Future Business, Energy and Environmental Case for Recycling

Presented to the

Association of Ohio Recyclers

By

Harvey W. Gershman

November 10, 2010

Outline

- Who I am
- Solid Waste Management Today
- Recycling More for Less
- Looking Ahead
- Comments for Ohio
- Summary

2

GBB Overview

- Headquartered in Fairfax, VA
- Established in 1980 as an objective adviser to governments, institutions, and businesses
- 30 years implementing innovative solutions for waste and recycling industry
- Dedicated exclusively to solid waste management; more focused than broad-based firms
- "Change Agents" to produce better services and facilities

Celebrating our 30th Anniversary

3

SOLID WASTE MANAGEMENT TODAY

4

EPA's Waste Management Policy

(Previous) waste management hierarchy:
- Source reduction
- Recycling
- Landfilling and incineration

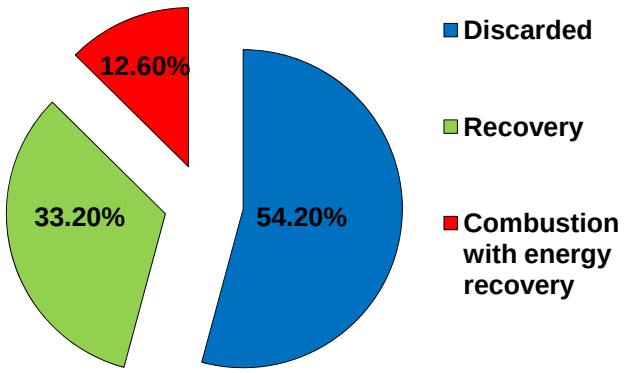
(Current) waste management hierarchy:
- Source reduction
- Recycling
- **Incineration/thermal processing with energy recovery**
- Landfilling and incineration (without energy recovery)

Source: Rick Brandes, U.S. EPA, 2009

In 2005, EPA designated WTE energy as renewable energy and 35% recycling goal established!

5

MSW Disposal in America

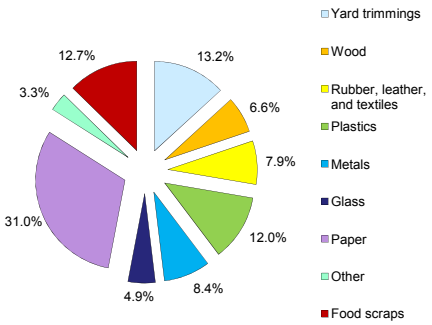


Source: USEPA 2008

6

Waste Facts

- Each person in U.S. today generates 1,643 lbs. per year
  - In 2010, to grow to 1,752 lbs. per year
- What is in our waste?
  - Recyclables
    - Feasible now to recycle up to 50-70%
  - Energy content of remainder: 5,500 BTUs per pound
    - Coal at 9,000 BTUs per pound

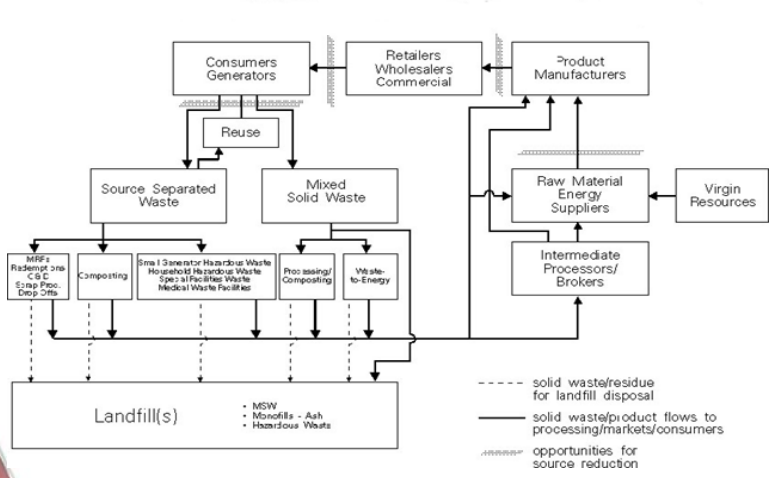


Total: 250 Million Tons (Before Recycling)

Source: US EPA, 2008 data

7

The Integrated Solid Waste Management System



Note: Biomass handling, treatment, reuse and disposal can be incorporated into this system as a separate waste stream

8

U.S. Solid Waste Management Programs/Facilities*

Program/Facilities	2000	2002	2004	2008
Curbside Program	9,709	8,875	7,689	-
Yard Trim Facilities	3,846	3,227	3,474	-
Landfills (MSW)	2,142	1,767	1,654	1,908
Incineration	132	107	109	115
Landfills (C&D)	1,825	1,931	1,574	-
Transfer Station	3,970	3,895	3,744	-

*Source: BioCycle, State of Garbage; various years

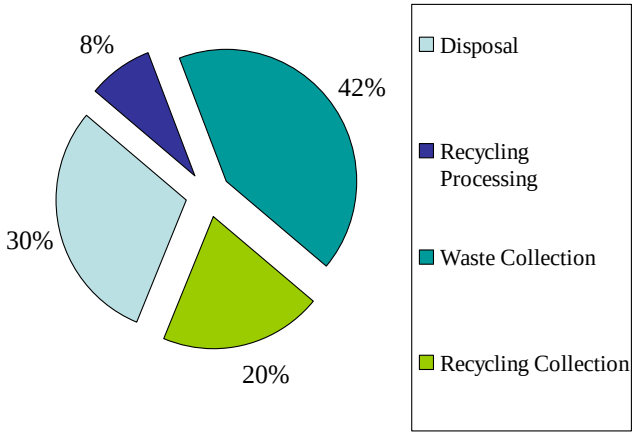
Materials Recycling Facilities in U.S.
Source: Governmental Advisory Associates, Inc.

2002 - 462	**2006** -539

9

MSW Management System Costs $100 - $400 per ton

Source: GBB, 2009



10

Value* of Recyclables in One Ton of Waste Sorted and Sold to Markets

Year	$ per Ton Equivalent
1994	$40.00
1995	$104.00
1998	$48.00
2005	$85.00
2008	$150.00
2009	$60.00
2010	$145.00

*Does not include any redemption values some states rebate to processors.

Source: GBB internal data base.

11

Air Emissions of Contenders for WTERT Award in 2006

Emission	WTE-A (mg/Nm^3)	WTE-B (mg/Nm^3)	WTE-C (mg/Nm^3)	Average of 10 Finalists (mg/Nm^3)	EU Standard (mg/Nm^3)	US EPA Standard (mg/Nm^3)
Particulate matter (PM)	0.4	1.8	1	3.1	10	11
Sulphur Dioxide (SO^2)	6.5	7.5	3	2.96	50	63
Nitrogen oxides (NO^x)	80	11	58	112	200	264
Hydrogen chloride (HCl)	3.5	0.5	0.7	8.5	10	29
Carbon Monoxide (CO)	15	7	15	24	50	45
Mercury (Hg)	0.002	0.005	0.002	0.01	0.05	0.06
Total Organic carbon (TOC)	0.5	NA	0.9	1.02	10	n/a
Dioxins (TEQ), ng/m^3	0.002	0.002	0.015	0.02	0.10	0.14

Source: Themelis, N.J. Thermal Treatment Review. Waste Management World, July-August 2007.

12

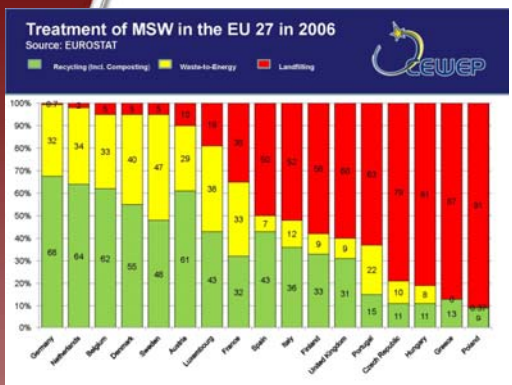
EPA Warm Model Comparison Between Recycling Rates with Composting or Waste to Energy

Baseline Description	Alternative	Total GHG Emissions (MTCO2E/day) from:			
		Baseline MSW Generation and Management	Alternative MSW Generation and Management	GHG Emission or Reduction Difference	Barrels of Oil Saved (bbls/day)
Waste landfilled	20% Recycling	110	(310)*	(420)	523
Waste landfilled	50% Recycling	110	(543)	(653)	907
Waste landfilled	50% Recycling and Rest to Composting	110	(597)	(707)	904
Waste landfilled	50% Recycling and Rest to Waste To Energy	110	(661)	(771)	1,047

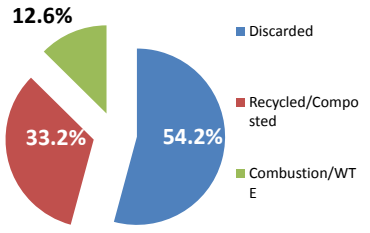
*Note: numbers in parenthesis are negative showing reductions in CO2 emissions.

13

Why Can't U.S. be like EU Countries?



U.S. MSW Disposal (USEPA 2006)



14

Disposal Taxes

- U.S. – recycling is approx. 30% and WTE < 10%
  - Federal – none
  - States – varies from none, often $1 per ton, and high of $12.70 per ton in Wisconsin
- Europe Countries – recycling > 50% and WTE 30-40%
  - Germany – none; landfill ban for untreated waste since 2005
  - Netherlands - 14-86 Euros*
  - Belgium – 55 to 79 Euros
  - Denmark – 50 – 63 Euros

*Euros Per Tonne:
  - 1 Euro = approx. $1.40 and 1 Tonne = approx. 2,205 lbs.
  - So, 50 Euros per Tonne = approx. $63.64 per ton

15

Why are we fighting with Zero Waste?

- Set aggressive and sustainable recycling goals in partnership with WTE
- *Do we need soil amendment or fossil fuels displaced?*
- Waiting for unrealistic recycling sends waste to landfills

How much waste are we for?

…as little as possible!

16

RECYCLING MORE FOR LESS

Common Elements for Successful Residential Programs

- ✓ Closed market collection services either provided efficiently by municipality or under long-term contract with private service provider
- ✓ Large MRF either publicly owned or under long-term contractor with reasonable revenue sharing back to municipality
- ✓ Supportive public officials
- ✓ Sustained and excellent public education program
- ✓ Large carts for residents to place single stream materials
- ✓ Pay as you throw charging system or user fees
- ✓ Higher demographics definitely help
- ✓ Urban or suburban environment
- ✓ High avoided disposal costs

18

Factors that Drive Cost Down

- ✓ Unbundling collection from processing
- ✓ Long-term contracts
- ✓ Automated collection
- ✓ Every other week collection for recyclables and yard waste
  - ✓ Even once per month for recyclables
  - ✓ Seasonal for yard waste
- ✓ Call in bulk service

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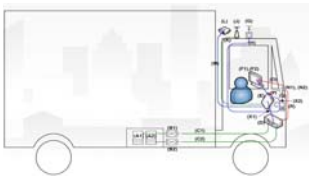
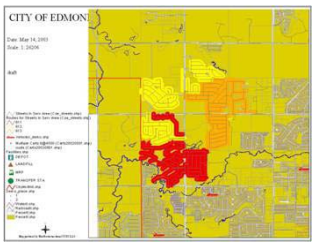
19

Collection Improvements Can Lower Cost and Improve Service

- ✓ Hardware
  - ✓ Semi-automation
  - ✓ Automation
  - ✓ Split packers
  - ✓ On-board computers
  - ✓ Cell phones
- ✓ Software and services
  - ✓ Computerized Routing
  - ✓ GPS
  - ✓ Asset management
  - ✓ Customer service
  - ✓ Web site and email reminders for customers
- ✓ Maintenance contracts
- ✓ Closed market contracting





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Commercial Waste and Recycling

- More control and lower cost in closed markets
- Right sizing services key
- Single-stream for commercial accounts too
- Food waste/organics collection for
  - Remaining waste is more "MRF-able"

www.EnviRelation.com

21

What options to consider?

- Changing collection frequency
- Dual vs. single stream for recyclables
- MRF services or your own MRF
- Adding food waste to yard waste
- New carts
- Closing collection market
- Mandatory commercial recycling requirements
- Benchmark comparisons to others

22

Develop Plan with Objectives and Stakeholders Input

- ❑ Diversion
- ❑ $$$$
- ❑ Facilities/Services
- ❑ Public-Private Partnerships
- ❑ Union
- ❑ Schedule

How much waste are we for?

...as little as possible!

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23

LOOKING AHEAD

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24

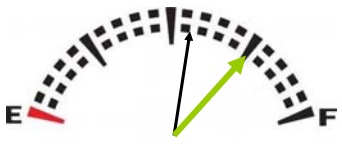
Resource Recycling October 2010 Conference Take-Aways

- NRC recycled — National Recycling Coalition
- RONA ramping up — Recycling Organizations of North America
- Extended Producer Responsibility (EPR) – not if, but when and how
- Changes in recycling ***metrics***
- Companies like WalMart wagging the ***dog*** with product stewardship and sustainability initiatives

25

Aluminum Industry Wants to Move the Recycling Needle

- Industry Goal: Achieve 75% recycling for aluminum (UBCs, containers and foil) by 2015, from current 57.4%



26

Aluminum Association is Evaluating Six Options

Worked with GBB to define options for consideration:

- Public Education
- Pay as You Throw (PAYT)
- Landfill Bans
- Mandatory Recycling
- Extended Producer Responsibility (EPR)
- Financial Incentives

27

Mandatory Recycling

Requiring Separation of Recyclables from Trash

- Pros
  - Increased recovery of recyclables
  - Reduced waste in landfills and WTE
  - Revenue from sale of recyclables
  - Energy and GHG savings
- Cons
  - Resistance from residents
  - Requires extensive public education
  - Requires monitoring and enforcement
  - Risk of illegal dumping
- Costs
  - Net costs can be lower for recycling vs. disposal
    - Collection needs to be efficient
  - Costs for enforcement, public education
- Outcomes
  - Revenues from sale of recyclables, reduced disposal costs, extended landfill life

28

EPR

Producers bear responsibility for "cradle to grave" product life cycle costs

- Pros
  - Shifts disposal costs from local governments to market price for products, leading to environmentally sound purchasing
  - Reduces waste disposal costs where producers take back and recycle
  - Increases recovery rates; extends landfill life
  - Companies may adjust manufacturing, design for the environment
- Cons
  - Opposition from companies
  - Not well developed in U.S.; many questions on how to implement
- Costs
  - Market prices rise; consumers bear cost burden – resistance
  - Monitoring and enforcement costs
- Outcomes
  - Environmentally responsible products; efficient recovery; lower disposal costs; extended landfill life

29

Financial Incentives

Rewarding Recycling

- Pros (combined with single stream recycling)
  - Increased recovery, feedstock
  - Reduced waste disposal costs
  - Energy and GHG savings
  - Extended landfill life
- Cons
  - Hard to implement with multifamily or tenant properties
  - Technology necessary to track participation and awards
  - Hard to evaluate consumer motivation (incentives vs. single stream)
- Costs
  - RecycleBank fees: up to $2.50/HH/month
- Outcomes
  - Doubles recycling rates (RecycleBank)

30

Aluminum Association's Call to Action

- Evaluating various strategies
- Implementing a unified legislative approach at local, state, and/or federal levels
- Working with industry partners
- Getting close: Stay tuned and join the movement!

31

468 (and counting) Companies Offering Technology and/or Development Services

- 13 Aerobic Composting
- 88 Anaerobic Digestion
- 26 Ethanol Fermentation
- 163 Gasification
- 46 Plasma Gasification
- 41 Pyrolysis
- 26 WTE: mass burn, modular, dedicated boilers, and RDF
- 70 Others (agglomeration, autoclave, de-polymerization, thermal cracking, steam reforming, hydrolysis)

Source: Gershman, Brickner & Bratton, Inc., September 2010.

32

Technologies and Risk

Source: Gershman, Brickner & Bratton, Inc. September 2010

Alternative	Risks/Liability	Risk Summary
Mass Burn/WaterWall	Proven commercial technology	Very Low
Mass Burn/Modular	Proven commercial technology	Low
RDF/ Dedicated Boiler	Proven commercial technology	Low
RDF/Fluid Bed	Proven technology; limited U.S commercial experience	Moderate
Pyrolysis	Previous failures at scale, uncertain commercial potential; no operating experience with large scale operations	High
Gasification	Limited operating experience at only small scale; subject to scale-up issues	High
Anaerobic Digestion	Limited operating experience at small scale; subject to scale-up issues	High
Mixed-Waste Composting	Previous large failures; No large-scale commercially viable plants in operation; subject to scale-up issues	Moderate to high
Chemical Decomposition	Technology under development; not a commercial option at this time	High

33

Recent Activities with Waste Processing Technologies in the U.S.

- Locations that have investigated conversion technology projects:
  - New York, NY; City of Los Angeles, CA; Los Angeles County, CA; City of Sacramento, CA; Tallahassee, FL; Broward County, FL; King County, WA
  - 80 + different companies responded
- Locations investigating conversion technologies:
  - San Bernardino County, CA; City of Glendale, CA; Santa Barbara County, CA
- Locations advancing new facilities with 'proven' technologies:
  - Frederick County, MD (NMWDA); Harford County, MD (NMWDA); Palm Beach County, FL (SWAPBC)
- Mass burn expansions announced/underway/completed:
  - Baltimore, MD; Hillsborough County, FL; Honolulu, HI; Lee County, FL

34

OHIO

35

Ohio Overview

Source: "The State of Garbage"; BioCycle, October 2010; all data 2008

- Population: 11.5 million
- MSW (includes residential, commercial, industrial, agricultural, CDD, and tires; no imports): 28.2 million tons
- MSW: 15.3 million tons
  - Recycled: 2.0 million tons (13.1%)
  - Composted: 0.8 million tons (5.2%)
  - WTE: 0 (There once was one in Columbus)
  - Landfilled: 10.3 million tons (67.3%)
    - 42 landfills
    - $32 per ton average tipping fee
- Generation rate: 1.15 tons/person/year
- Imports: 2.3 million tons
- Exports: 0.9 million tons
- Landfill bans:
  - Yard trimmings when separately collected
  - Whole tires

36

Ohio

- New Recycling Goals in March 2010:
  - Ohio EPA adopted 50 % landfill diversion
    - 2002 diversion at 45%
    - 2007 diversion at 40.7%
    - Plan supports technology that uses waste and produces energy
- State solid waste management plan every 3 years
- Ohio EPA chairs Solid Waste Management Advisory Council to advise and assist in State Plan
- 88 counties form 52 solid waste management districts; update plans every 3-5 years

37

Ohio DSIWM Fee Collection

- Solid Waste Disposal Fee is $4.75* per ton, regardless of the origin of the waste:
  - One dollar of the fee goes to fund state hazardous waste cleanup activities
  - One dollar per ton funds Ohio EPA's solid waste, infectious waste and construction demolition debris regulatory programs
  - The remaining $2.50 per ton goes into Ohio's Environmental Protection Fund
  - $0.25 to fund soil and water conservation programs through the Ohio Department of Natural Resources

*Increased from $3.50 per ton effective August 1, 2009

38

What Should be Done with Ohio's Waste?

- ✓ Ohio wants jobs and sustainable industry added here
- ✓ Ohio wants to be energy independent
- ✓ Waste disposal very abundant and inexpensive
- ✓ Low level of recycling
- ✓ Recyclables are valuable
- ✓ Brownfield sites across the state without funding to be cleaned up for re-used
- ✓ Ohio a crossroads state to >50% of U.S. mainland population within 6 hours by road

39

Ohio Recyclables for New Re-Manufacturing

Waste Component	%	Tonnage to 50% Reduce/Reuse/Recycle
Paper	34	1,870,000
Yard	13	715,000
Food	12	660,000
Plastic	12	660,000
Metal	8	440,000
Textiles, Rubber, Leather	7	385,000
Glass	5	275,000
Wood	6	330,000
Other	3	165,000
Total	100	5,500,000

•$1.3 Billion in Capital Needed
•Jobs: 1,500 at MRFs alone; re-manufacturing add more; plus multiplication factor.
*•**5X available within 6 hours road time from Ohio***

40

Ohio Energy from Waste

WTE Tons Per Year Or BBLs Oil Equivalent	KWHrs Per Year	MWs Capacity
5,500,000	3,025,000,000	377

•$3.8 Billion in Capital Needed

•Jobs: about 1,000 at Facilities; plus multiplication factor

41

Change Waste and Energy Economics

- Waste disposal is too cheap
  - Increase the MSW Disposal Tax to $25 per ton for every ton disposed in a landfill or incinerated without energy recovery
  - $275 million per year in capital; $5 billion needed
- Energy is too cheap
  - Add $0.25 tax on every gallon of gasoline sold
  - 1,406 million gallons sold in Ohio* = $352 million per year in capital
- Apply $$ to advance recycling and renewable energy

* Based on 3,852,900 gallons delivered by refineries in 2008; U.S. DOE Energy Information Agency

42

Summary Points

43

Establish New Ohio Goals

- Ohio already has the 25% by 2025 for renewable energy goal – great!
  - Just make sure MSW stays as renewable fuel
- Add one for waste:
  - 50% recycling and 50% WTE by 2025 too!

44

Federal Policy Considerations

- ❑ Increase recycling goals and establish WTE goal also
- ❑ Make MSW "renewable" in all states
- ❑ Share WTE renewable $ benefits to increase recycling
- ❑ Create individual and business federal tax credits if your jurisdiction meets federal recycling goal
- ❑ Federal legislation being considered could provide significant benefits

45

Future Planning Considerations

1. Set 'real' diversion/recycling goals at 50-60% level with supporting policies and services
2. Make collection as efficient as possible while supporting robust recycling
3. Consider public ownership structure to assure waste flow control
4. Set up services to a greater share of revenues
5. Consider RDF in existing coal-fired electric utility boilers or cement kilns
6. Do long-term contracting with service providers with track record
7. Procure collection and processing services cooperatively
8. Proven WTE in the $100 per ton range; needs higher energy revenues to be competitive with landfill disposal
9. Emerging technologies promising much lower costs than traditional WTE…stay tuned
10. Have landfill disposal capacity secured for long-term access

46

The Ultimate Goal:

Fully Integrated and Efficient Waste Management System with Significant Diversion and WTE …in a 50-50 partnership!

47

Thank you!!

Harvey W. Gershman

hgershman@gbbinc.com

1-800-573-5801
1-703-663-2424 (office)
1-703-698-1306 (fax)

www.gbbinc.com

48