

**Waste-to-Resources**  
International Symposium MBT & MRF

# North American Perspective on Integrated Solid Waste Management

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Introductions

History of the MSW  
management in the US

Management  
Practices

Technology  
Review

On-going projects

Opinion & Trends

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## GBB -- Quality – Value – Ethics – Results



- Established in 1980
- Solid Waste Management and Technology Consultants
- Helping Clients Turn Problems into Opportunities

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## GBB Waste Technology Services

- Economic, technical, and environmental reviews
- Markets development
- Process planning and design
- Waste characterization and sourcing
- Procurement and negotiation assistance
- Independent feasibility consultant
- Technology due diligence
- Acceptance testing and operations monitoring



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**RENEWABLE Energy FROM WASTE**

INSIDE:  
Maximizing RDF Systems .....p. 25  
A Financial Source for WTE .....p. 29  
Boiler Emission Rules Update .....p. 32  
Biogas Heats Up in Wisconsin.....p. 35  
Fueling Fleets with Plastics.....p. 38

SERVING FUEL AND ENERGY PRODUCERS // SPRING 2012

[www.rewmag.com](http://www.rewmag.com)

**A WORKING MODEL**  
Greenwood Energy is producing market-friendly fuel pellets from waste in America's heartland.

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**RENEWABLE Energy FROM WASTE**

CONFERENCE NOVEMBER 18-20 2013 >> WEST PALM BEACH, FLORIDA

*Providing insight into the conversion of  
waste to energy and resources*


**recycling today**  
MEDIA GROUP

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**SMITHERS APEX**

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## History of the MSW Management in the US

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## General Trends in the US

- Recognized value in recovery of materials and energy from waste
- Waste reduction and product stewardship efforts
- Reduce the environmental impact of products
- Implementation of integrated waste management related policy with recycling goals
  - No significant disposal taxes nor bans
- Public and financial support for better waste management

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## Policy History

- The first U.S. federal solid waste management law: Solid Waste Disposal Act (SWDA) of 1965
- First Earth Day April in 1970
- The Resource Conservation and Recovery Act (RCRA) of 1976
- Amendments to RCRA in 1984 through 1998 policy shift from landfilling toward waste reduction, and recovery of materials and energy

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## EPA Significant Changes to the Waste Management Policy, 2005

### EPA Waste Hierarchies

**Waste Management Hierarchy**

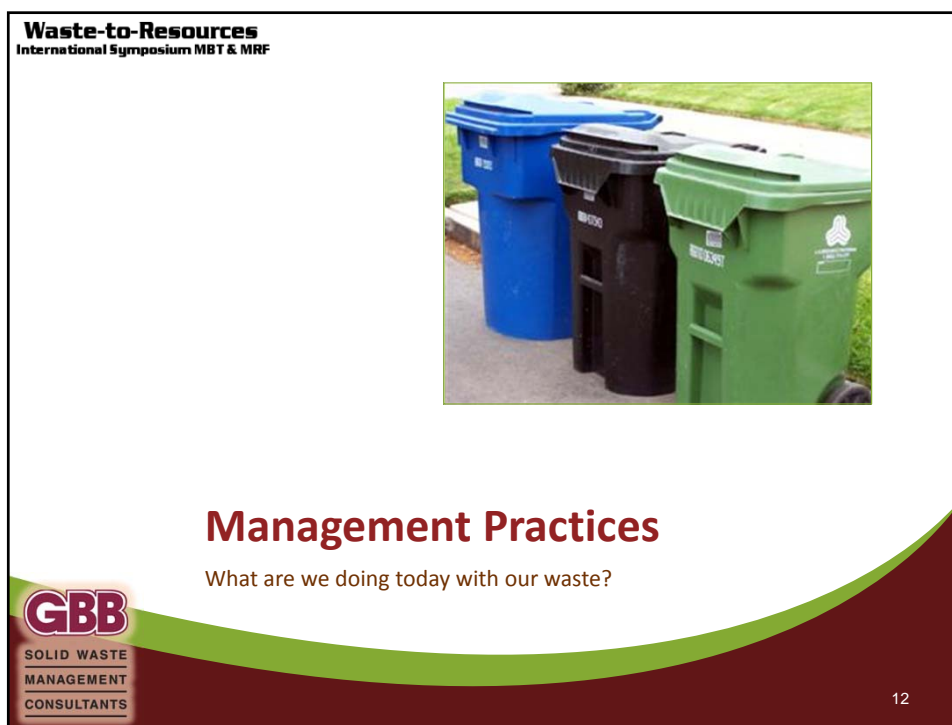
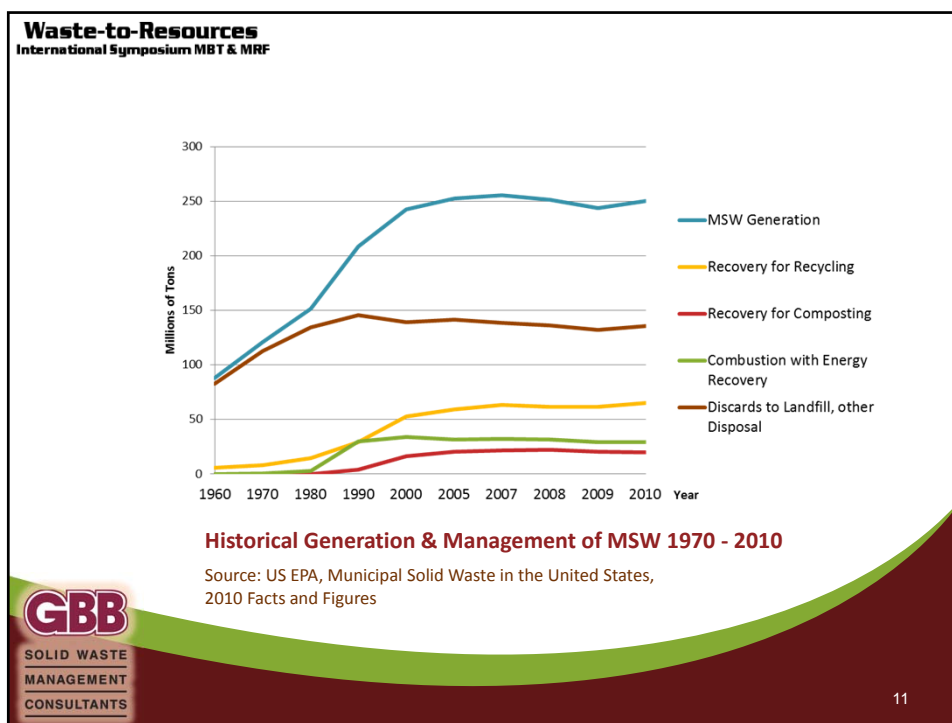
- Source Reduction & Reuse
- Recycling / Composting
- Energy Recovery
- Treatment & Disposal

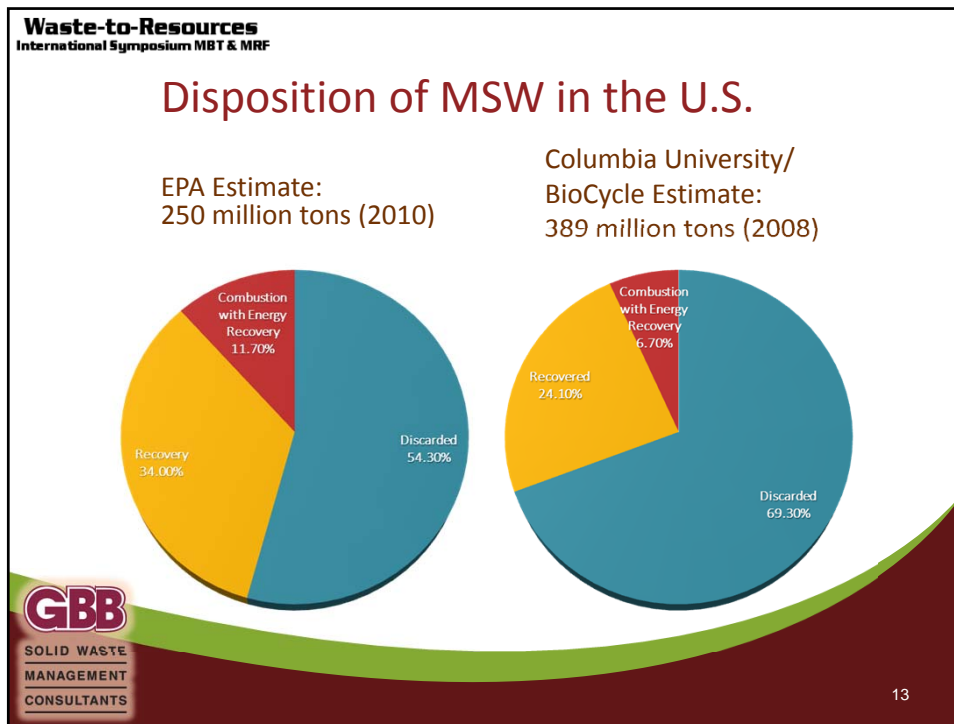
**Food Recovery Hierarchy**

- Source Reduction
- Feed Hungry People
- Feed Animals
- Industrial Uses
- Composting
- Incineration or Landfill

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### Recycling and Material Recovery Facilities

- In 1970, US relied on local scrap yards and waste paper dealers to receive and prepare materials for recycling
- Now, US also has MRFs:

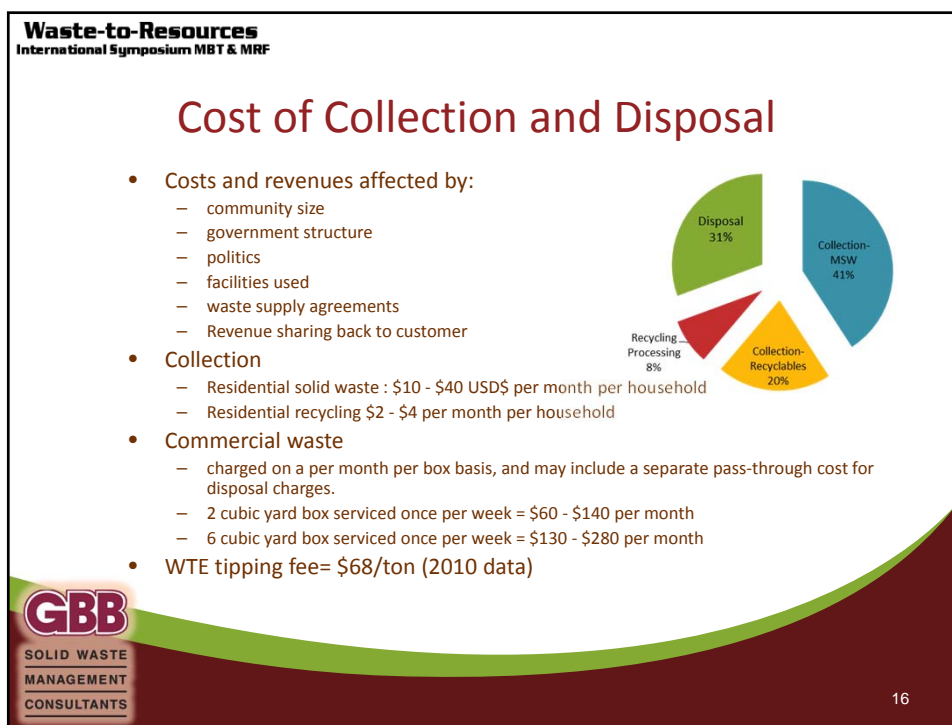
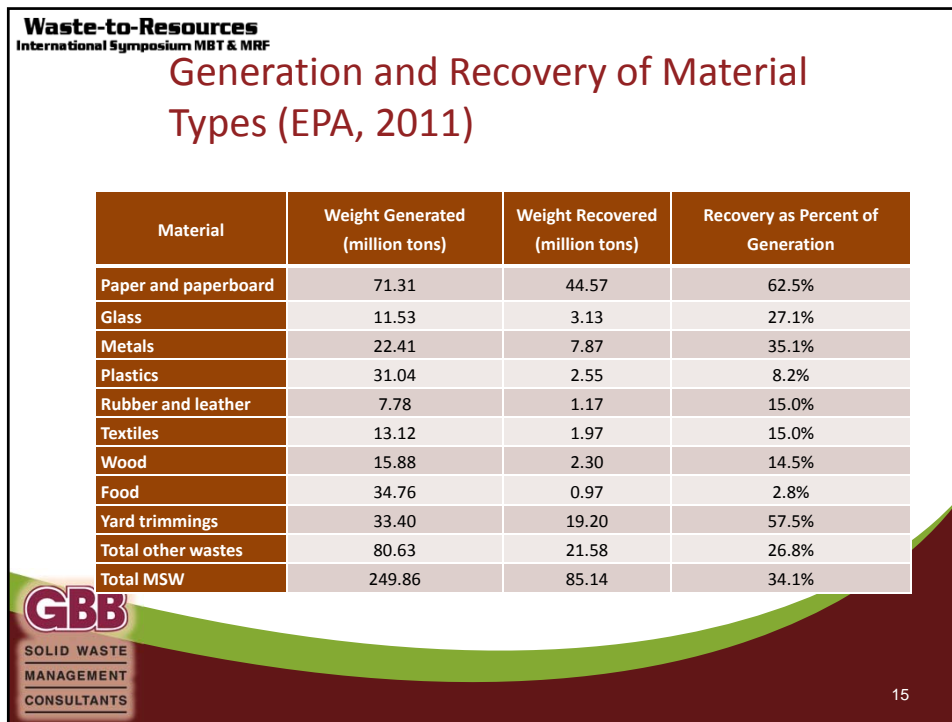
MRF Type	Number of MRFs	
Year:	2006	2012
Single Stream	144	263
Dual Stream	227	228
Source Separated, Other Programs	127	95
<b>All MRFs</b>	<b>437</b>	<b>586</b>

*Materials Recycling and Processing in the United States (BERENYI, 2012)*

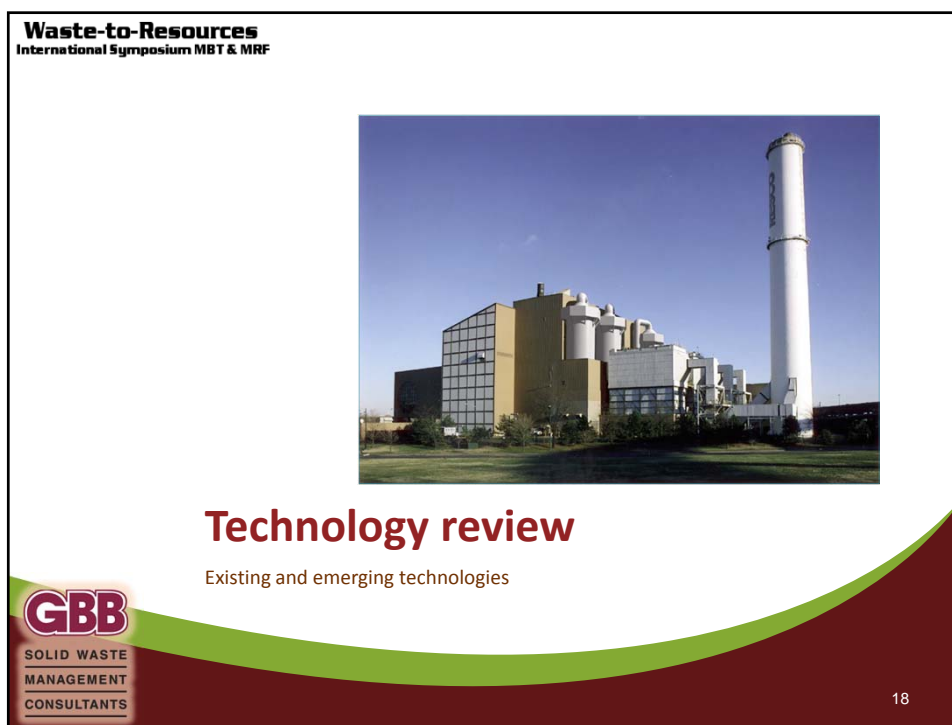
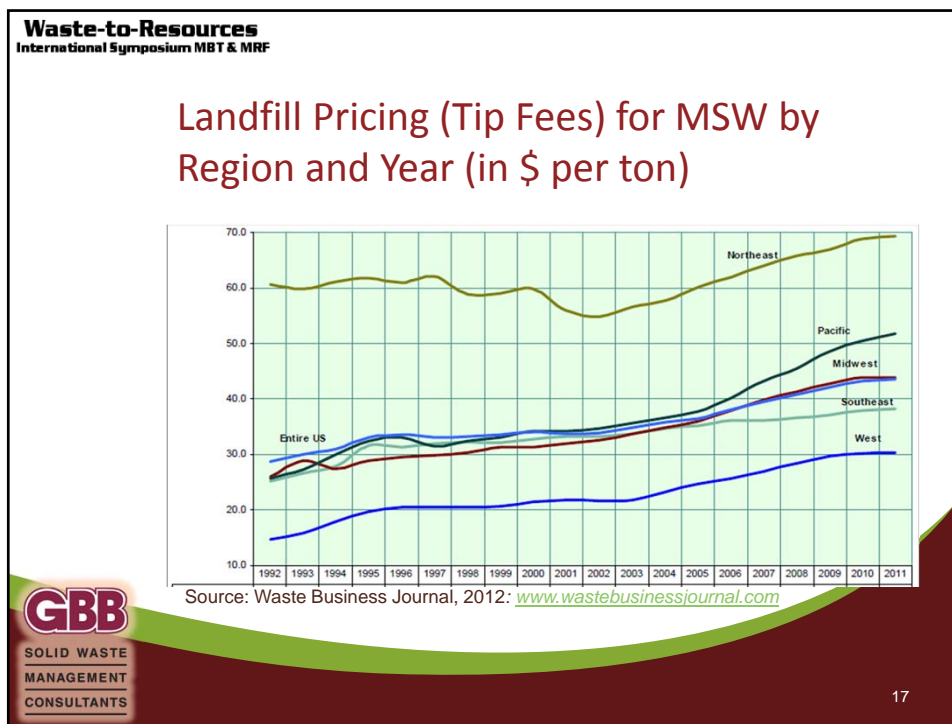
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## WTE Evolution in the US

- Recovery 1 Facility- City of New Orleans- Waste Management, Inc.: 1976-1987
- 150 WTE projects in development in the U.S. in the late 1990s
- 2 US Supreme Court cases and the 1990 Clear Air Act Amendment affected the WTE development
- Today, there are 85 WTE plants operating in 23 states, handling approximately 12% of MSW

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## WTE Plants in the US

Technology	Number of Facilities	Average Tons Per Day	Total Tons Per Day
All Facilities	85	975	82,893
Mass Burn	65	1,023	64,452
RDF	15	1,128	16,926
Modular	7	216	1,515

*Facilities and Tons Processed by Technology Type  
(BERENYI, 2012)*

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## Technology and Project Developers – 579 and Counting

- 34 Aerobic Composting
- 100 Anaerobic Digestion
- 30 Ethanol Fermentation
- 174 Gasification
- 49 Plasma Gasification
- 69 Pyrolysis
- 59 WTE: mass burn, modular, dedicated boilers, and RDF
- 64 Others (agglomeration, autoclave, de-polymerization, thermal cracking, steam reforming, hydrolysis)

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Source: Gershman, Brickner & Bratton, Inc., June 2013

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## Gasification Technology Offerors



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## Technologies Processing Mixed Non-recyclable Plastics



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## Technologies Processing Organic Waste



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### Technology Commercialization Examples

Location	Edmonton, Alberta, CA	Vero Beach, FL	Storey, NV
Technology	Gasification/ Catal. Conv. of Syngas	Gasification/ Ferment. of Syngas	Gasification/ Catalytic Conv. of Syngas
Developer	Energkem	INEOS Bio	Fulcrum Bioenergy
Feedstock	Non-recycled MSW	Yard, vegetative, resid. waste	Post-sorted MSW
Throughput (TPD)	300	450	400
Energy Products	Methanol; Ethanol	Ethanol	Ethanol; Propanol
Cost	\$80M	\$130M	\$120M
Federal Grants/Loan Guarantees	\$23.5M	\$125M	--
Start Date	2014	June 2012	2015

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### Locations Advancing “Proven” Technologies

- Example of Mass burn WTE expansions completed
  - Hillsborough County, FL - Covanta
  - Lee County, FL - Covanta
  - Olmsted County, MN – Olmsted County
  - Honolulu, HI – Covanta
- Example of Locations advancing new facilities with ‘proven’ technologies:
  - Baltimore, MD – Energy Answers
  - Frederick County, MD (NMWDA) - Wheelabrator
  - Durham York (Ontario CN) - Covanta
  - City of Los Angeles, CA – Green Conversion Systems
  - Palm Beach County, FL (SWAPBC) – B&W
  - Puerto Rico – Energy Answers
  - Metro Vancouver, Canada – To be determined

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## Featured on going projects in North America

-  **City of Cleveland- *Cleveland Recycling and Energy Generation Center Project***
-  **City of Houston- *One Bin for all***
-  **Prince William County- *Demonstration plant of an emerging MSW WTE conversion technology***
-  **County of Maui- *Integrated Waste Conversion and Energy Project***
-  **Metro Vancouver- *Establishment of New WTE capacity***

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## Opinion: Trends for the Future

- Many conversion projects advancing
- Will need 4-6 years to learn what works and their economics
- Continuation of public sector taking “Low Risk” attitude until “proven”
- Demand for more recyclables expected to continue at attractive pricing
- More mixed waste processing systems [again]
  - Many conversion technologies require MSW pre-processing... for feedstock sizing and inerts removal
  - Electric utilities may become a player for RDF
- ‘Environmentalists’ and ‘Zero Waste’ proponents will continue to fight WTE and Waste Conversion Technologies calling them all “incineration”

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A Realistic & Ultimate Goal:  
Fully Integrated and Efficient Waste  
Management System with Significant  
Diversion (Recycling) and WTE-WCT  
...in a 50-50 partnership!  
*...for more jobs, better environment,  
and energy independence!*

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Questions and comments?

***Thank you!!***

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