Market Overview Presentation

Presented at the

2nd Annual Waste-To-Energy Finance & Investment Summit

San Diego, CA

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By
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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 exclusively to solid waste management; more focused than broad-based firms
- "Change Agents" to produce better services and facilities

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SOLID WASTE MANAGEMENT IN THE PAST

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Alternative Technologies in the 1970s and early 1980s

- Andco Torrax Gasifier in Niagara, NY
- Black Clawson Hydropulper in Franklin, OH
- CEA Eco-Fuel in Bridgeport, CT
- Columbus, Ohio RDF Burning Power Plant
- Occidental Petroleum, GarbOil in San Diego, CA
- Monsanto Pyrolysis in Baltimore, MD
- Recovery 1 in New Orleans, LA
- Union Carbide Oxygen Pyrolysis in Charleston, WVA
- RDF for Utility Boilers in St. Louis, MO; Milwaukee, WI; Rochester, NY; and Chicago, IL

Why did these projects fail or stop operating?

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Monsanto Pyrolysis Kiln Baltimore, MD (1,000 TPD)

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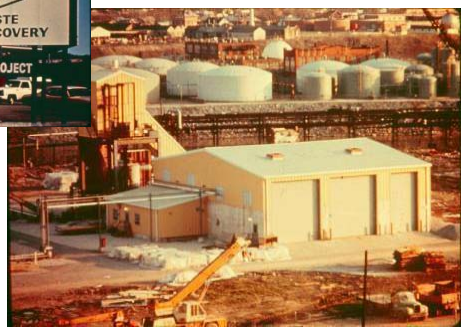
Union Carbide Purox System Charleston, WV (300 TPD)



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NCRR Recovery I Facility New Orleans, LA (750 TPD)

Primary goal was shredding and extensive materials recovery

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RDF Burning in Coal-Fired Utility Boilers

Union Electric Co.
St. Louis, MO

Americology – WEPCO
Milwaukee, WI

St. Louis facility started with just shredded MSW less ferrous metals as the fuel which became problematic; Milwaukee facility was developed as a complete RDF processing facility w/Americology.

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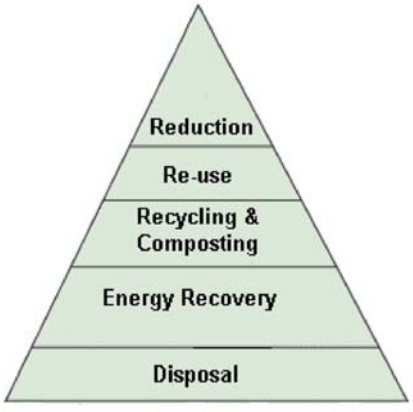
Waste Management Hierarchy



Note: In 2005, EPA designated WTE energy as renewable energy and 35% recycling goal established!

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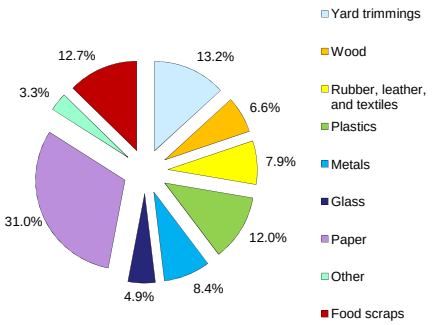
Waste Facts

- Each person in U.S. today generates 1,643 lbs. per year
  - In 2010, to grow to 1,752 lbs. per year
- What is in our waste?
  - Recyclables
    - Feasible now to recycle up to 50-70%
  - Energy content of remainder: 5,500 BTUs per pound
    - Coal at 9,000 BTUs per pound



Total: 250 Million Tons (Before Recycling)

Source: US EPA, 2008 data

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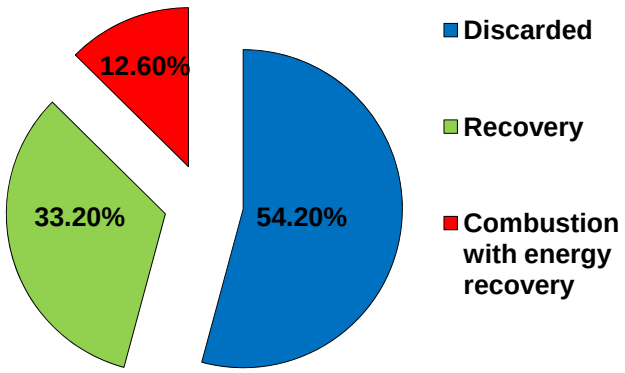
MSW Disposal in America



Source: USEPA 2008

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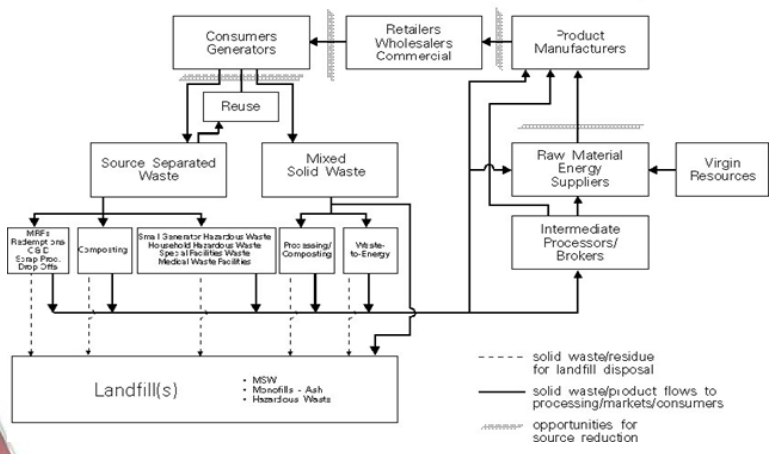
The Integrated Solid Waste Management System



Note: Biomass handling, treatment, reuse and disposal can be incorporated into this system as a separate waste stream

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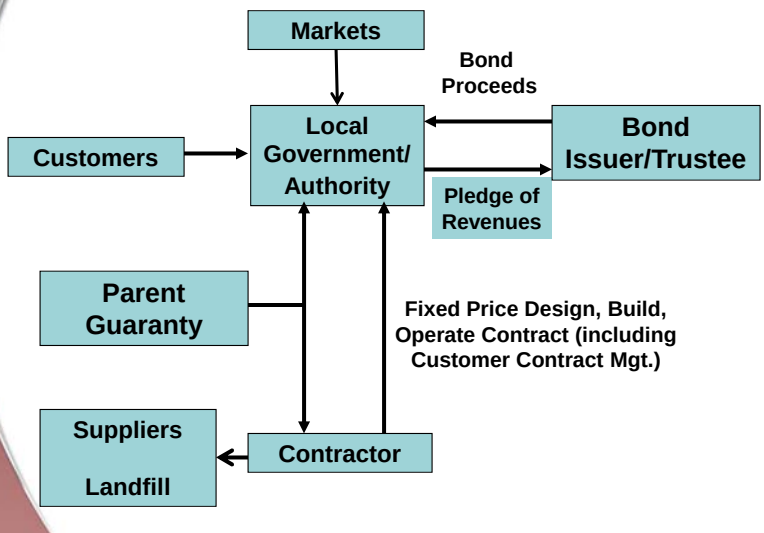
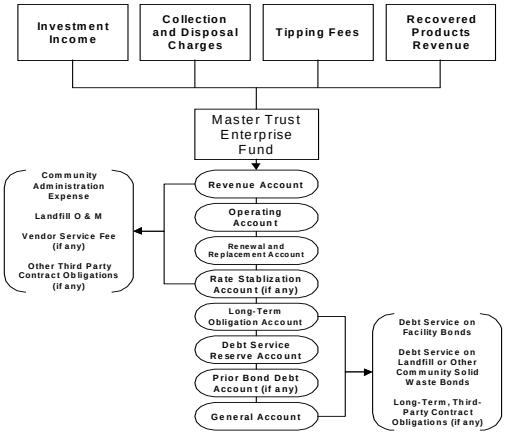
Relationships Amongst Parties



Enterprise Fund Flow



Contractor Risk and Service Fee Formula

- SF = Service Fee
- SF = DS + OM + PT - RPC ± OPB , where
- DS = Debt Service
- OM = Operation and Maintenance Expense
- PT = Pass Through Costs
- RPC = Recovered Products Credit (sharing of revenue often applied)
- OPB = Other Payments Balance
- OM = Labor + Benefits + Parts and Supplies + Equipment Replacement + Office Supplies + Communications + Delivery + Outside Contractors + Leased Equipment + Disposal Charges + Insurance/Bonding + Management Fee + Return on Equity *+ Risk Factor
  - * If privately owned/operated

U.S. Solid Waste Management Programs/Facilities*

Program/Facilities	2002	2004	2008
Curbside Program	8,875	7,689	* *
Yard Trim Facilities	3,227	3,474	* *
Landfills (MSW)	1,767	1,654	1,831
Waste-To-Energy	107	109	103
Landfills (C&D)	1,931	1,574	**
Transfer Station	3,895	3,744	**

*Source: *BioCycle*, State of Garbage; various years
** Watch for publication in near future

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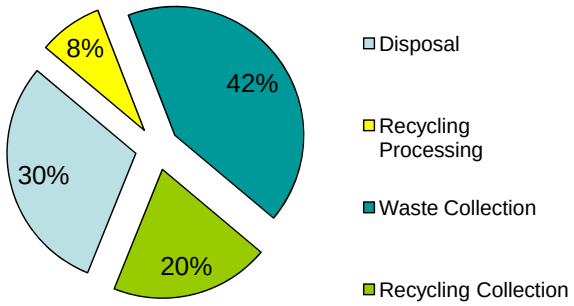
MSW Management System Costs $100-$400 per ton

Source: GBB, 2010



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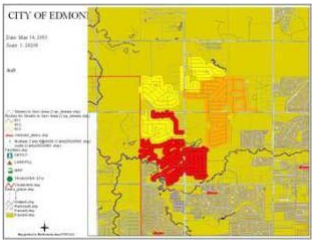
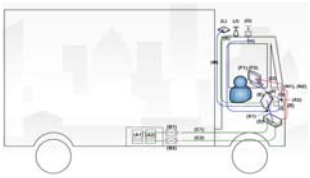
Collection Technology Improvements

- ✓ Hardware
  - ✓ Semi-automation
  - ✓ Automation
  - ✓ Split packers
  - ✓ Carts
- ✓ Software and services
  - ✓ Computerized Routing
  - ✓ GPS
  - ✓ Asset management
  - ✓ Customer service
  - ✓ Web site and email reminders for customers
  - ✓ Cell phones
  - ✓ Reward systems, e.g. RecycleBank
- ✓ Maintenance contracts
- ✓ Closed market contracting





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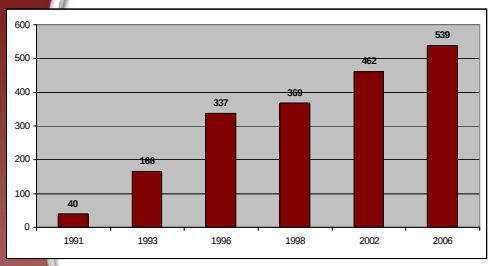
Materials Recovery Facilities Operating in the U.S.



Source: Governmental Advisory Associates, Inc.

Waste Management Recycle America, Elkridge, MD

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Dirty MRFs

- Processes MSW and separates out recyclable materials through a combination of manual and mechanical sorting
- Sorted materials prepared to market specifications
- Organics processed further for mulch, compost, or alternative daily cover (ADC)
- Remainder sent to disposal
- Capable of higher recovery rates than a clean MRF
- Good examples in California with recovery rates of 18 – 48 %
  - Many built or retrofitted to perform as dirty MRFs during 2002 and 2008
  - Capacities range from 1,400 TPD (GreenWaste Recovery Facility, San Jose) to 6,000 TPD (Republic CVT MRF, Anaheim)
- Residuals from Dirty MRFs provide good feed stocks for anaerobic/biological treatment technologies

Medina County (Ohio) Solid Waste Central Processing Facility

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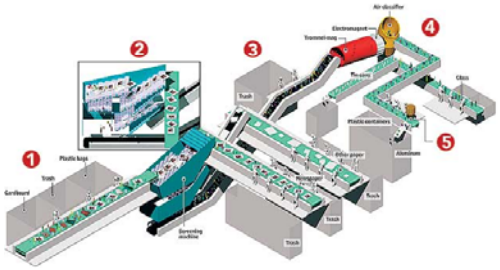
GreenWaste Recovery Facility - San Jose, CA

1. Incoming material to **conveyer belt;** workers pull out large items, cardboard and plastic bags and toss into bins. Trash is discarded.
2. Recyclables move into a double-deck **screening machine** that separates newspapers, mixed paper and containers into separate streams. Materials bounce over rows of square wheels spinning 1,000 times per minute. Blasts of air dislodge cans and bottles from newspapers. Smaller items fall through gaps between rollers onto conveyer belts.
3. Workers again pull out any trash and discard it.
4. Oversized materials continue to the **trommel-mag** - a large, rotating tube with small holes in the sides and an **electromagnet** at one end. Small items such as bottle caps fall through holes. The electromagnet snags tin cans. Then, the **air classifier's** powerful fan blows lightweight aluminum and plastic onto one conveyer, and heavier glass falls onto another. Workers sort glass and plastics.
5. An **electromagnetic device** diverts aluminum cans into a storage bin



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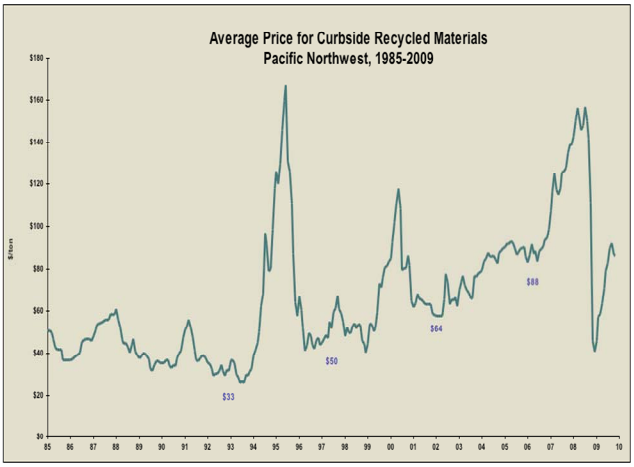
Recycling Revenue Volatility



Source: This graph gives the weighted average market price (large quantities packed for shipment to end-use manufacturers, F.O.B. processing facility) for materials collected by curbside programs in Washington State's Puget Sound region, Morris, Dr. Jeffrey, Sound Resource Management Group, Inc. http://zerowaste.com/pages/Recycling-Markets.htm..

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Food Waste Collection

- Commercial Generators
  - Large generators segregate food scraps for collection to composters
    - Grocery, food manufacturers/packers,
  - Smaller food-based business collections
    - Restaurants, hotels, cafeterias, universities, institutions, places or worship, corporate cafeterias
- Residential Programs
  - Add food scraps in yard debris collection containers (over 90 reported)
    - Ann Arbor, Boulder, Cedar Rapids, Huron, San Francisco, Seattle, State College, etc.

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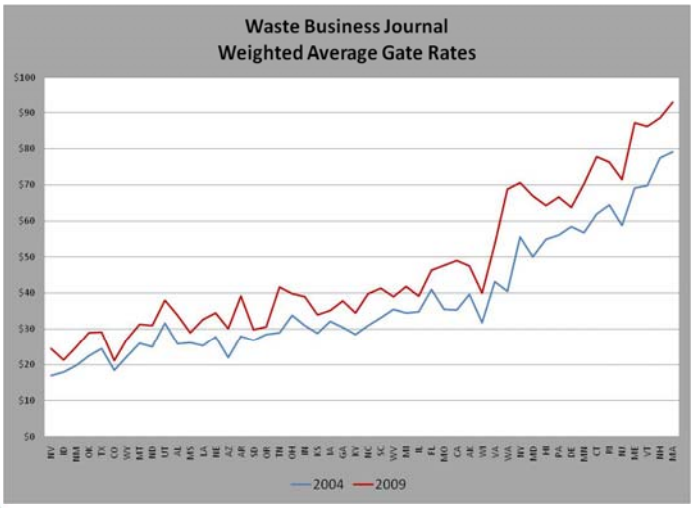
Landfill Gate Rates per ton in the U.S. 2009 Compared to 2004*



Source Waste Business Journal: www.wastebusinessjournal.com

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Today's WTE and Conversion Technologies

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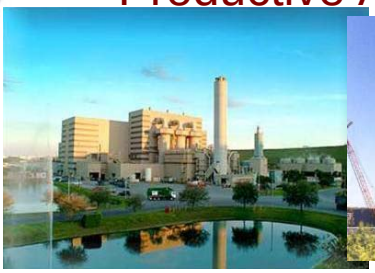
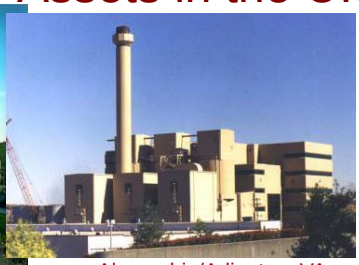
Waste-to-Energy:
87 Facilities with $14 Billion of Productive Assets in the U.S.



North Broward County, FL



Alexandria/Arlington, VA

Springfield, MA

Baltimore, MD

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U.S. WTE Plants by Technology Generating approx. 2,700 MWs

Technology	Operating Plants	Daily Design Capacity (TPD)	Annual Capacity (1) (Million Tons)
Mass Burn	64	71,354	22.1
Modular	7	1,342	0.4
RDF - Processing & Combustion	12	15,428	4.8
RDF - Processing Only	2	6,075	1.9
RDF – Coal Combustion	2	4,592	1.4
Total U.S. Plants (2)	87	98,791	30.6
WTE Facilities	83	92,716	28.7

(1) Annual Capacity equals daily tons per day (TPD) of design capacity multiplied by 365 (days/year) multiplied by 85 percent. Eighty-five percent of the design capacity is a typical system guarantee of annual facility throughput.

(2) Total Plants includes RDF Processing facilities that do not generate power on site.

Source: IWSA (now Energy Recovery Council), 2007 Directory

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WTE Technology & Companies

Company	Technology		
	Mass Burn	RDF	Modular
Babcock & Wilcox	X	X	
Casella		X	
Covanta	X	X	X
Energy Answers*	X	X	X
Foster Wheeler	X		
Veolia*	X	X	
Wheelabrator (WMI)	X		
Xcel Energy		X	

* Covanta purchased Energy Answer's plants in 2008 and Veolia's plants in 2009.

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Air Emissions of Top Three WTE Contenders for WTERT Award in 2006

Emission	WTE-A (mg/Nm^3)	WTE-B (mg/Nm^3)	WTE-C (mg/Nm^3)	Average of 10 Finalists (mg/Nm^3)	EU Standard (mg/Nm^3)	US EPA Standard (mg/Nm^3)
Particulate matter (PM)	0.4	1.8	1	3.1	10	11
Sulphur Dioxide (SO^2)	6.5	7.5	3	2.96	50	63
Nitrogen oxides (NO^x)	80	11	58	112	200	264
Hydrogen chloride (HCl)	3.5	0.5	0.7	8.5	10	29
Carbon Monoxide (CO)	15	7	15	24	50	45
Mercury (Hg)	0.002	0.005	0.002	0.01	0.05	0.06
Total Organic carbon (TOC)	0.5	NA	0.9	1.02	10	n/a
Dioxins (TEQ), ng/m^3	0.002	0.002	0.015	0.02	0.10	0.14

Source: Themelis, N.J. Thermal Treatment Review. Waste Management World, July-August 2007.

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"Porter: Will burning Durham's garbage make us sick? Even Greenpeace has stopped objecting, but Durham residents aren't convinced"

- "Instead, Durham health officer Dr. Robert Kyle gave the project a green light. His risk assessment didn't say it was 100 per cent safe; he said the risks of additional cancers attributable to the plant would be one in a million."
- "Recently, the British Health Protection Agency, an arm's-length advisory body made up of professionals and doctors, agreed with him. "Well-managed, modern incinerators are likely to have only a very small effect on health," the report concludes. Particulates, dioxins, furans, heavy metals — all these things are emitted by incinerators, it states, but at insignificant amounts. (Municipal waste incinerators account for less than 1 per cent of UK dioxin emissions.)"
- The changes were what led Greenpeace to dismantle its anti-incinerator campaign. "A lot of the health-impact concerns about incineration have died away," says Paul Johnson, principal scientist at the organization's research lab and an author of that damning 2001 report. "The conventional wisdom is with all the emissions control, they are as safe as houses."

Source: http://www.thestar.com/news/ontario/oshawa/article/790181

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EPA WARM Model Comparison between Recycling Rates with Composting or Waste to Energy

Baseline Description	Alternative	Total GHG Emissions (MTCO2E/day) from:			
		Baseline MSW Generation and Management	Alternative MSW Generation and Management	GHG Emission or Reduction Difference	Barrels of Oil Saved (bbls/day)
Waste landfilled	20% Recycling	110	(310)*	(420)	523
Waste landfilled	50% Recycling	110	(543)	(653)	907
Waste landfilled	50% Recycling and Rest to Composting	110	(597)	(707)	904
Waste landfilled	50% Recycling and Rest to Waste To Energy	110	(661)	(771)	1,047

*Note: numbers in parenthesis are negative showing reductions in CO2 emissions.

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Some WTE Costs from Hawaii

Location	MSW Capacity TPD	Capital Cost at Location ($1,000)	Net Cost $/ton	Source
Hawaii County, HI	230	$125.5 M	135	Big Island's Waste to Energy Plant Moves Forward, Advertiser Big Island Bureau, Kevin Dayton, April 2009
Honolulu County, Hawaii	854	$90.72	91	http://www.brighterenergy.org/3754/news/bioenergy/302m-expansion-for-hawaii-energy-from-waste-plant/ And http://www.covantaholding.com/site/news-2009/december-21, 2009
Maui County, HI	360	$86 M	81	County of Maui, Integrated Solid Waste Management Plan, February, 2009, GBB

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The Ultimate Goal:

Fully Integrated and Efficient Waste Management System with Significant Diversion and WTE …in a 50-50 partnership!

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Alternative Conversion Technologies >>243 Different Companies with Offerings<<

- Biological
  - Aerobic Composting
  - Anaerobic Digestion/ Codigestion
  - Biodiesel
  - Bioethanol
  - Biological Pretreatment
  - Vermicomposting
- Thermal/Chemical
  - Acid Catalysis & Distillation
  - Direct Combustion
  - Gasification/Pyrolysis
  - Microwave Processes
  - Plasma-Arc
  - Thermal Decomposition

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Source: Gershman, Brickner & Bratton, Inc., April 2010.

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U.S. DOE Funds 19 "Biorefinery" Projects for $564 million, December 2009

Company	Funding		Location	Description
	DOE Grant	Non-fed/Other		
Bluefire Ethanol	$ 81,134,686	$ 223,227,314	Fulton, MS	Facility will be constructed to produce ethanol from woody waste, mill residue, and sorted municipal solid waste
BioEnergy International	$ 50,000,000	$ 89,589,188	Lake Providence, LA	Process biologically produces succinic acid from sorghum, the process displaces petroleum
Enerkem	$ 50,000,000	$ 90,470,217	Pontotoc, MS	the project will be sited on an existing landfill and use feedstock's such as woody biomass in a gasification and catalytic process
INEOS New Planet BioEnergy	$ 50,000,000	$ 50,000,000	Vero Beach, FL	The facility will combine biomass gasification and fermentation to process wood, vegetative residues and construction and demolition material
Sapphire Energy	$ 50,000,000	$ 85,064,206	Columbus, NM	The project will cultivate algae in ponds the will be converted into green fuels using the Dynamic Fuels refining process
Algenol Biofuels	$ 25,000,000	$ 33,915,478	Freeport, TX	The project will make ethanol directly from carbon dioxide and seawater using algae
American Process	$ 17,944,902	$ 10,148,508	Alpena, MI	The project will produce fuel and potassium acetate and the plant will have the capacity to produce up to 890,000 gallons of ethanol per year
Amyris Biotechnologies	$ 25,000,000	$ 10,489,763	Emeryville, CA	The project will produce a diesel substitute through the fermentation of sweet sorghum and will have the capacity to co-produce lubricants, polymersand other petro-chemicals substitutes
Archer Daniels Midland	$ 24,834,592	$ 10,946,609	Decatur, IL	the project will use acid to break down biomass which can be converted to liquid fuels or energy. The facility will produce ethanol and ethyl acrylate
Clearfuels Technology	$ 23,000,000	$ 13,433,926	Comerce City, CO	The project will produce renewable diesel and jet fuel from woody biomass by integrating ClearFuel's and Rentech's conversion technologies
Elevance Renewable Sciences	$ 2,500,000	$ 625,000	Newton, IA	The project was selected to complete preliminary engineering design for a future facility producing jet fuel, renewable diesel substitutes, and high-value chemical from plant oils and poultry fat
Gas Technology Institute	$ 2,500,000	$ 625,000	Des Plaines, IL	The project was selected to complete preliminary engineering design for a novel process to produce green gasoline and diesel from woody biomass, agricultural residues, and algae
Haldor Topsoe	$ 25,000,000	$ 9,701,468	Des Plaines, IL	The project will convert wood to green gasoline by fully integrating and optimizing a multi-step gasification process
ICM	$ 25,000,000	$ 6,268,136	St. Joseph, MO	The project will modify an existing corn-ethanol facility to produce cellulosic ethanol from switchgrass and energy sorgghum using biochemical processes
Logos Technologies	$ 20,445,849	$ 5,113,962	Visalia, CA	The project will convert switchgrass and woody biomass into ethanol using a biochemical conversion process
Renewable Energy Institute International	$ 19,980,930	$ 5,116,072	Toledo, OH	The project will produce high quality green diesel from agriculture and forest residue using advanced pyrolysis and steam reforming
Solazyme	$ 21,765,738	$ 3,857,111	Riverside, CA	The project will produce algae oil that can be converted to oil-based fuels
Honeywell's UOP	$ 25,000,000	$ 6,685,340	Kapolei, HI	The project will integrate existing technology from Ensyn and UOP to produce green gasoline, diesel, and jet fuel from agricultural residue, woody biomass, dedicated energy crops , and algae
ZeaChem	$ 25,000,000	$ 625,000	Boardman, OR	The project will use purpose grown hybrid poplar trees to produce fuel-grade ethanol using hybrid technology

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Ethanol and Value (Cents per gallon, 2005$)

Year	2008	2009	2010	2011	2012	2013
Ethanol Wholesale Price	209.9	181.4	174.2	171.3	166.1	165.1
Ethanol (E85) *	226.4	198.5	191.4	189.6	188.3	186.5
Motor Gasoline **	227.3	217.3	209.2	204.7	201.1	195.2

Source: U.S. DOE, EIA: http://www.eia.doe.gov/oiaf/aeo/pdf/aeotab_12.pdf

*E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). The annual average ethanol content of 74 percent is used for this forecast.
**Sales weighted-average price for all grades. Includes Federal, State, and local taxes.

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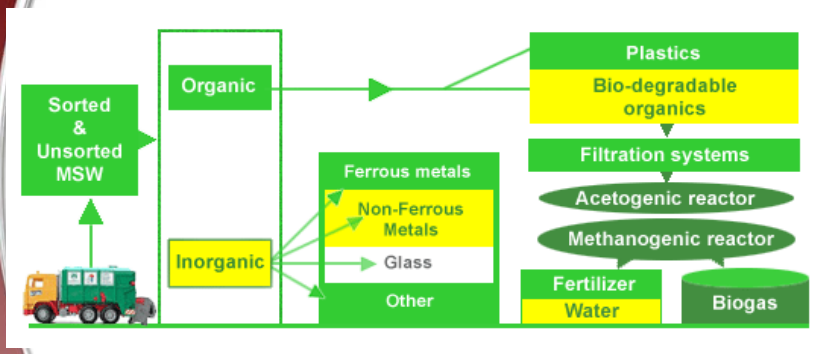
ArrowBio Process Flow



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ArrowBio Facility Hidera, Israel

- 100,000 tons per year of MSW
- 320 TPD on a 6 days per week basis
- Initial separation of recyclables using water slurry
- 23,000 tons of compost product
- 19,000 tons of residue
- Capital cost $70K +/- per daily installed ton

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ArrowBio – Sydney, Australia

WSN Facility – 300 TPD
Jacks Gully Tank Farm
Fall 2008

April 2010: Los Angeles County announced it wants to advance a 150 TPD ArrowBio anaerobic digestion project at CR&R Inc. in Stanton, CA

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Enerkem

- Gasification and conversion to ethanol
- Pilot plant in Westbury, Quebec
- Catalyst conversion system proven and operational
- Feedstock flexibility

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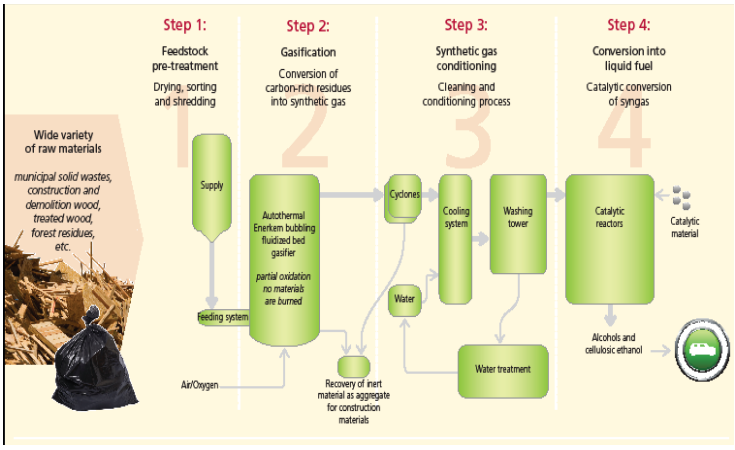
Biofuel from Thermal Gasification Enerkem Technology



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Enerkem Edomonton, Alberta

- **Feedstock :** Sorted Municipal Solid Waste
  - 660 TPD to 330 TPD RDF for feedstock
- **Total Capacity :** 10 M gallons per year (initially)
- **Product :** Syngas, Methanol, Ethanol
- **Start date:** 2012
- **Approval:** Environmental permit granted
- Good support during public consultation process
- See: www.edmontonbiofuels.ca

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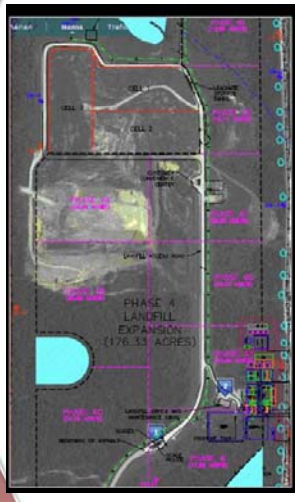
Enerkem – Pontotoc, MS



- **Feedstock :** Sorted Municipal Solid Waste and wood residues
  - 660 TPD to 330 TPD RDF for feedstock
- **Total Capacity :** 10 M gallons per year (initially)
- **Product :** Syngas, Methanol, Ethanol
- **Start date:** 2012
- LOI signed with the Three Rivers Planning and Development District for MSW feedstock
- Currently in permitting cycle
- Will help recycle and convert 60% of the waste crossing the area's landfill gate
- Awarded $50M funding from U.S. DOE advanced bio-refineries program

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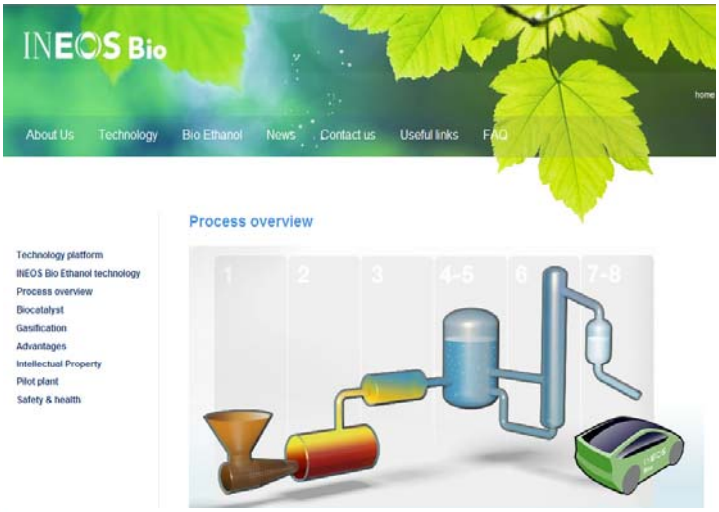
INEOS Bio Waste into Ethanol



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INEOS Bio Pilot Plant

Biocatalytic Reactor

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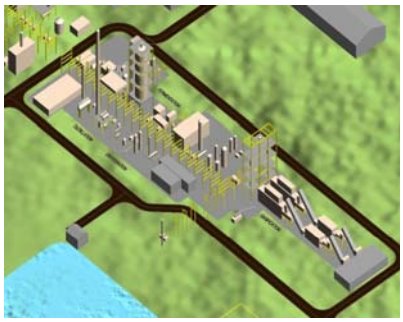
INEOS New Planet Bio Energy, LLC

- Vero Beach, Indian River County, FL
- In Dec. 2009, received $50 million DOE grant
- Feedstock: 300 TPD wood, vegetative residues, and C&D materials into ethanol
- 80-100 gallons of ethanol per dry ton of biomass
- Products: 8 million gallons per year and 1-2 MW power
- Completion target: 4th Qtr. 2011



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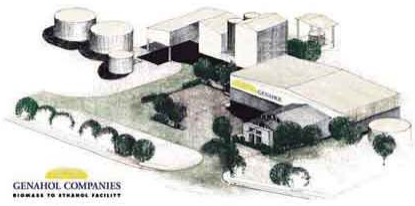
Lake County, IN Waste-to-Ethanol Project



Genahol Powers 1 LLC

Initially, now

Powers Energy One of Indiana LLC

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Lake County (IN)
Solid Waste Management District
Waste-to-Ethanol Project

- Powers (developer) to use INEOS technology
- 2,000 tons per day facility with multiple lines sized for 125 tons per day each (16 lines)
- Capital cost: $256 million
- Plans include expanding to as 10,000 tons per day
- INEOS guaranteeing 90 gallons ethanol per ton MSW input
- Tipping Fee projected to be $17.25 per ton after 3 cent per gallon ethanol payment to municipalities participating and $2.50 per ton host community fee to the District
- Service agreements needed with most municipalities in Lake County; many executed

Source: Jeffrey Langbehn, Executive Director; June 2010

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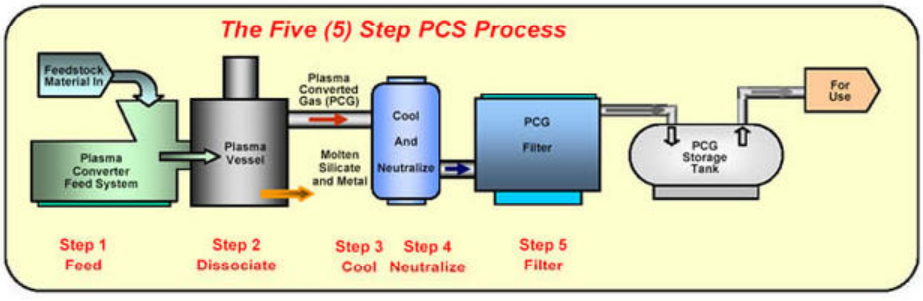
Geoplasma

Jacoby Energy

Plasma Converter System Process



Generates a SYNGAS that is available for use in power generation. Plasma vessel based on Westinghouse Plasma furnace.

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GeoPlasma St. Lucie LLC Renewable Waste-to-Energy Project

- Feedstock (Tons Per Day) : 525 MSW and 75 tires
- Capital cost: $125 million
- 9-acre site at County Landfill
- Florida DEP Air Construction Permit Application filed in December 2009
- Energy output type(s): approx. 20 megawatts power and steam offload to Tropicana Products
- Owner: GeoPlasma, Atlanta, GA / Energy Resources Group
- Financing method: Private
- Construction Start: First Quarter 2011, subject to permits and financing
- Operations Start: Mid 2013

Source: GeoPlasma-St. Lucie, LLC and Energy Resources Group, May 2010

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Plasco Energy Group Inc.

- Plasco Energy Group Inc. located in Ottawa, Canada
- Post recycled MSW is shredded for processing in Plasco conversion chamber
- Produces Syngas for electrical generation
- Two operating facilities
  - 94 ton-per-day capacity plant in Ottawa, Canada
  - 5 ton-per-day research and development facility in Castellgali, Spain

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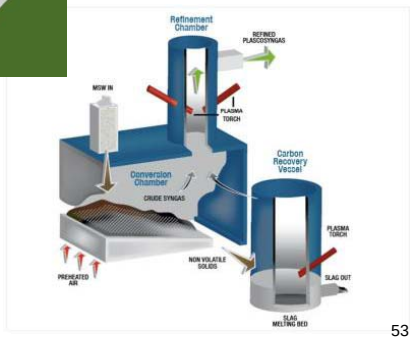
Plasco Energy Group Inc. Conversion System



Note: Plasco Energy recently announced plans to build plants in Canada and China.

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Thermoselect SA - Pyrolysis

- Swiss pyrolysis/gasification technology
- Offered in U.S. by Interstate Waste Technologies, the North American licensee
- Seven facilities with this technology in Japan (with variety of fuels)
- Actively marketing system in U.S.

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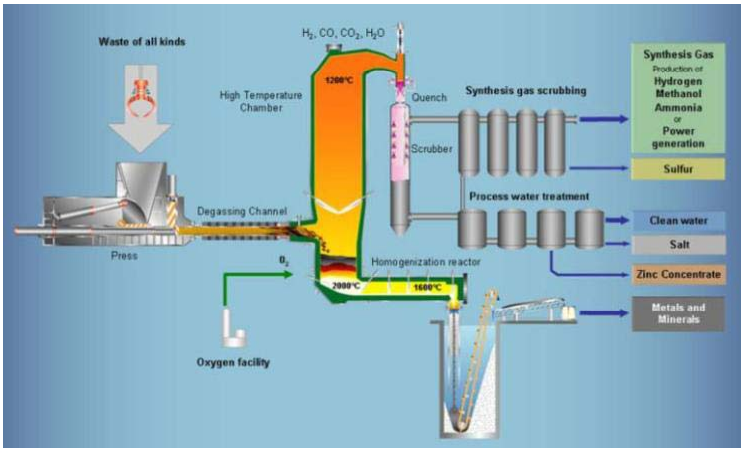
Thermoselect Process Flow



No waste preparation or RDF production required

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City of Taunton, MA
Solid Waste Management Facility

- Awarded through public procurement for non-mass burn incineration technologies
- Design capacity: 1,770 tons per day
- Guaranteed availability: 85.6% or 552,750 tons per year
- Construction cost: $420 million
- Operating costs: $55 million
- Estimated Start-up date: Third Quarter 2013
- Electricity Output (initially): sell net 54 Mw; 733 Kwhr per ton
- Ethanol Output (current): 34 million gallons per year; 61.3 gallons per ton
- Other Outputs (Per Input Ton): approx. 20 percent (Aggregate, Metal , Sulfur, Salt, and Zinc Concentrate)
- Net Service Fee: Approximately $50 per ton
- Owner is IWT Taunton Renewable Energy LLC.
- Financing: debt and equity; to apply for loan under DOE Loan Guarantee Program

Source: Interstate Waste Technologies, May 2010

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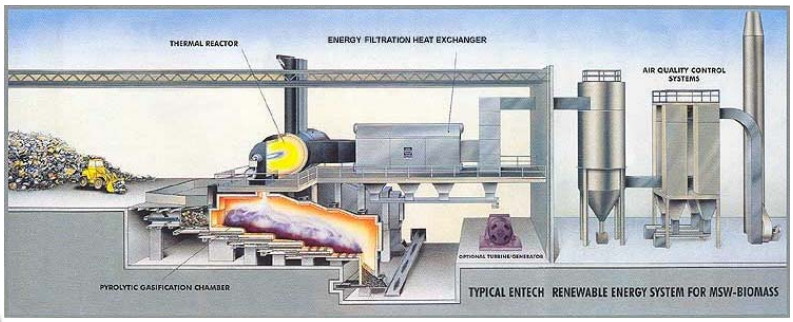
Entech Typical Arrangement Advanced Conversion Technology



April 2010: Los Angeles County advances negotiations for a facility at Rainbow Disposal in Huntington Beach, CA

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Bouldin Corp. "WastAway" Process

- Process MSW into RDF; then steam heated and hydrolyzed to make RDF into a "Fluff" product
- Multi-year demonstration operation in McMinnville, TN (two - 2 TPH lines)
- New 2-line commercial plant in Aruba; operational since July 2009
- Selected by developer for two 200-TPD plants on USVI (Fluff into fuel pellets for firing in fluidized bed boilers)

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Minimrf LLC

- Process Unsorted MSW for
  - Ferrous and non-ferrous
  - Compostibles; ADC
  - Combustibles (optional engineered fuel module)
- Up to 100 TPH
- Small footprint
- Modular, trailer units
- Partners: Novelis and PRFection Engineering

Source: Steven M. Viny, PRFection Engineering

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Issues to consider in Technology Development

- Performance history and size
- Scaling uncertainties
- Environmental impacts
- Siting and permitting needs
- Cost uncertainties and their $ coverage
- Product market uncertainties
- Process guarantees
- Financial resources of developer/guarantor
- Community acceptance (work with community; don't surprise them!)
- Other risks and unknowns

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Technologies and Risk

Source: GBB, April 2010

Alternative	Risks/Liability	Risk Summary
Mass Burn/WaterWall	Proven commercial technology	Very Low
Mass Burn/Modular	Proven commercial technology	Low
RDF/ Dedicated Boiler	Proven commercial technology	Low
RDF/Fluid Bed	Proven technology; limited U.S commercial experience	Moderate
Pyrolysis	Previous failures at scale, uncertain commercial potential; no operating experience with large scale operations	High
Gasification	Limited operating experience at only small scale; subject to scale-up issues	High
Anaerobic Digestion	Limited operating experience at small scale; subject to scale-up issues	High
Mixed-Waste Composting	Previous large failures; No large-scale commercially viable plants in operation; subject to scale-up issues	Moderate to high
Chemical Decomposition	Technology under development; not a commercial option at this time	High

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Recent Activities with Waste Processing Technologies in the U.S.

- Locations with Planning/Procurements:
  - New York, NY; City of Los Angeles, CA; Los Angeles County, CA; St. Lucie County, FL; Hawaii County, HI; Frederick and Carroll Counties, MD (NMWDA) ; Harford County, MD (NMWDA); City of Sacramento, CA; Tallahassee, FL; Broward County, FL; Palm Beach County, FL; Taunton, MA; Santa Barbara, CA; San Bernardino County, CA
  - 80 + different companies responded
- Mass burn expansions announced/underway/completed:
  - Baltimore, MD; Honolulu, HI; Hillsborough County, FL; Lee County, FL

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Future of RDF…Reasons for Increased Demand

- Many conversion technologies require MSW pre-processing
- Electric utilities required to have 20 percent of demand met through renewable energy and efficiency measures by 2020
- Electric utilities that burn coal could be retrofitted for RDF
  - 10 percent of the coal used equates to 225 millions tons RDF per year

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Summary Points

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Change Waste, Recycling, and Energy Economics

- Waste disposal is too cheap
- Energy revenues not high enough
- Energy too cheap
  - Federal policy change needed

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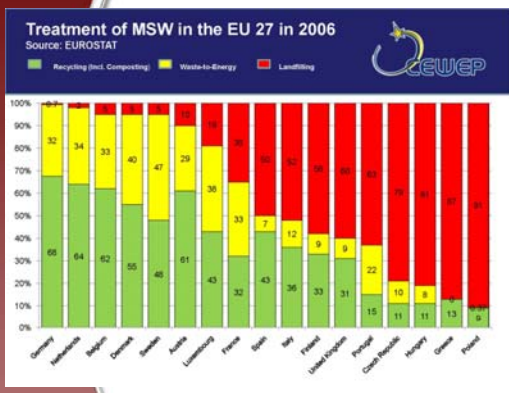
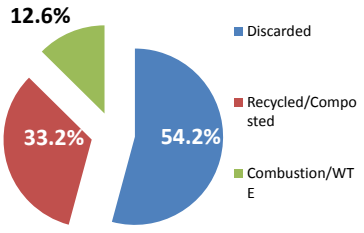
Why Can't U.S. be like EU Countries?



U.S. MSW Disposal (USEPA 2006)



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Disposal Taxes

- U.S. – recycling is approx. 30% and WTE < 10%
  - Federal – none
  - States – varies from none, often $1 per ton, and high of $12.70 per ton in Wisconsin
- Europe Countries – recycling > 50% and WTE 30-40%
  - Germany – none; landfill ban for untreated waste since 2005
  - Netherlands - 14-86 Euros*
  - Belgium – 55 to 79 Euros
  - Denmark – 50 – 63 Euros

*Euros Per Tonne:
- 1 Euro = approx. $1.40 and 1 Tonne = approx. 2,205 lbs.
- So, 50 Euros per Tonne = approx. $63.64 per ton

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Facility Aesthetics

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Some Recent Facilities in EU
(Courtesy: Ramboll)

UDDEVALLA – SVERIGE 300 TPD

SYSAV – SWEDEN 2,400 TPD

FASAN – DENMARK 500 TPD

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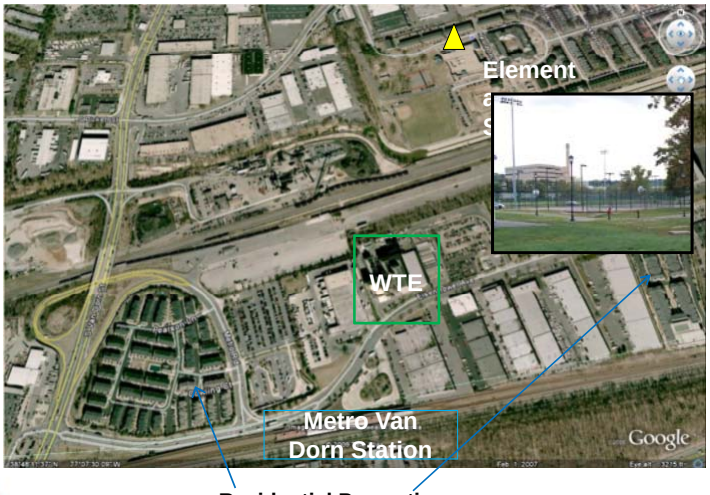
Covanta Alexandria/Arlington (VA) WTE Facility Neighbors, Including Elementary School



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What if a clock was added to the stack?

Would the WTE Facility be called a "Clock Tower"?

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Why are we fighting with Zero Waste?

- Set aggressive and sustainable recycling goals
  - 50-50 or 60-40 Partnership: Recycling and WTE
- *Do we need soil amendment or fossil fuels displaced?*
- Waiting for unrealistic recycling sends waste to landfills

How much waste are we for?

...as little as possible!

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11 Project Building Blocks

- ❑ Limited and High Alternative Disposal Costs, e.g. approaching $100 per ton
- ❑ High level of recycling – 50-60 percent
- ❑ Planning and implementation resources
- ❑ Waste Supply and Control for non-recycled materials
- ❑ Energy/Fuel and Materials Market(s)
- ❑ Site that can be permitted, with good logistics, and public acceptance
- ❑ Landfill for ash and by-pass
- ❑ Contractors with deep pockets and proven technology
- ❑ Capital
- ❑ Financability
- ❑ An informed public
- ❑ ***Enlightened Elected Officials***

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Thank you!!

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