Mike Brinchek, PE	Senior Project Manager
SW Authority of Central Ohio (OH)	Scott Perry	Operations Director
SWA of Palm Beach County (FL)	Mark Hammond	Executive Director
City of Tucson, AZ	Martin Bey	Landfill Manager
Waste Comm. of Scott County (IA)	Kathy Morris	Director
Winston-Salem , NC	Jan McHargue, PE	Solid Waste Administrator

Food Waste Diversion – The New Frontier



Take the
Food Waste
Pledge

Food Waste Diversion Programs – How Will They Impact SWANA members

- SWANA members (you) will have to/get to:
 - Implement food waste diversion programs
 - Anticipate and address their impacts on other MSW system elements
 - Determine what programs will reduce local GHG emissions



Food Waste Diversion Programs – What You Need To Know

- Current Status
- Types of Programs
- Food Waste Processing Systems
- Impacts on Landfills
- Impacts on Composting Facilities
- Environmental Impacts
- Conclusions



Current Status

- Food waste characteristics
- Local Food Waste Diversion Programs
- National/State Policies and Regulations

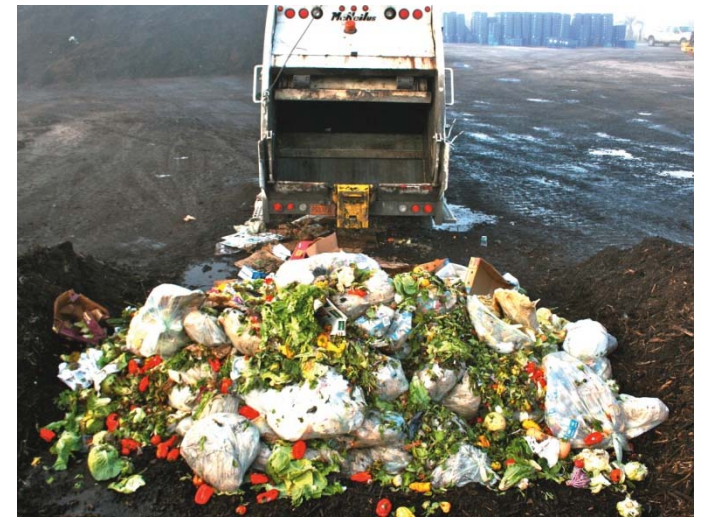
Food Waste ...

- Is moist - 70%
- Is heavy – 850 lbs/CY
- Is highly biodegradable – 96% volatile solids
- Biodegrades rapidly - decay rate of 0.19 per year.
- Contains pathogens



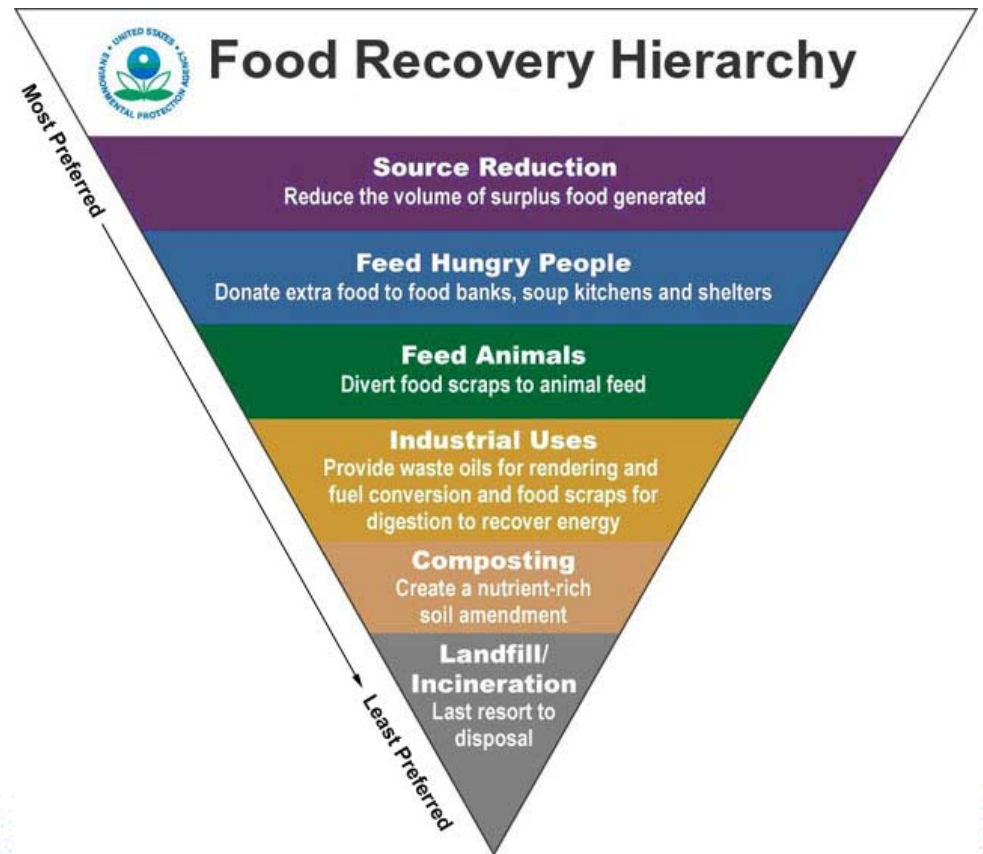
Local Food Waste Diversion Programs

- 198 residential source-separation programs in 2013
- 75% of programs in 3 states
 - CA – 33%
 - WA – 29%
 - MN – 12%
- All use composting to process food waste.
- Most accept meat/fish waste.



National/State Food Waste Policies/Regulations

- US EPA's Food Recovery Hierarchy
- EPA/USDA food waste Reduction Goal – 50% by 2030.
- Food waste disposal bans in three states
- Mandatory source separation of food waste in Portland, San Francisco and Seattle



Food Waste Diversion Program Types

- Single-family residential programs
- Multi-family residential programs
- Commercial food waste programs

Single-Family Residential Programs

- Collected weekly with yard waste
- Cannot use plastic bags to contain food waste
- Accept meat/fish/bones
- Unpleasant to participate – odors, flies, mold
- High waste diversion impact
 - 5-10 lbs/hh/week
 - Similar to curbside recycling
- Low Cost impact – if collected with yard waste



Multi-Family Residential Programs

- Food waste collected by itself
- Cannot use plastic bags to contain food waste
- More unpleasant to participate
 - Odors, flies, mold
 - Longer transport distances
- Low diversion rates – 2 lbs/hh/wk
- Cost – \$1.38/hh/mo (Seattle)



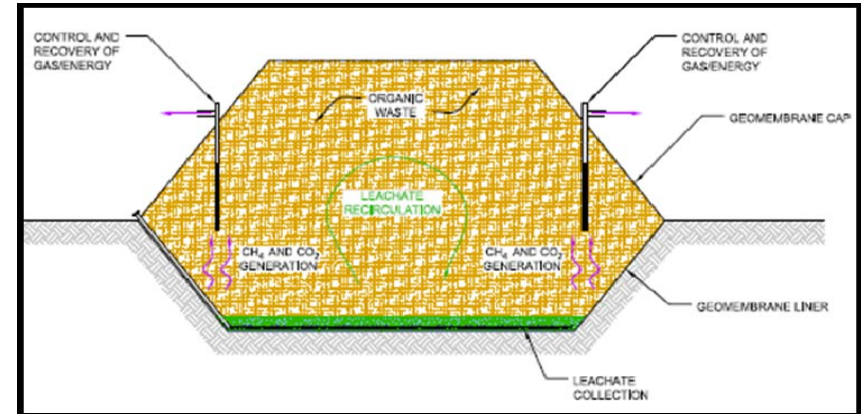
Commercial Food Waste Programs

- 67 commercial food waste programs
- Typical Program
 - 64-gallon carts serviced 3 times per week
- Average cost - \$14 per cubic yard of food waste collected
- Growing demand for services
 - State landfill bans
 - Farm to table strategies
 - Green corporate policies



Food Waste Processing Systems

- Anaerobic Digestion
 - Preferred process - biogas and compost
 - Expensive
 - Uncommon in U.S.
 - 160 facilities in Europe
- Composting
 - Used to process most food waste in U.S.
- Anaerobic Digestion at WWTPs
- Organics Processing Biocells at Landfills



Conceptual Sketch of HDR's Organic Recycling Biomodule

Impact on Landfills

- Landfill Airspace Utilization
- LFG Recovery
- GHG Emissions

Impacts on Landfill Airspace Utilization

Parameter	Food Waste	Mixed Waste
Input Waste		
Moisture Content	73%	20%
Dry Mass	27%	80%
Landfilled Waste		
Mass converted to LFG	29%	27%
Mass remaining in landfill		
- Dry mass	15%	69%
- <u>Water</u>	<u>76%</u>	<u>4%</u>
- Total	71%	73%

Impact on LFG Recovery - Reduction in Landfill Tonnage

Parameter	Units	Food Waste	Mixed Waste	Total
LFG Generation	Ft ³ Per Ton	7,303	6,614	
Waste Fraction		21.1%	78.9%	100%
LFG Generated	Ft ³	1,541	5,218	6,759
Collection Efficiency	%	52%	62%	60%
LFG Collected	Ft ³	801	3,254	4,055
Decrease in LFG Collected	Ft ³			801
	%			20%

Impact on LFG Recovery – Food Waste Replaced with Mixed Waste

Parameter	Units	Mixed Waste With Food Waste	Mixed Waste Without Food Waste
LFG Generated	Ft ³ /Ton	6,759	6,614
LFG Collection Efficiency	%	60	62
LFG Collected	Ft ³ /Ton	4,055	4,124
Increase in LFG Collected	Ft ³ /Ton	--	69
	%	--	2

Impact on GHG Emissions – Landfills With LFG Recovery and Electricity Generation

Parameter	Basis/Units	Net GHG Emissions (MTCO ₂ e)
Mixed Waste Emissions – Including Food Waste	Per Ton MSW	0.15
Food Waste Emissions	Per Ton Food Waste	0.43
Mixed Waste Emissions – Without Food Waste	Per Ton MSW	0.08
Emission Reductions	Per Ton MSW	.07
	%	50%

Impacts on Composting Facilities

- Compost mixture - 66% food waste and 34% bulking agent (weight basis: shredded branches)
- Co-composting yard waste/food waste not permitted in some states
- Permit modification may be required



Impacts on Composting Facilities

- Food waste composting concerns
 - Odors
 - Pests
 - Pathogens
 - Water contamination
- Cannot be stockpiled or unmixed for more than 24 hours
- Negative Impacts on compost quality
 - Plastic produce stickers
 - Food packaging materials



Environmental Impacts

- WARM Model – Base Case Assumptions
- WARM Model – Alternate Assumptions
- Levis and Barlaz Analysis
- LA County Sanitation Districts Analysis

GHG Impacts – WARM Base Case

Process	Technology	GHG Impacts (MTCO ₂ e Per Short Ton)	Rank
Anaerobic Digestion	Wet AD	--	--
Composting	Windrow	(0.14)	1
Landfill Disposal	LFG Recovery and Electricity Generation	0.26	3
Combustion	Mass Burn WTE Facility	(0.13)	2

GHG Impacts – WARM – Alternate Assumptions

Process	Technology	GHG Impacts (MTCO ₂ e Per Short Ton)	Rank
Anaerobic Digestion	Wet AD	--	--
Composting	Windrow	(0.04)	3
Landfill Disposal	LFG Recovery and Electricity Generation	(0.05)	2
Combustion	Mass Burn WTE Facility	(0.13)	1

GHG Impacts – Levis and Barlaz

Process	Technology	GHG Impacts (MTCO ₂ e Per Short Ton)	Rank
Anaerobic Digestion	Wet AD	(0.40)	1
Composting	Windrow	(0.15)	3
Landfill Disposal	LFG Recovery and Electricity Generation	(0.24)	2
Combustion	Mass Burn WTE Facility	--	--

GHG Impacts – LA County Sanitation Districts

Process	Technology	GHG Impacts (MTCO ₂ e Per Short Ton)	Rank
Anaerobic Digestion	Wet AD	(0.24)	2
Composting	Windrow	(0.16)	3
Landfill Disposal	LFG Recovery and Electricity Generation	(0.31)	1
Combustion	Mass Burn WTE Facility	--	--

Conclusions

- SWANA solid waste managers will face increasing pressure to implement food waste diversion programs.
- These programs will have both positive and negative impacts on other MSW system elements that should be understood and planned for.
- Processing food waste at composting facilities can be problematic.
- The GHG impacts of food waste management options should be analyzed locally to determine the best option.