

RENEWABLE Energy
FROM WASTE
CONFERENCE

Progress Report on Waste Conversion in North America

Orlando, FL

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President
Gershman, Brickner & Bratton, Inc.

November 17, 2015

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Session - - Update on Waste Conversion Technologies in North America

- Harvey Gershman, Gershman, Brickner & Bratton, Inc.
- Ted Michaels, Energy Recovery Council
- Norma McDonald, Organic Waste Systems
- Allison Kerester, Gasification Technologies Council
- Marco Castaldi, City College of New York

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Harvey Gershman



"Earth Day 1970 first inspired my career to focus on helping do better things with waste. And, I have been able to do just that for the past 40+ years."

Harvey Gershman
President and Co-Founder

Specialties: Strategic thinking and planning; procurement and negotiation assistance; system administration; change management; and project financing coordination.

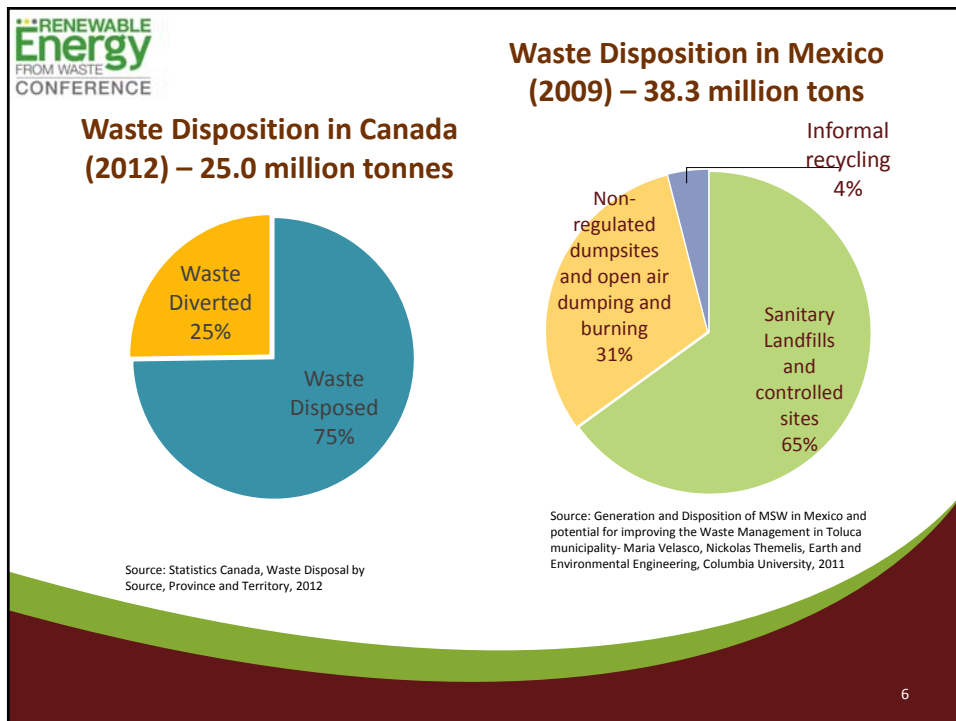
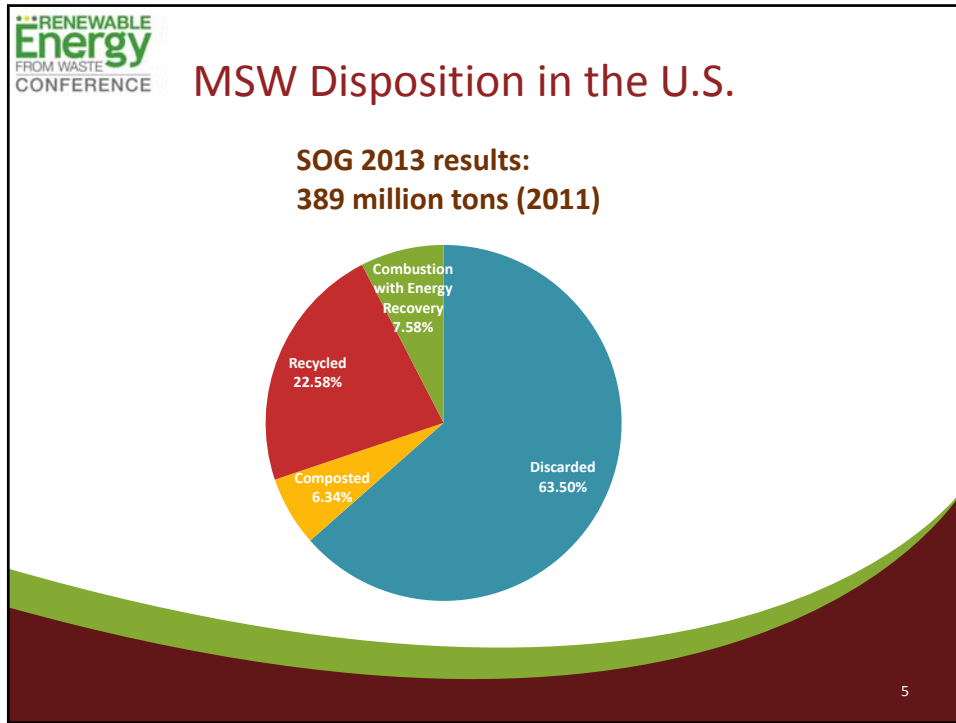
GBB Quality – Value – Ethics – Results
Founded 1980

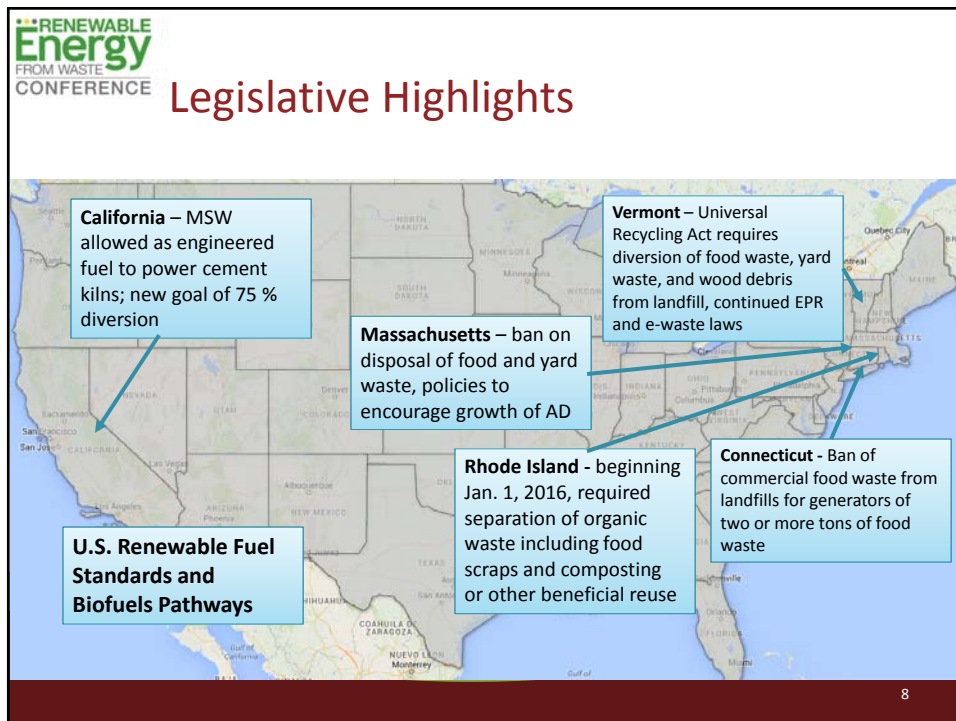
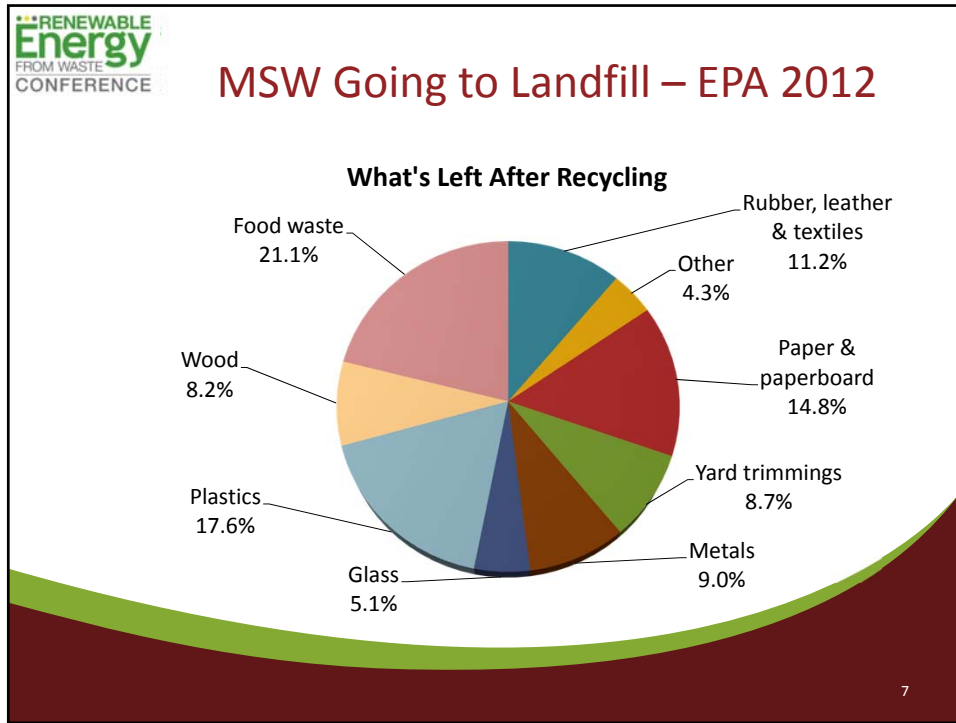
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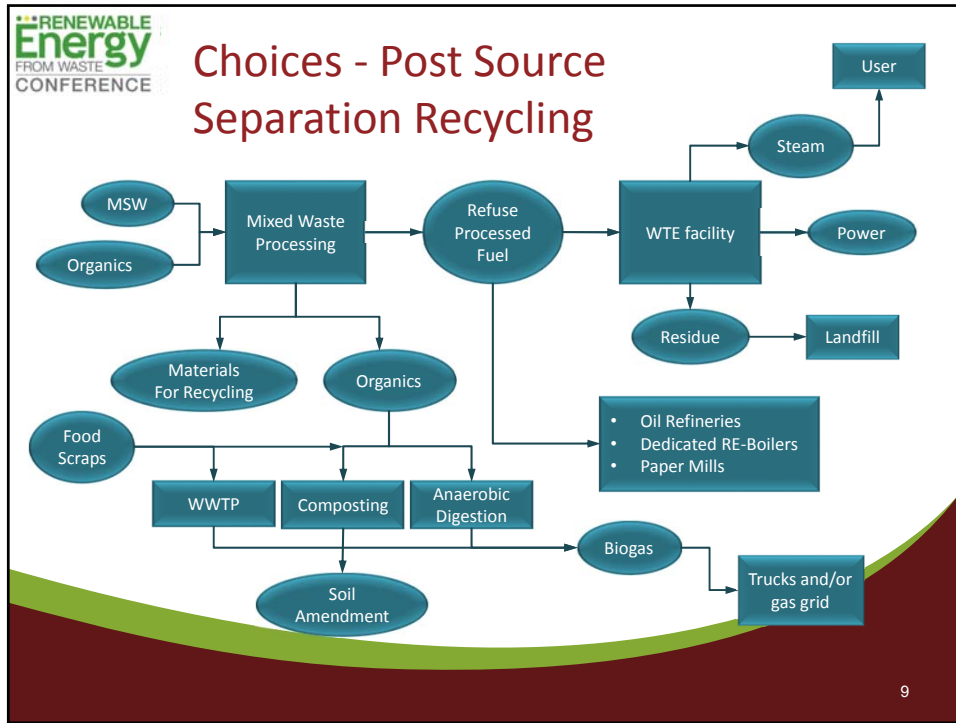
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UPDATE ON WASTE CONVERSION IN NORTH AMERICA

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Mass Burn/Dedicated Boilers

- Excess air for complete combustion
 - Starved air with some modular mass burn
- Products: steam, power, hot water, and/or chilled water; also metals, aggregates, and ADC
- Feedstocks
 - MSW
 - Special wastes
 - Biosolids

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Anaerobic Digestion/Composting

- Biological decomposition of the organic material in absence of oxygen
- >20 commercial plants that take source separated organics
- Feedstock: Commercial food waste, residential SSO, co-digestion at WWTP and farms
- Two main type: high solids AD and low solids AD

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Gasification

- Partial combustion in an air-controlled environment
- Product: Syngas for production of electricity, chemicals/ fuels (ethanol)
- Feedstocks
 - Engineered fuel from MSW
 - Biomass
 - Agricultural waste

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Plastic to Oil Technologies

- Thermal conversion in the absence of oxygen
- Non-recyclable plastics to oils, fuels
- Plastics-to-Oil Technologies Alliance formed by ACC

Source: RES Polyflow




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State of the U.S. LFG Industry

- LFG is extracted from landfills using a series of wells and a blower/flare system
- Collected gas goes to a central point for treatment and conversion/sale
- 636 operational LFG energy projects in the U.S. (July 2014)
 - 1,978 MW and 305 mmscfd
- EPA estimates an additional 440 MSW landfills could turn their gas into energy
 - Enough to power 500,000 homes



Maui, HI LFG System

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Economics Holding Back WTE

- Landfill capacity abundant and relatively cheap
 - *We don't tax landfills like in Europe and UK*
- Energy revenues too low and declining
 - RECs not always available for MSW-power
 - Power alone not enough
 - Cogeneration/CHP applications improve revenues
- Bottom line: WTE will cost more
 - Are there savings to find in the collection part of your system?

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Energy/Fuel Product Values - Key and Cyclical

Converting MSW to...	Product	Yield from 1 Ton MSW	Value Per Production Unit	Revenue Per Input Ton
	Power	500-650 kWh	@ \$0.05 / kWh	\$25-\$33
	Synthetic Crude	1 barrel	@ \$40 / barrel	\$40.00
	Ethanol	50 gallons	@ \$2.00 / gallon w/o subsidies	\$100.00
	Bio- Diesel (w/subsidies)	35 gallons	@ \$3.57- 4,00 / gallon*	\$125 to 140

*Includes Renewable Identification Numbers (RINs) and from California Low Carbon Fuel Standard (LCFS) subsidies

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Processing Technology Vendors




AMUT
Infinitus ENERGY
RRT
BHS
LINDNER America LLC
STADLER America
CP
MACHINEX
VAN DYK recycling solutions
Mustang Renewable Power Ventures, LLC
Vecoplan

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Project Status - Solid Waste Authority of Palm Beach County, FL



Source: SWA of Palm Beach County


- 3,000 TPD Mass Burn facility (1,040,000 TPY)
 - Babcock & Wilcox
 - 130 MW renewable power; enough for over 86,000 houses
 - \$668 million construction price
 - \$20.5 million first year O&M cost
 - Advanced emissions controls, ferrous and non-ferrous metals recovery
- Notice of Award – April 2011
- Groundbreaking – April 2012
- First Fire – February 2015
- Commercial operation – June 2015
- 12.7% plastics in MSW means over 132,000 TPY recovered as fuel

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Montgomery, AL – Infinitus – DOORS SHUT

- High-tech 80,000 square feet “state-of-the-art” Mixed Waste Processing Facility
- \$30 + Million capital cost
- First “One Bin for All” in 21st Century in the U.S.
- Bulk Handling Systems Process
 - One-line, 40 ton per hour input for 100,000 tons per year
 - 60 % material recovery guarantee plus other organics separation capabilities
- Commercial operations began April 2014
- Temporarily closed October 2015



Source: GBB 2014


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Reasons Procurements Fail

- ***Costs too high***
- ***No site***
- ***Lack of political will***
- Technology risk
- ***Hurts recycling***
- Inadequate waste supply
- Regulatory push back
- No financing

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Sell the Procurement ...Pre-Develop Project Building Blocks

- Include a site
- Address recycling as part of future solution
 - In certain states, organics too
- Show understanding of cost implications and how it will be funded
- Offer waste supply strategy and commitment
- Include service agreement showing risk posture
- Involve internal decision-makers and stakeholders
- Have internal team with resources and advisors

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TRENDS, EXPECTATIONS, AND OPPORTUNITIES FOR THE FUTURE

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Trends Ahead

- More mixed waste processing
- Added recycling side-benefit
- New conversion technology facilities and “One-bin” key to watch
- ‘Environmentalists’ and ‘Zero Waste’ proponents fight non-recycling only alternatives

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Legislation and Regulations

- *Will more states ban food scraps from disposal?*
- *Will North American landfills cost a lot more?*
- *Will local political will step up to pay more for better?*
- *Can procurements be better pre-developed and include sites?*

- **Waste is very recyclable and it is also very renewable!**
- **A lot less waste to landfills is better!**

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Thank you!

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