


The Greening of Solid Waste Management


Presenter: Betsy Dorn

RFT Conference - Going Green Session
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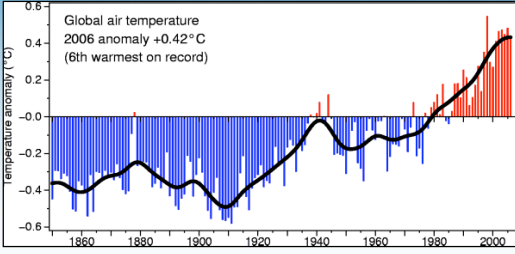


Mind Powered: Insight with Impact.

Why “Green”? - Key Greening Drivers



- Alarming climate change trends and opportunity to reduce GHG emissions
- Rising fuel prices
- National security concerns over dependence on foreign oil



Source: Climatic Research Unit,
Univ. of East Anglia, Norwich, UK

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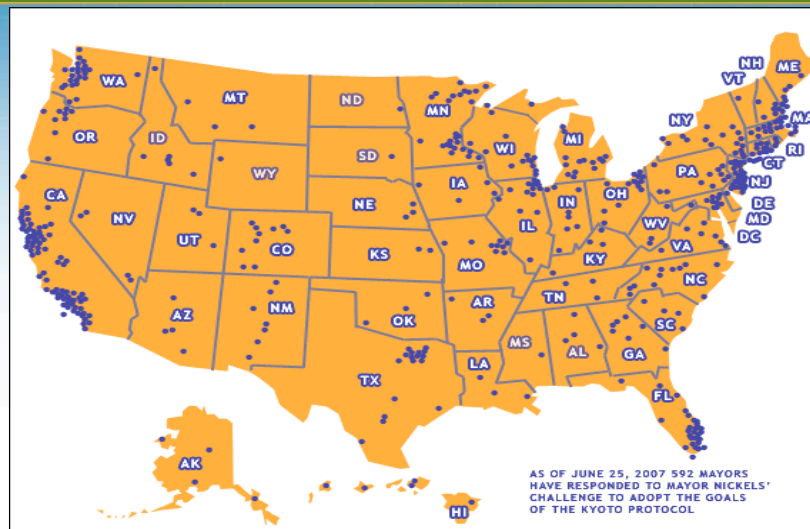
Why Green Solid Waste Management?



- Growing consumer demand for green products and services
- Public and private sector leaders are establishing sustainability programs
- Money/support is being shifted towards sustainability initiatives - particularly those that reduce GHG emissions
- Opportunities abound for reducing GHG emissions through changing solid waste management practices

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Over 600 Mayors Pledged to Reduce CO₂ Emissions to <1990 Levels



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Emission Reduction Benefits



Upstream:

- Reduce CO₂ emissions from energy use in material acquisition and manufacturing stages
- Increase carbon storage:
 - in forests
 - in soils when organics are composted and applied to the soil

Downstream:

- Avoid landfill methane emissions
- Avoid CO₂ emissions from combustion

Source: EPA Region 4

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Energy Benefits



- Decrease demand for raw materials
- Reduce energy associated with raw materials extraction
- Reduce energy needed for manufacturing and transportation
- Produce energy from landfill gas & WTE

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Benefits of Recycling



Based on EPA WARM model & recycling rate of 32%:

- Avoided GHG emissions of 183M metric tons of CO₂e (49M metric tons of Carbon equivalent)

Equivalent to emissions from:

- 930,000 railcars of coal burned, or
- Annual electricity use by 23.5 million households
- Energy benefit of about 1.4 quadrillion BTUs

Equivalent to energy used by:

- More than 17 million cars on the road for 1 year
- Approximately 240 million barrels of oil

Source: Bassett, EPA Region 4

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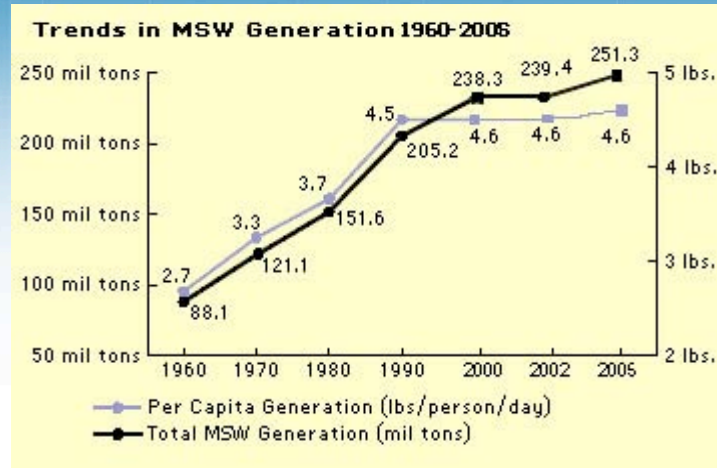
Why Green Solid Waste Management?



- Solid waste generation continues to increase
- Declining recycling rates in many states and communities - in spite of higher recycling tonnages

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MSW is Increasing



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Declining Recycling Rates Example: Oregon



- 2006: Total waste generation reached record high 5.75 million tons - 3.9% increase from 2005
- 2006: 47.5% recovery rate - down from 49.1% in 2005

Source: Oregon DEQ

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Declining Recycling Rates Example: Maine



- 12-year trend of increased recycling (in tons)
- 2005: 36% recycling rate - down from 41% in 1995

Source: Maine 2006 Solid Waste Disposal Capacity Report

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Declining Recycling Rates Example: Florida



From 2002 to 2006:

- MSW (burned, buried or recycled) has increased from 1.76 to 1.91 tons/capita/year
- Recycling rate decreased over 4% - from 28% down to 24%

Source: FL DEP Annual Reports

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5 Key Steps to Greening of Solid Waste Management



- 📁 Re-define goals
- 📄 Re-structure and re-define roles & responsibilities
- 📋 Employ best management practices to achieve goals
- 🏗️ Design and run green facilities and operations
- 📊 Track progress and practice continuous improvement

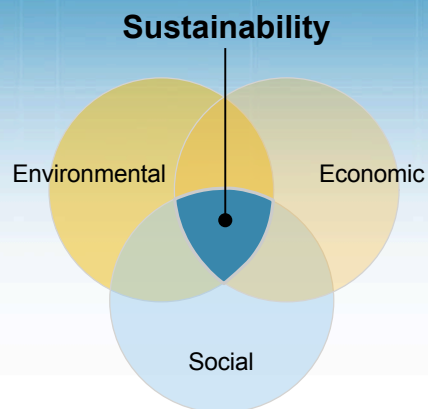
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1. Re-define Goals: *Achieve Sustainability*



Triple Bottom Line:

Achieve economic, social, and environmental success



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1. Re-define Goals: Aim for Zero Waste



Communities with Zero Waste Goals



United States:

- City of Oakland, CA
- San Francisco, CA City & County
- Berkeley, CA
- CA Integrated Waste Mgt Board
- Boulder, CO County & City
- Carrboro, NC
- Central Vermont Waste Mgt District
- Seattle, WA
- Summit County, CO
- Matanuska-Susitna Borough, AK
- Logan County Solid Waste District, Bellefontaine, OH

Source: Gary Liss, CA

Canada:

- Toronto, ON
- Halifax, Nova Scotia
- Regional District Nelson, BC
- Regional District Kootenay Boundary, BC
- Regional District Central Kootenay, BC
- Smithers, BC
- Regional District Cowichan Valley, BC
- Nanaimo, BC
- Sunshine Coast Regional District, BC

2. Re-Structure: *Integrate with Environmental/Sustainability Programs*



- **CIWMB** - reorganized non-regulatory activities (over 250 staff) into new Sustainability Program
- **Portland, OR** - created Office of Sustainable Development, merging Solid Waste & Recycling Division with Energy Office
- **Plano, TX** - created Sustainability & Environmental Services Dept - addressing water, energy, solid waste, litter, etc.

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2. Re-define Roles: *Use Partnership Based Approach*



- Shared responsibility model is leading practice
- *Role of waste manager*: Influencer, change agent, facilitator, motivator, coordinator - *leader*
- Solid waste management is no longer just downstream materials handling

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3. Employ Best Management Practices to Achieve Goals: *Smart Planning*



- Prepare SWMP to reflect new priorities and shared responsibility approach
- **Planning Tools:**
 - *Waste characterization and capture studies* - to identify opportunities to eliminate waste and recover resources
 - *Life cycle analysis* (economic and environmental modeling) - to determine impacts of different options
 - *Waste flow mapping* - to determine opportunities for intervention
 - *Stakeholder engagement* - to build understanding and support

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Planning Example: Portland Oregon



Portland developed 10 year plan to:

- Promote sustainability of solid waste/recycling system that includes maximum efficiency, equity and economic vitality, improved worker safety and reduced environmental and human health impacts over entire life cycle of the materials
- Minimize impact of harmful wastes by targeting toxicity and reducing greenhouse gas emissions
- Reduce waste generation below 2005 levels by 2015
- Increase recovery with target of 75% by 2015 and promote highest value use of the recovered materials

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Planning Process: Portland Oregon



- 4 stakeholder groups involved in 20 meetings
- Economic and environmental modeling of scenarios
- 45-day public review period - 5,900 comments
- Final plan completed - 2007

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3. Employ BMPs to Achieve Goals: *Financing*



- True cost accounting
- Re-design program financing to eliminate dependence on waste
- Create incentives to achieve higher waste reduction and diversion rates
- Raise cost of disposal to increase waste reduction and recycling
- Modify or avoid put or pay agreements in future contracts
- Pay-as-You-Throw (PAYT)
- Participate in emissions reduction credit systems
- Eliminate subsidies that favor use of virgin materials and generation of waste

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3. Employ BMPs to Achieve Goals: *Reduction, Reuse Recycling/ Composting*



- **Education/outreach** - social marketing to achieve behavior change
- **Reuse and recycling** - as convenient as waste disposal
- **C&D debris** -waste prevention and on site recovery, followed by central processing
- **Composting** - food waste plus yard debris (then reduce waste collection)
- **Recycling and compost market development** - to feed local, regional and global economies

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3. Employ BMPs to Achieve Goals: *Policies*



- Disposal bans and mandatory recycling ordinances
- Automatic recycling service provision (not optional)
- Building codes and permitting requirements to design for recycling in commercial buildings and multi-family units
- Requirements for builders to have recycling plans
- Producer responsibility/product stewardship

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3. Employ BMPs to Achieve Goals: *Disposal with Recovery In Mind*



- Integrate materials recovery in transfer stations and disposal sites
- Preprocess waste prior to landfill/WTE
- Consider bioreactor landfills
- Develop landfill gas-to-energy

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4. Design & Run Green Facilities and Operations: *Leading by Example*



Facilities:

- LEED/green buildings and facilities construction
- Planning and designing for materials recovery
- EPP procurement for furniture, supplies, and equipment
- Operation and maintenance to minimize waste (e.g., in house programs for waste prevention, recycling, and composting)

Collection operations:

- Use alternative fuel powered vehicles and fuel efficient vehicles
- Improve routing & collection efficiency
- Reduce/consolidate collections

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5. Track Progress and Practice Continuous Improvement



- Life Cycle Cost Analysis
- EPA WARM Waste Reduction Model
<http://epa.gov/climatechange/wycd/waste/index.html>
- Northeast Recycling Council (NERC)
Environmental Benefits Calculator
www.nerc.org/documents/environmental_benefits_calculator.html
- Global Reporting Initiative (GRI+)
www.globalreporting.org

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EPA WARM Waste Reduction Model



- Assesses GHG & energy impacts of waste reduction activities
- Accepts user-specific inputs
- Provides individualized results



<http://epa.gov/climatechange/wycd/waste/index.html>

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NERC Environmental Benefits Calculator



- Downloadable Excel-based spreadsheet tool
- Generates estimates of environmental benefits based on tons of materials: source reduced, reused, recycled, landfilled, or incinerated (includes WTE)
- Derived from per-ton estimates of energy use and emissions from lifecycle analysis studies for "typical" facilities & operating characteristics existing in the U.S.
- Incorporates EPA's WARM Calculator, plus info from U.S. Department of Energy, Steel Recycling Institute, Glass Packaging Institute, and U.S. Climate Technology Cooperation Gateway
- Usable by any U.S. state, region, county, town, institution, college or business

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Global Reporting Initiative (GRI+)



- Most widely accepted sustainability reporting framework
- Identifies specific and standard economic, environmental, social metrics for sustainability reporting
- GRI+ includes electric and water utility supplements to the original GRI



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Continuous Improvement



No rest for the weary!
When the goal is met:
rejoice, then raise the bar higher.

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