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Mechanical-Biological Treatment (MBT) As A Strategy For Zero Waste To Landfills

Harvey Gershman
Gershman, Brickner & Bratton, Inc.
August 26, 2014

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Outline

- GBB Overview
- History of the MBT in Europe
- Tour - Pohlsche Heide, Germany
- Economics
- Advantages and Disadvantages
- Potential of MBT concept on the US market

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GBB Overview

Established in 1980

Solid Waste Management and Technology Consultants

Helping Clients Turn Problems into Opportunities



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GBB's Waste Consulting Services

- Economic, technical and environmental reviews
- Procurements
- Due diligence third-party reviews
- Waste characterization and sourcing
- Process planning and conceptual designs
- Independent feasibility consultant



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MSW IN THE US

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MSW Disposition in the U.S.

**EPA Estimate:
251 million tons (2012)**

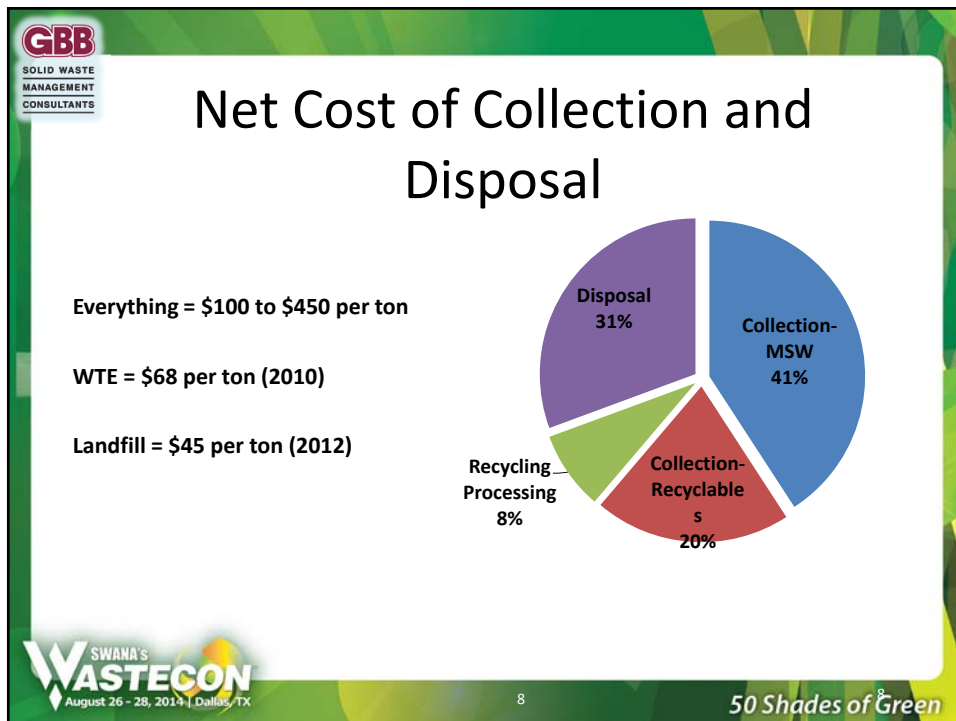
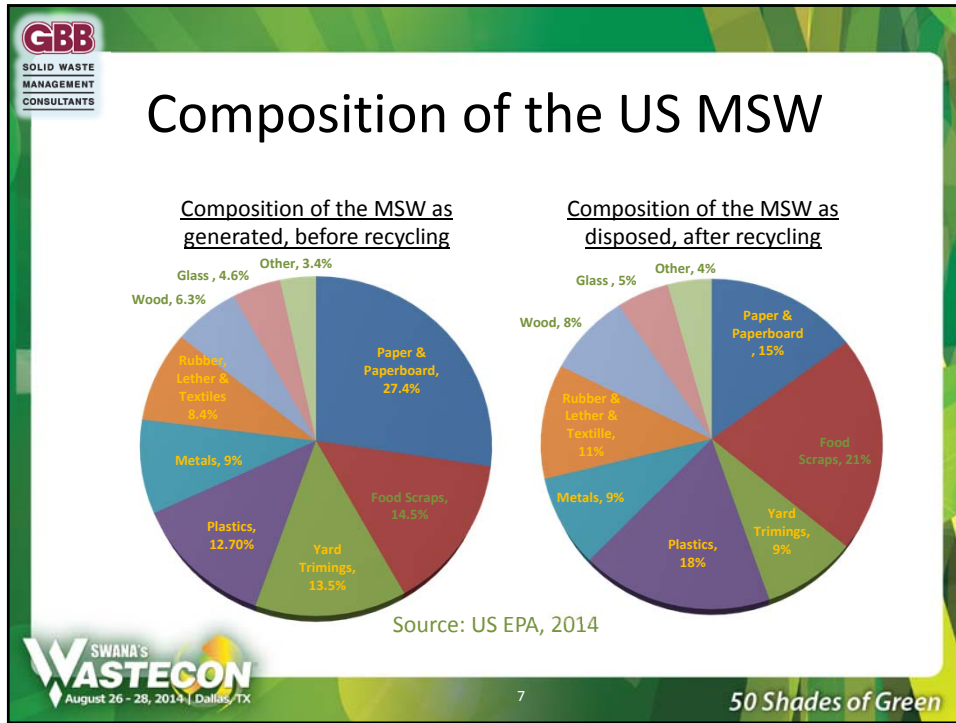
Category	Percentage
Discarded	54%
Recycled	26%
Composted	8%
Combustion with Energy Recovery	12%

**Biocycle Estimate:
389 million tons (2008)**

Category	Percentage
Discarded	69.30%
Recovered	24.10%
Combustion with Energy Recovery	6.70%

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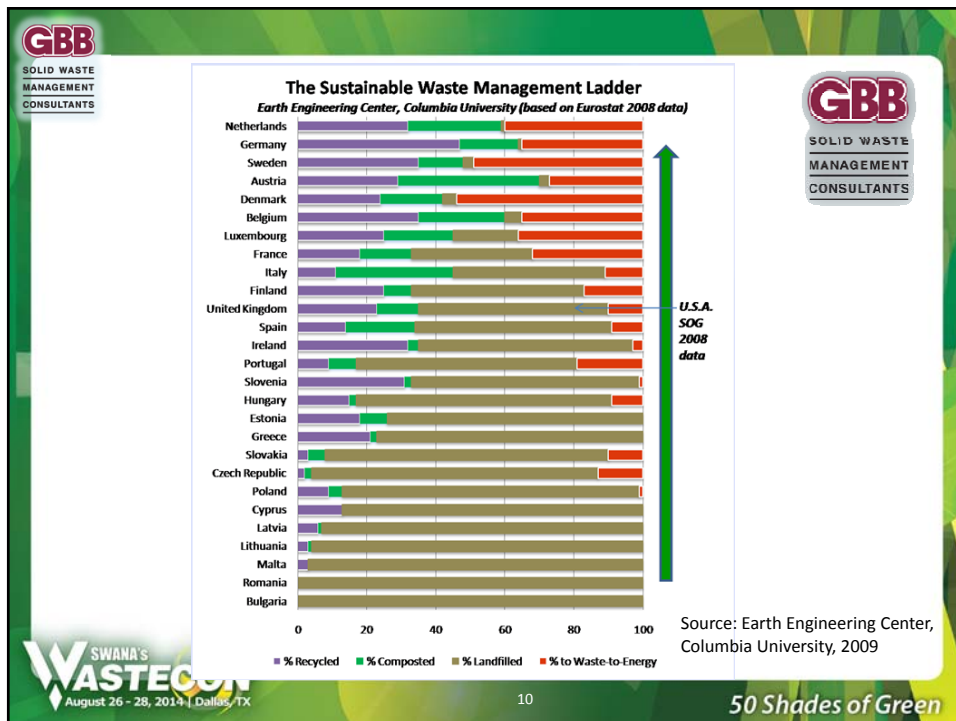
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HISTORY OF MBT PLANTS IN EUROPE

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Origin of MBT Plants

- Originated in Germany in 1999
- Drivers:
 - EU Landfill Directive from 1999
 - Alternative to incineration
 - Landfill tax (up to \$130/ton)
 - Growing demand for the high-grade refuse-derived fuel

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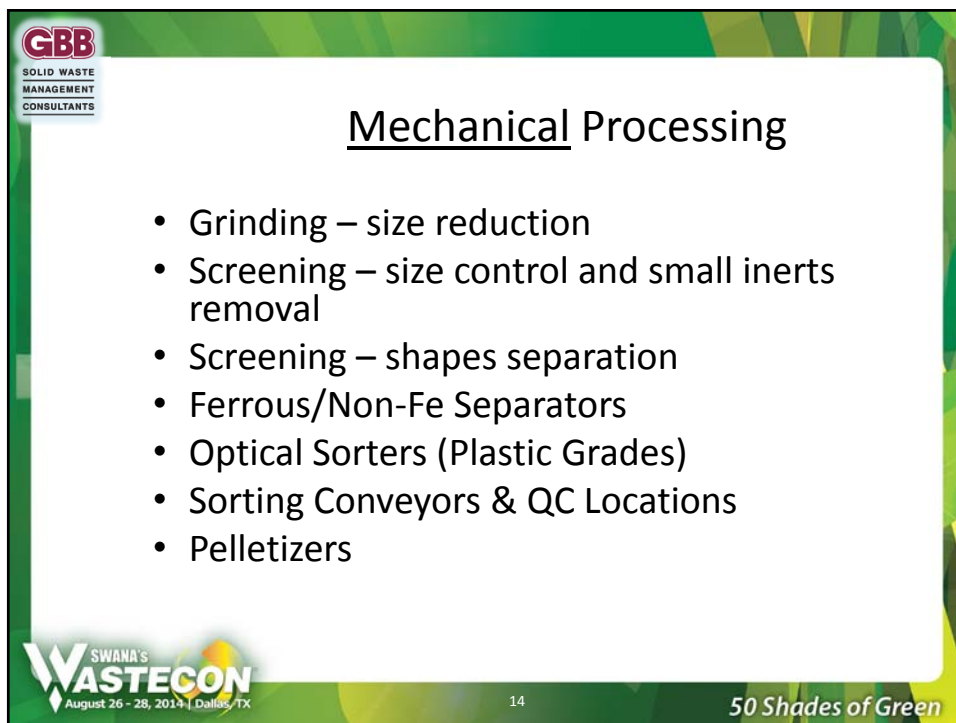
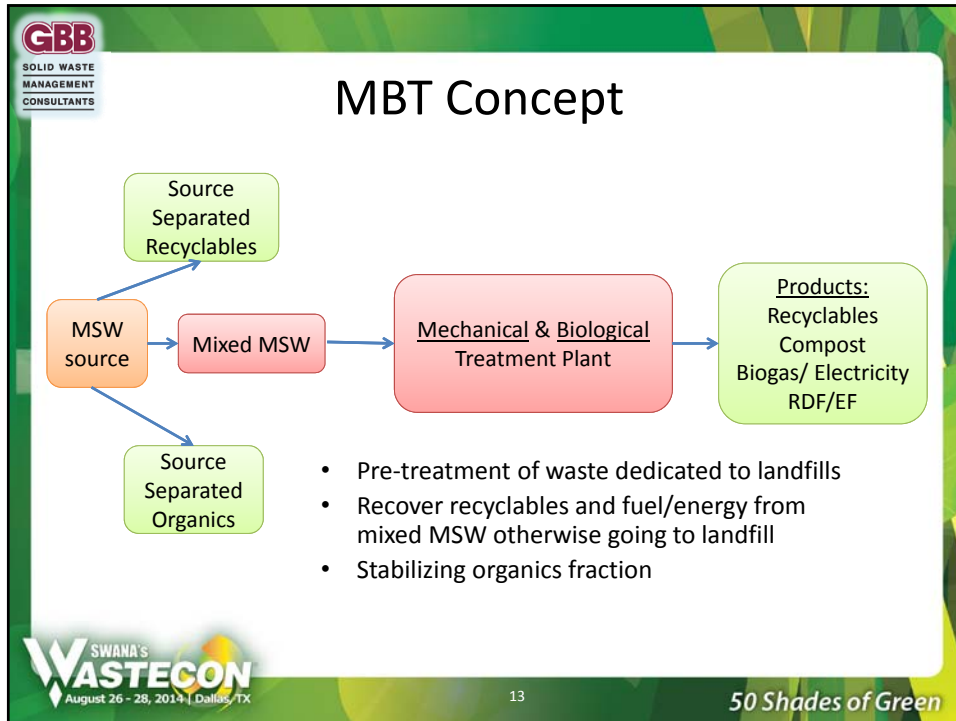
MBT Plants in Europe

- Biggest MBT markets in the:
 - Germany,
 - Austria,
 - Italy,
 - Spain
- The number has increased by almost 60 percent to more than 330 plants between 2005 and 2011.
- Growth expected to continue to 450 plants in the next five years
- RDF is the key to MBT, with 54% to dedicated boilers, 16% to coal plants, 11% to cement kilns and 19% to other users,
- MBT plants evolved from stabilizing the organic fraction for landfilling to RDF and biogas producers

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Biological Treatment Options

1. Aerobic- Bio-drying /bio stabilization with partial compost of the entire waste stream
2. Aerobic – In-Vessel Composting to bio stabilize the waste or processing of the segregated organic-rich fraction
3. Anaerobic Digestion (AD) – Used to process a segregated organic rich fraction.

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MBT Facility of New Earth Solutions - Avonmouth UK



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MBT facility of Veolia - Southwark UK



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Shanks MBT Plant – Barrow, UK (225,000 TPY)



IAIN MCLEAN

Picture Source: Resource UK – August 5 2013


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Germany

- 46 MBT plants
- Approx. of 6 million TPY
- Process approx. 25 % of the generated MSW
- 20 - 30 plants (capacity of 2 - 3 million TPY) produce RDF



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Italy

- Longest tradition for MBT in Europe
- 133 plants
- Process Approximately 14 million TPY
- Initially volume reduction option and stabilization of organics
- Lately dry AD installed
- RDF product

Austria

- 16 plants in operations and two planed

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TOUR - POHLSCHHE HEIDE, GERMANY

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Waste Management Centre Pohlsche Heide

- MBT with dry AD digestion, composting and RDF production
- Small sized industrial RDF combined heat and power (CHP) plant – Minden
- See: <http://www.pohlsche-heide.de/english/index.php?head=home&nav=company&um=home&cont=company>



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Harvey Gershman Facility Visit June 14, 2013



- Organized by the Center for Research, Education and Demonstration in Waste Management – CReED - a national German center for research and education in waste and resource management

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Waste Management Centre - Pohlsche Heide

- Handles around 200,000 TPY through the following units:
 - Convenience Center
 - Mixed waste processing facility for materials and RDF
 - Yard waste processing for mulch and composting
 - Anaerobic digestion for wetter organics for CHP and biogas
 - Landfill



Scale House Entrance

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Convenience Center for Residents



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Convenience Center for Residents



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Mixed Waste Processing Facility



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Mixed Waste Processing Facility



RDF product load out and outside storage

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Mulch and Composting Areas



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Inside Composting Areas



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Mulch Product Free For Citizens



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This is always nice!

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Composting Area in Pole-barn Building....For Less Wet Organics



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Mixed Waste Product Being Composted



Compost product from processed waste

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Inside the AD Facility



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Biogas Clean Up and Storage Equipment and CHP Module



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Small Sized Industrial RDF CHP Plant - Minden



Receiving doors for RDF delivery tractor trailers

- This facility takes RDF from MBT
- RDF=recycled derived fuel.
- Went into operation in 2001
- Produces process steam at 12 bar, 250° C.
- 35,000 tons per year RDF processed; 4.5 tons per hour; steam output at 15-18 tons per hour for next door chemical company, BASF, who uses for process steam; no power production; there is condensate return.

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Small Sized Industrial RDF CHP Plant - Minden



Receiving doors, office, furnace area, and ash boxes – left to right.

RDF being delivered.

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Small Sized Industrial RDF CHP Plant - Minden



Inside RDF tipping hall with walking floor storage pit; approximately 2 days storage

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Small Sized Industrial RDF CHP Plant - Minden

- RDF: particle size: < 120 mm; 13-17 mj per kg; moisture 12-13%.
- Residue production is 20% by weight; approximately 7,000 tons per year.
- RDF pays to be combusted as a fuel; 35 - 65 Euro per ton; very lucky if RDF combusted for "0"; RDF tipping fee at this facility is 50 Euro.
- Facility is paid for steam.
- Fly ash kept separate and goes to underground storage; bottom ash is processed for recycling
- Capex in 2001: 15 Euro, paid or privately.



Exterior of plant; bottom ash roll-off boxes on left

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ECONOMICS

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Economics

- UK numbers (without fuel utilization)
 - Gate fees- \$120/ton (UK, WRAP 2011)
 - CapEx
 - \$150 per annual ton of capacity (with aerobic composting)
 - \$250 per annual ton of capacity (with AD)

Typical MBT Cost in EU


	Aerobic processes		AD processes	
Capacity (TPY)	CapEx \$/T/year	OpEx \$/t	CapEx \$/T/year	OpEx \$/t
< 50,000	120-250	<235	270-700	>38
> 50,000	50-380	33-115	180-470	26-115

Source: Waste Technology Data Centre 2007 and Juniper Consultancy Services (2005)




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ADVANTAGES AND DISADVANTAGES



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Advantages

- High flexibility to changing waste stream
- Recovers additional recyclables
- Produces digestate that can be co-composted with biosolids and/or yard waste
- Recovers fuel/ energy as biogas and/or RDF
- Minimizes GHG emissions of MSW managed
- Minimizes amount of MSW landfilled helping towards Zero Waste to Landfill

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Disadvantages

- Quality of the recyclables
- Quality of the compost like product
- Cost
- Public acceptance near sites



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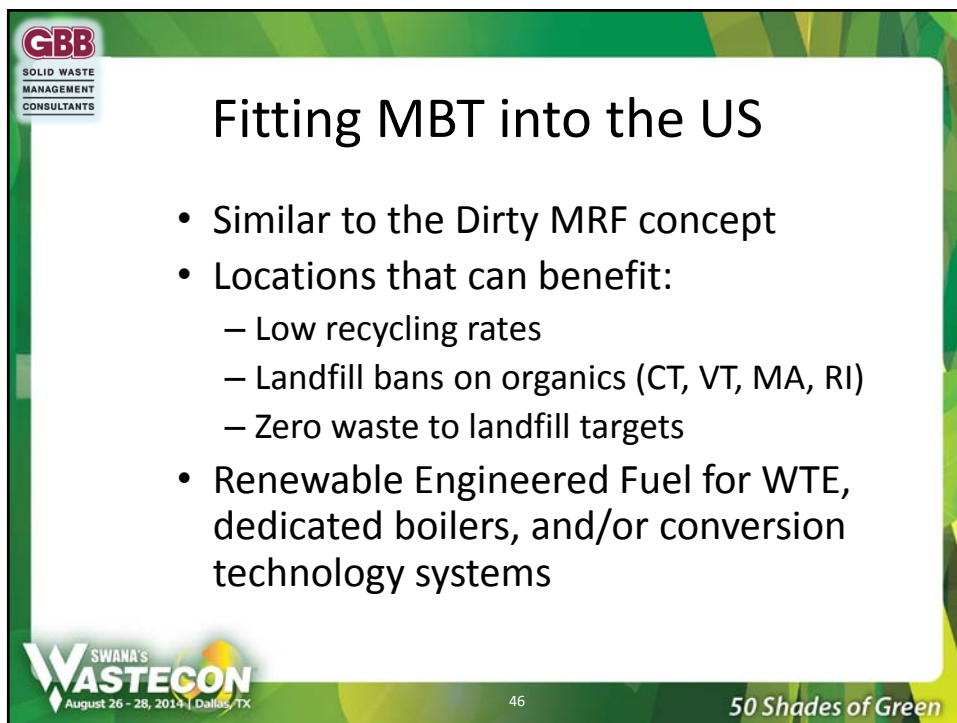
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MBT POTENTIAL IN THE US

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Fitting MBT into the US

- Similar to the Dirty MRF concept
- Locations that can benefit:
 - Low recycling rates
 - Landfill bans on organics (CT, VT, MA, RI)
 - Zero waste to landfill targets
- Renewable Engineered Fuel for WTE, dedicated boilers, and/or conversion technology systems

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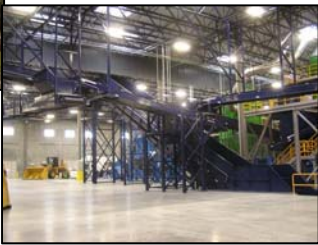


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City of Montgomery , Alabama

IREP- Infinitus Dirty MRF



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Edmonton, Canada

Edmonton combined composting, MW-MRF, and Enerkem gasification plant

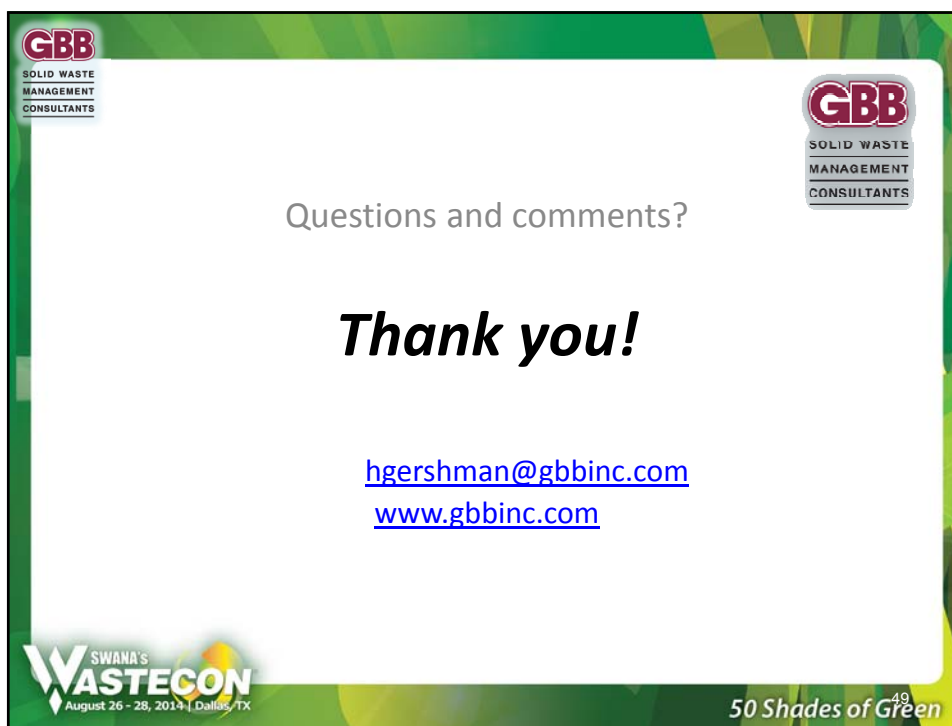


Edmonton Waste Management Centre
Integrated Processing and Transfer Facility
Edmonton Site No. 480

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The slide features a green and yellow geometric border. In the top left and right corners, there is a logo for GBB SOLID WASTE MANAGEMENT CONSULTANTS. The center of the slide contains the text "Questions and comments?" followed by a large, bold "Thank you!". Below this, two blue underlined links are provided: hgershman@gbbinc.com and www.gbbinc.com. In the bottom left corner, there is a logo for SWANA'S WASTECON August 26 - 28, 2014 | Dallas, TX. In the bottom right corner, the text "50 Shades of Green" is displayed with a small "49" above the "n".

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Questions and comments?

Thank you!

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