



Best Practices on Solid Waste and Recycling

Presented to:
The Municipal Waste
Management Association

By:
Harvey W. Gershman
President



GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS



GBB Overview




- Headquartered in Fairfax, VA
- Established in 1980 as an objective adviser to governments, institutions, and businesses
- Over 26 years implementing innovative solutions for the waste and recycling industry
- Dedicated exclusively to solid waste management; more focused than broad-based firms
- Principals and senior staff have 150+ years of combined experience
- “Change Agents” to produce better services and facilities




GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

2



Agenda

1. Before Earth Day 1970
2. Earth Day 1970
3. Solid Waste Management Now
4. Some Best Practice Advice
5. Where does Waste-to Energy or Alternative Technologies Fit in
6. Summary Points




3



1. BEFORE EARTH DAY 1970




4




Looking Back Personally....


- The backyard burn barrel
- The in-ground garbage can
- Deposits on soda bottles
- Grandpa's ball of string
- Grandpa's oak leaves brushes
- Annual trips to the scrap yard with Dad
- Fly ash from the City incinerator



5



2. EARTH DAY 1970



6

 MWMA

The First Earth Day – April 22, 1970

Earth Day led the way to Federal legislation for improving our environment

- Clean Air Act
- Clean Water Act
- Resource Conservation and Recovery Act




 GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

7

 MWMA

The First Earth Day – April 22, 1970

- Solid waste hierarchy
 - Reduce
 - Reuse
 - Recycle
 - Recover
- *How did this affect me?*
 - *In 1970, a Senior Mechanical Engineering student*
 - *“Reclamation for a Town of 20,000” design team project*



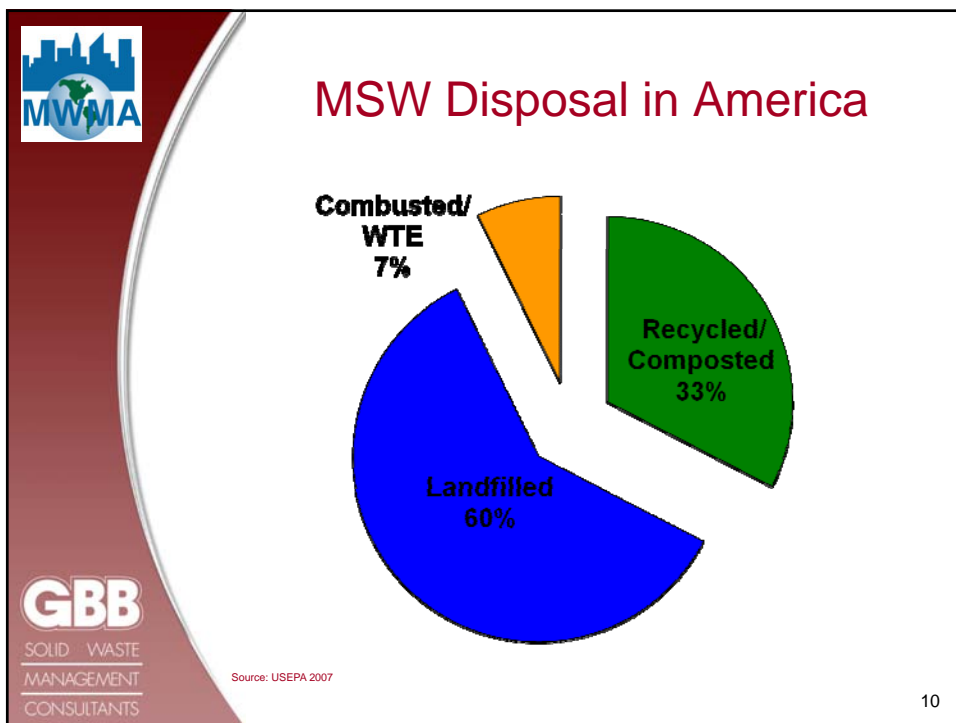
 GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

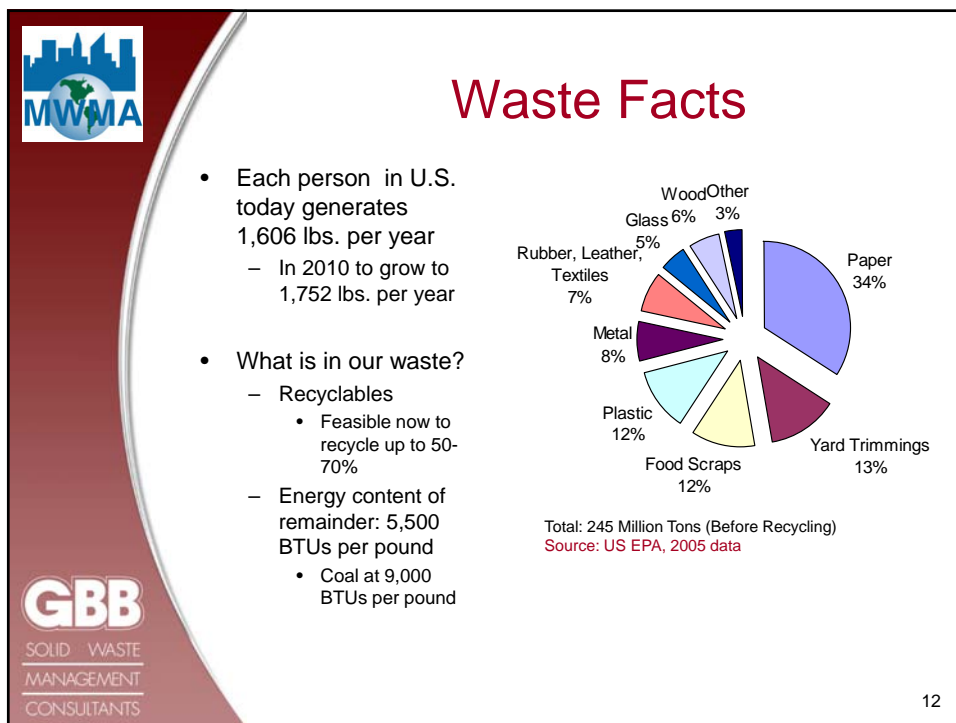
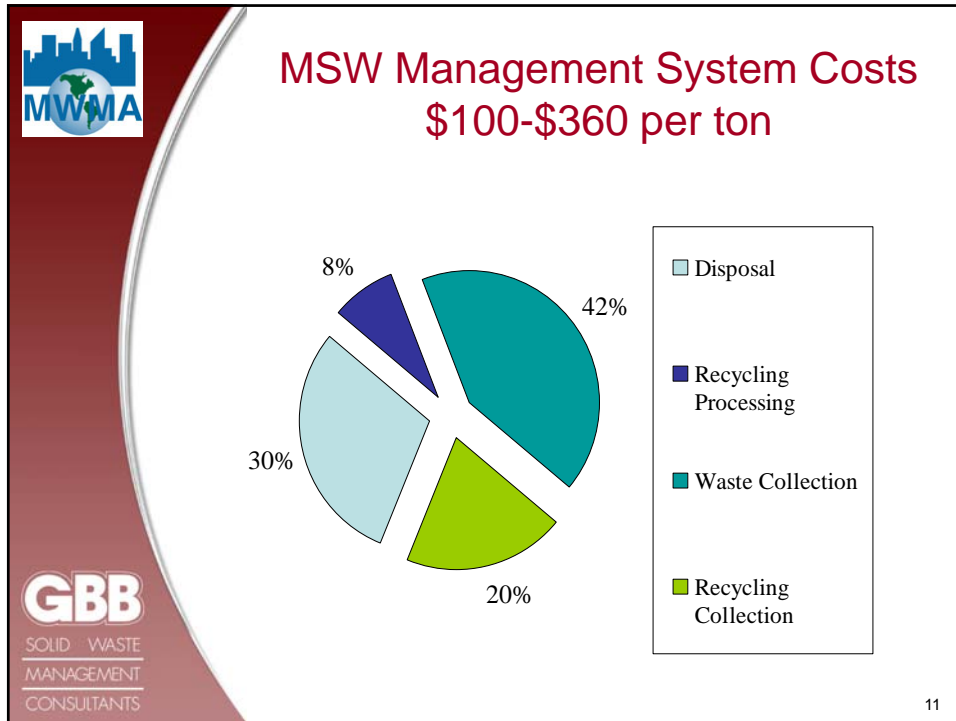
8


**3. SOLID WASTE
MANAGEMENT NOW**

GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

9





MWMA

Residential Collection



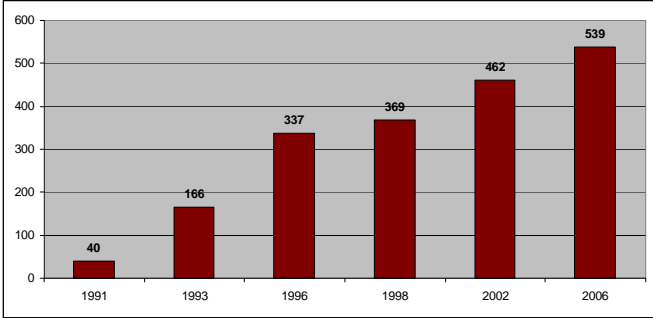
GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

Ontario, CA Carts for Recyclables, Waste, Yard Waste

13


MWMA

MRFs Operating in the U.S.




Year	Number of MRFs
1991	40
1993	166
1996	337
1998	369
2002	462
2006	539

Source: Governmental Advisory Associates, Inc.



Loose Newsprint



Mixed Paper and baled Aluminum Cans

GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

14



Recyclables Processing/MRF

MRF = Materials Recovery Facility

Recyclables sorted by machine, air, magnet, and hand into each marketable material category

Single-stream processing trend now



Waste Management Recycle America, Elkridge, MD



SOLID WASTE
MANAGEMENT
CONSULTANTS

15



WTE is Accepted Worldwide

Location	Number of Facilities	Amount of MSW Managed by WTE as % of Total MSW Generated
USA	89	8-15% based on MSW reported by EPA and Biocycle data
Europe	400	varies from country to country
Japan	100	70 to 80%
Other nations (Taiwan, Singapore, China, etc.)	70	varies from country to country

Source: IWSA website; (statistics as of 2004)



Brescia, Italy



Vienna, Austria



SOLID WASTE
MANAGEMENT
CONSULTANTS

16



Waste-to-Energy:

\$14 Billion of Productive Assets Servicing the U.S.



North Broward County, FL




Alexandria/Arlington, VA



Springfield, MA



17




U.S. WTE Plants by Technology

Technology	Operating Plants	Daily Design Capacity (TPD)	Annual Capacity ⁽¹⁾ (Million Tons)
Mass Burn	65	71,354	22.1
Modular	9	1,342	0.4
RDF -Processing & Combustion	10	15,428	4.8
RDF -Processing Only	5	6,075	1.9
RDF -Combustion Only	5	4,592	1.4
Total U.S. Plants ⁽²⁾	94	98,791	30.6
WTE Facilities	89	92,716	28.7

⁽¹⁾ Annual Capacity equals daily tons per day (TPD) of design capacity multiplied by 365 (days/year) multiplied by 85 percent. Eighty-five percent of the design capacity is a typical system guarantee of annual facility throughput.

⁽²⁾ Total Plants includes RDF Processing facilities that do not generate power on site.

Source: J.V.L. Kiser and M. Zannes, Integrated Waste Management Services Association, April 2004




18




Zero Waste Movement




19



4. SOME BEST PRACTICE ADVICE




20




Reducing Collection Costs

- There is better technology today - hardware and software
- The public *can* compete with the private sector
- ***Controlling who collects should lower costs; set up franchises and/or contract areas***
- Charge the customer for service



21



Common Elements for Successful Residential Programs

- ✓ Large carts for residents to place single stream materials
- ✓ 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
- ✓ Pay as you throw charging system or user fees
- ✓ Sustained and excellent public education program
- ✓ Supportive public officials
- ✓ Higher demographics definitely help
- ✓ Urban or suburban environment
- ✓ High avoided disposal costs



22



PLANNING AND PROCUREMENT ISSUES

23



What are your goals?

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



*How much waste are we for?
...as little as possible!*

24



What do you have now?


- Collection on a task system
- Union contract constraints
- Asset review
- Contracts review
- Organization review
- Maintenance review
- Input from customers
 - *What do they want?*






SOLID WASTE
MANAGEMENT
CONSULTANTS


25



What does it cost?


- Full cost management review
- Functionality benchmarking
- Look for areas to improve
- Revenues review
 - *Are all customers being charged?*
 - *Are customers charged the right amount?*

Functionality	Amount
Waste Collect - Contract	\$17.29 million
Litter Bin Collect	\$0.064 million
Waste Collect - City	\$0.57 million
Disposal (North LF)	\$12.34 million
Trash Processing (Wood, WG)	\$1.11 million
Recyclables Collection	\$3.49 million
Recyclables Processing	\$0.47 million
Other Reduce/Recycling	\$0.28 million
HHW	\$0.045 million
Other	\$1.08 million
TOTAL COST	\$36.74 million





SOLID WASTE
MANAGEMENT
CONSULTANTS

26




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


27



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-Early	\$150.00
2008-Now	Declining Fast

Source: GBB internal data base



28



Getting Closer To Zero Waste

- Carts
- Variable rate structures
- Weekly collection of recyclables, yard and food waste
- C&D processing and recycling
- Education: people and politicians
- Collection control
- Collection efficiency, including use of co-collection vehicles
- Diversion incentives for Service Providers
- Making Buy Recycled a Priority
- Changing local ordinances and regulations
- Reuse centers
- Mandatory separation requirements
- Landfill bans



29




Commercial Waste and Recycling

- Less control and higher costs in open markets
- More control and lower cost in closed markets
- Right sizing services key
- Single-stream for commercial accounts too
- Add food waste/organics collection for greater diversion
 - Remaining mixed waste is more MRF-able






30



Procurement and Implementation Management

- ✓ Enlightened Elected Officials and Purchasing Agents
- ✓ Staff Resources
- ✓ Game Plan
- ✓ Incremental Decision-Making
- ✓ Management & Operations Capability



SOLID WASTE
MANAGEMENT
CONSULTANTS

31



The Road to Discovery

- Proper solid waste management planning, e.g. Hawaii
 - State law with prescriptive process
 - Must involve an advisory committee and public process
 - Plans thus far have put forward 60% diversion target
- CT recent state plan update sets diversion target at 57%



SOLID WASTE
MANAGEMENT
CONSULTANTS

32

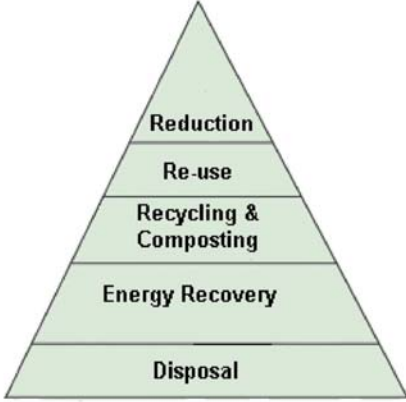


5. WHERE DOES WASTE TO ENERGY OR ALTERNATIVE TECHNOLOGIES FIT IN

The slide features a red and white border with the MWMA logo at the top left and the GBB logo (Solid Waste Management Consultants) at the bottom left. The number 34 is in the bottom right corner.




Waste Management Hierarchy




The pyramid is divided into five horizontal sections from top to bottom: Reduction, Re-use, Recycling & Composting, Energy Recovery, and Disposal.

In 2005, EPA designated WTE energy as renewable energy.



35




U.S. WTE Plants by Technology

Technology	Operating Plants	Daily Design Capacity (TPD)	Annual Capacity ⁽¹⁾ (Million Tons)
Mass Burn	65	71,354	22.1
Modular	9	1,342	0.4
RDF -Processing & Combustion	10	15,428	4.8
RDF -Processing Only	5	6,075	1.9
RDF -Combustion Only	5	4,592	1.4
Total U.S. Plants ⁽²⁾	94	98,791	30.6
WTE Facilities	89	92,716	28.7


⁽¹⁾ Annual Capacity equals daily tons per day (TPD) of design capacity multiplied by 365 (days/year) multiplied by 85 percent. Eighty-five percent of the design capacity is a typical system guarantee of annual facility throughput.

⁽²⁾ Total Plants includes RDF Processing facilities that do not generate power on site.

Source: J.V.L. Kiser and M. Zannes, Integrated Waste Management Services Association, April 2004




36



Some U.S. WTE Factoids

- Displaces energy from fossil fuels
- In U.S., some 32 million tons of MSW goes to WTE creating over 2,300 MWs of electricity, while some 138 million tons go to landfills annually
- MSW could generate an additional 6,000 MWs of electricity
- Air emissions
 - Controlled under the federal Clean Air Act; more stringent than for utility and industry boilers
 - 89 existing US facilities meet standards
- Ash management issues
 - Bottom and fly ash generally combined for disposal
 - Significant ferrous metals removal at facilities; some non-ferrous; some aggregate and alternative daily cover applications
 - Ash monofills, built to Subtitle D standards, generally used to dispose ash




37



Alternative...a.k.a. Conversion Technologies

- Biological
 - Aerobic Composting
 - Anaerobic Digestion/Codigestion
 - Biodiesel
 - Bioethanol
 - Biological Pretreatment
 - Vermicomposting
- Thermal/Chemical
 - Acid Catalysis & Distillation
 - Direct Combustion
 - Gasification/Pyrolysis
 - Microwave Processes
 - Plasma-Arc
 - Thermal Decomposition
- Processing
 - Fiberboard and Construction Composites
 - Refuse Derived Fuels



Source: Gershman, Brickner & Bratton, Inc. September 2008.

38




Alternative Technologies and Cost – 22 Firms Reviewed

Technologies	Size Range (Tons per Year)	New York City \$ Per Ton	City of Los Angeles \$ Per Ton
Gasification; Plasma; Anaerobic Digestion; Mass Burn; Pyrolysis	180,000-1,000,000	\$200-700	\$136-900




39




Technologies and Risk

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



Source: Gershman, Brickner & Bratton, Inc. September 2008.


40




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.




41




6. Summary Points

- Set 'real' diversion/recycling goals higher (real 50-60%) with supporting policies, programs, and services
- Public ownership structure helps assure waste flow control and keep a greater share of revenues
- Current disposal cost environment needs to be high to support WTE economically, e.g. approaching \$100 per ton
- Landfill mining for recyclables and WTE feedstock will add significant cost
- Do long-term contracts with service providers with track record
- Beware of vendors offering unproven technologies with attractive economics and promises
- Landfill disposal capacity always required – secure under long-term contracts



42




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



GBB
SOLID WASTE
MANAGEMENT
CONSULTANTS

43