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The Changing Waste Stream and its Implications for WTE

NAWTEC 20
Portland, Maine
April 23-25, 2012

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“The Times They Are a- Changin’”

- Bob Dylan



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Outline

- GBB Overview
- Waste Composition
- Electronics
- Implications for WTE
- Q&A

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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 and focused exclusively to solid waste management
- Owner's representative and feasibility reports for financings
- "Change Agents" to produce better services and facilities

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Waste Composition

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U.S. MSW Characterization (post recycling)

Material	Percentage
Other	24%
Paper	16%
Glass	5%
Metals	9%
Plastics	17%
Food	20%
Yard Waste	9%

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Source: USEPA, Municipal Solid Waste Generation, Recycling, and Disposal in the United States, 2011

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Characterization Methods

- Sorting Studies
- Visual Estimates
- Materials Flow Methodology (USEPA)

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Characterization Studies



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Waste Categories

Paper

- newspaper-magazines-office paper-cardboard-other

Plastic

- PET-HDPE-PS-PVC-LDPE-PP-
- film-deposit containers-other

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Waste Categories

Metal

- aluminum beverage cans
- other aluminum-ferrous cans-deposit containers-other ferrous
- other non-ferrous

Glass

- Clear-green-blue-brown-deposit bottles-other

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Waste Categories

Organics


- Yard waste-food waste-wood waste
- Diapers-pumpkins-other

Hazardous Materials

- Paints-solvents-fertilizers-
- Pesticides-fuels-oils-lubricants-compressed gases-other




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State Multi-Year Characterization Studies

- California
- Iowa
- Missouri
- Washington



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California

Material	1999	2008	Difference
Paper	30.2%	17.3%	-42.7%
Plastic	8.9%	9.6%	7.9%
Metals	6.1%	4.6%	-24.6%
Glass	2.8%	1.4%	-50.0%
Organics	35.1%	32.4%	-7.7%
Hazardous	0.3%	0.3%	None

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Sources: 1999 Statewide Waste Characterization Study and
 2008 Statewide Waste Characterization Study

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Iowa

Material	1988	2011	Difference
Paper	35.1%	25.2%	-28.2%
Plastic	15.1%	16.7%	10.6%
Metals	5.1%	5.0%	-2.0%
Glass	2.4%	1.5%	-37.5%
Organics	23.7%	25.5%	7.6%
Hazardous	0.7%	0.2%	-71.4%

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Sources: 1988 Statewide Waste Characterization Study and
 2011 Statewide Waste Characterization Study

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Missouri

Material	1998	2008	Difference
Paper	37.3%	33.6%	-9.8%
Plastic	14.4%	17.3%	19.8%
Metals	6.9%	6.0%	-12.5%
Glass	5.8%	5.4%	-6.2%
Organics	30.8%	31.6%	2.6%
Hazardous	N/A	0.9%	N/A

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Sources: 1998 Waste Composition Study and 2008 Waste Composition Study

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Washington

Material	1992	2009	Difference
Paper	29.5%	19.2%	-34.9%
Plastic	10.0%	11.4%	14.0%
Metals	6.7%	6.3%	-6.0%
Glass	4.6%	2.4%	-47.8%
Organics	37.7%	36.0%	-4.5%
Hazardous	0.9%	2.3%	155.6%

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Sources: 1992 Statewide Waste Characterization Study and 2009 Statewide Waste Characterization Study

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States Average

Material	1988-1999	2008-2011	Difference
Paper	33.0%	23.8%	-27.8%
Plastic	12.1%	13.7%	13.5%
Metals	6.2%	5.5%	-11.5%
Glass	3.9%	2.7%	-31.2%
Organics	31.8%	31.4%	-1.4%
Hazardous	0.6%	0.9%	46.8%

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United States

Material	1994	2009	Difference
Paper	32.9%	16.1%	-51.1%
Plastic	11.8%	17.2%	45.8%
Metals	6.3%	8.5%	34.9%
Glass	6.4%	5.5%	-14.1%
Organics	31.5%	37.6%	19.4%
Hazardous	N/A	N/A	N/A

Source: USEPA, Municipal Solid Waste Generation, Recycling, and Disposal in the United States, 1995 and 2011

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Observations


Substantial reduction in MSW paper

- 25-50%
- Recycling
- Smaller newspapers
- Electronic communications

*“I just want to say one word to you,
just one word...plastics”
(The Graduate, 1967)*



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Observations

Metal and glass reductions in MSW



- Recycling
- Replaced by plastics

Organics largest fraction of MSW

- Target for recovery
- Commercial and Residential




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Electronics

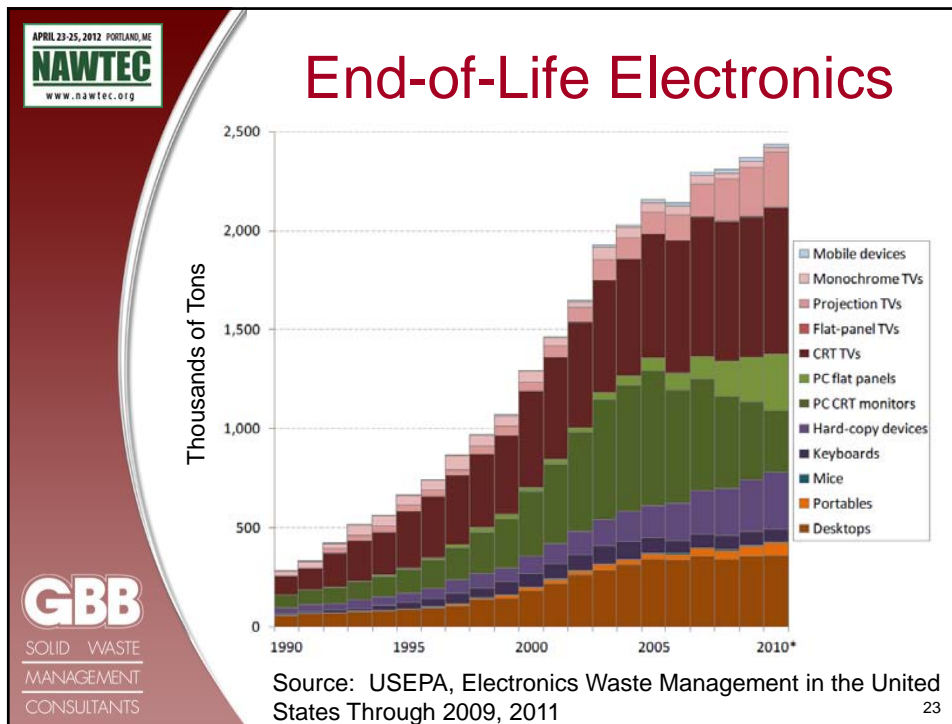
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Electronic Wastes

- Comprise 1-2% of waste stream
- Rapid growth and change in products
- Substantial growth in end-of-life electronics
- Substances of concern in electronics (lead, mercury, cadmium)

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Implications for WTE

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Heating Value

- Lower percentages of glass and metals
- Higher percentages of plastic
- Increasing MSW heat value thru 2008
- Organics recovery programs will further increase heating value
- Mixed plastic market may reduce waste plastics (Agylix, Climax Global Energy, Covanta Alphakat, Envion, Plastic 20:1, Rational Energies, and Vadxx)

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MSW Heat Content

Year	Heating Value (btu/lb)
1989	5,030
1990	5,100
1991	5,200
1992	5,300
1993	5,450
1994	5,580
1995	5,550
1996	5,480
1997	5,580
1998	5,520
1999	5,480
2000	5,650
2001	5,600
2002	5,580
2003	5,580
2004	5,720
2005	5,880

Source: USDOE, Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy, 2007

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Greenhouse Gases

- WTE has a net GHG benefit
- Biogenic wastes / emissions are decreasing
- GHG emissions are typically calculated based on non-biogenic fractions
- Implications on WTE GHG emissions

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Biogenic/Non-Biogenic


Year	Biogenic (%)	Non-Biogenic (%)
1989	33	67
1990	33	67
1991	33	67
1992	33	67
1993	33	67
1994	33	67
1995	33	67
1996	33	67
1997	33	67
1998	33	67
1999	33	67
2000	33	67
2001	33	67
2002	33	67
2003	33	67
2004	33	67
2005	33	67

MSW Heat Content by Materials Group (Per cent)

Source: USDOE, Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy, 2007

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Ash/Emissions Quality


- E-waste is a growing potential source of concern for WTE
- Combustion of e-waste could increase lead, mercury and cadmium levels in ash/emissions
- Numerous and growing opportunities to keep e-wastes out of the waste stream (ECOvanta)



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Summary Points



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Summary

- MSW waste heating value has been increasing – but downturn in economy has reduced HHV
- Organics recovery programs will further increase waste heat value
- Increase in non-biogenic wastes may impact WTE GHG benefits
- E-wastes will need to be managed to prevent impacts on WTE ash/emissions

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Thank you!



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