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RENEWABLE ENERGY FROM WASTE

“An Overview of Waste-to-Energy in the US Today”

Ted Michaels
President
Energy Recovery Council

Governor’s Recycling Working Group
Hartford, CT

September 11, 2012

Energy Recovery Council & Industry Overview

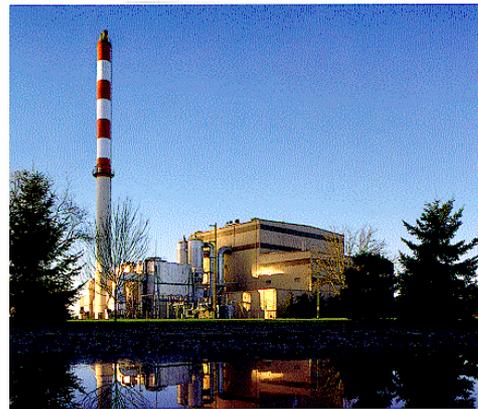
- ERC represents companies and local governments engaged in the nation's waste-to-energy sector.
- There are 86 waste-to-energy facilities in the United States which produce clean, renewable energy through the combustion of municipal solid waste in specially designed power plants equipped with the most modern pollution control equipment to clean emissions.
- Trash volume is reduced by 90% and the remaining residue is safely reused or disposed in landfills.
- The 86 waste-to-energy plants in the nation have a baseload electric generation capacity of approximately 2,700 megawatts and can process more than 28 million tons of trash per year.



What is Waste-to-Energy?

Waste-to-Energy is a specially designed energy generation facility that uses household waste as fuel and helps solve some of society's big challenges

Municipal Solid Waste 1
ton

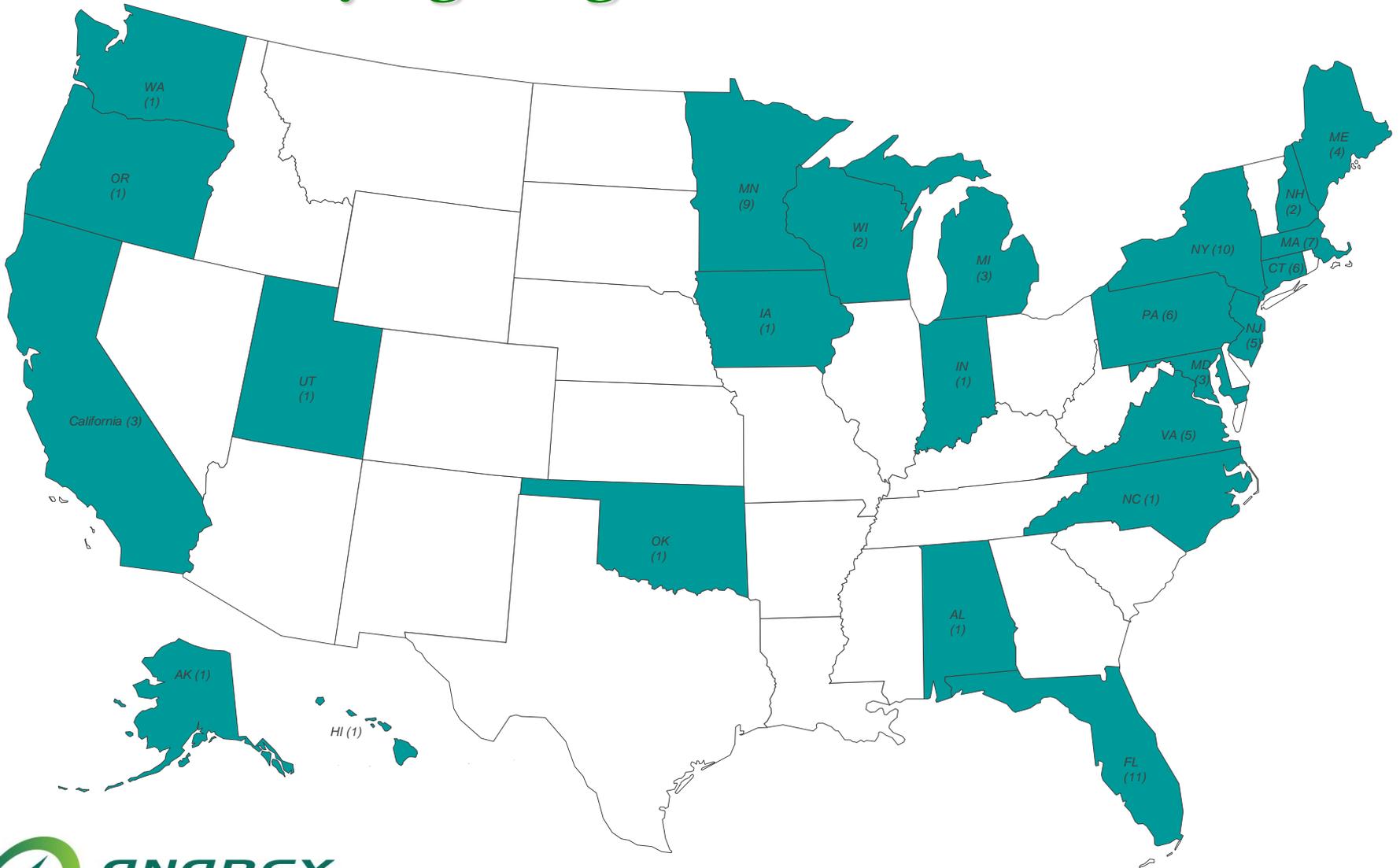


- Power: up to 750 kWh
- Metal: 50 lbs
- Ash: 10% of original volume



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Waste-to-Energy Playing a Significant Role



Waste Management in the United States vs. Connecticut

According to the 2010 BioCycle/Columbia University report entitled “State of the Garbage in America” (based on 2008 data):

	United States	Connecticut
Recycling/composting	24.0%	26.1%
Waste-to-energy	6.6%	62.8%
Landfilling	69.3%	11.1%

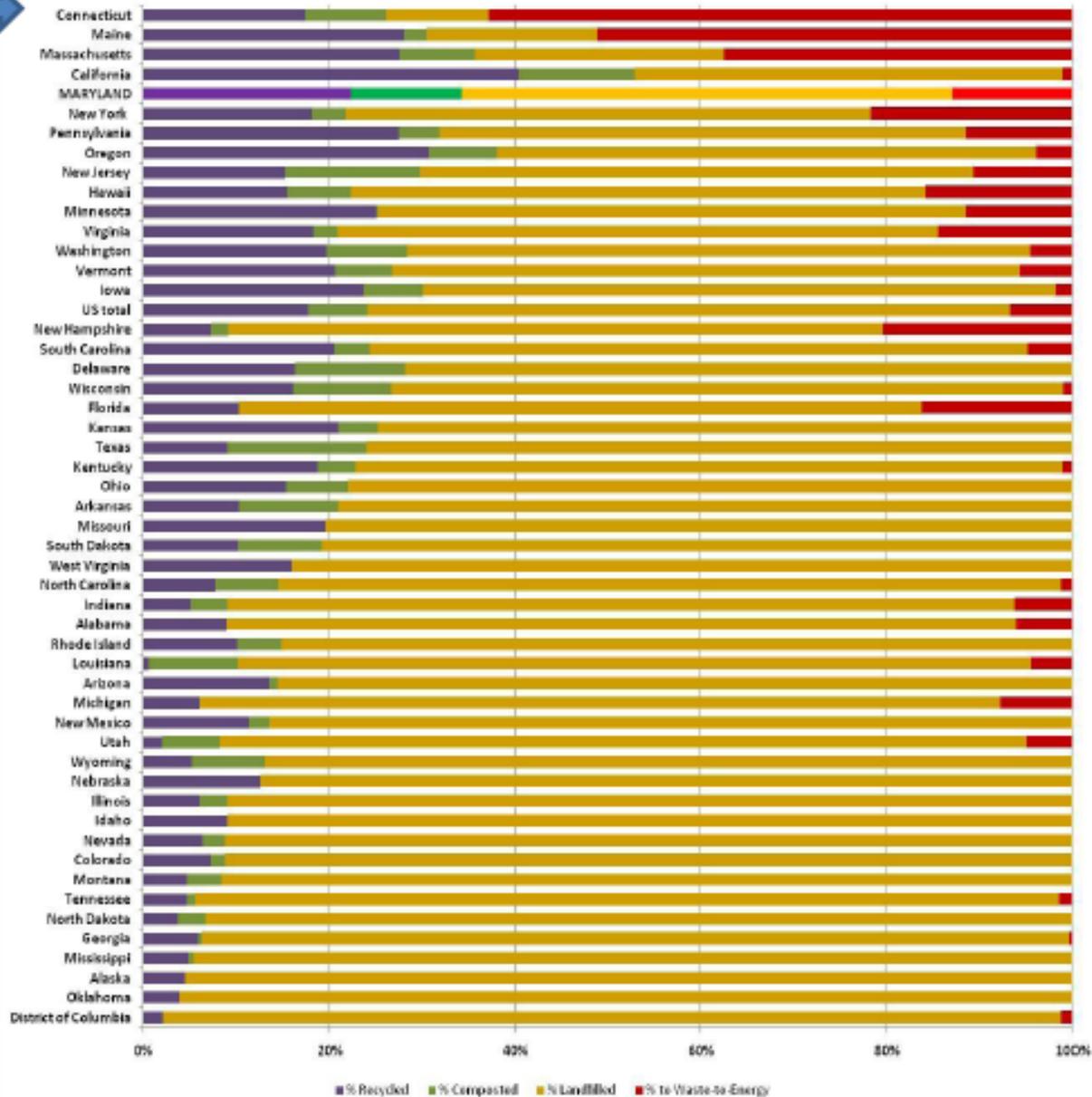
Connecticut



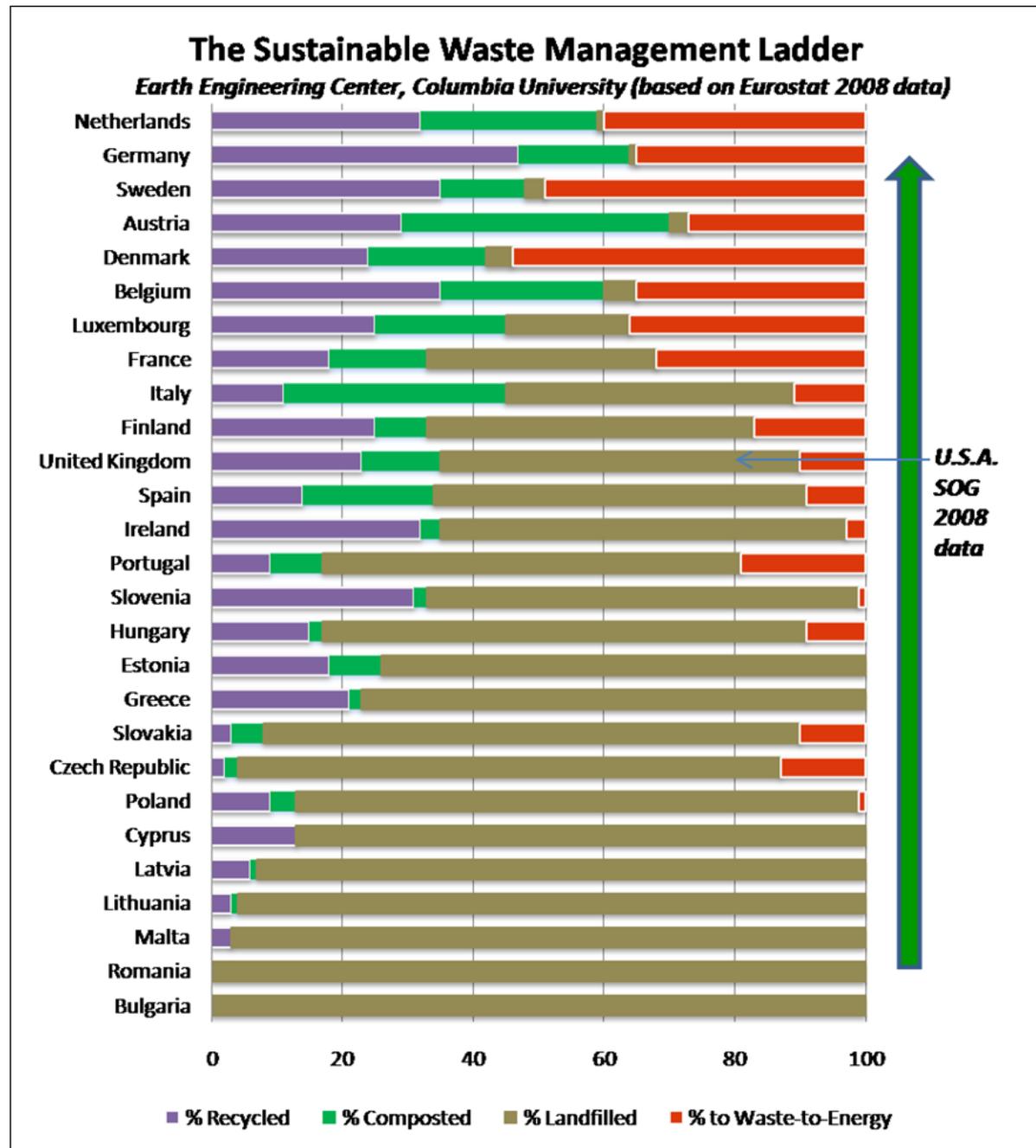
Applying the Sustainability Ladder to the fifty states

The Sustainable Solid Waste Management Ladder for the US

Earth Engineering Center, Columbia University (based on SOG 2008 data)



European Trends in Sustainable Waste Management



Waste-to-Energy in Connecticut

Waste-to-energy has a significant impact on local jobs and the local economy. The six WTE facilities in Connecticut employ hundreds of people at high paying wages.

WTE Jobs in Connecticut:	405
WTE Payroll in Connecticut:	\$45,000,000 annually
Local Taxes/Payments:	in excess of \$10,000,000 annually
\$ Spent on Local Goods and Services:	Tens of millions of dollars annually



Clean, Renewable Energy

- U.S. EPA has stated that waste-to-energy “produces electricity with less environmental impact than almost any other source”
- 30 States, the District of Columbia, Puerto Rico, the Northern Marianna Islands, and the federal government define waste-to-energy as renewable
- Waste-to-energy produces up to 750kWh per ton while landfills produce on average 65 kWh per ton
- Waste-to-Energy complements intermittent renewable sources by providing baseload electric power 24 hours per day, 7 days per week
- The 6 WTE facilities in Connecticut generated more than **1.27 million megawatt hours** of renewable electricity last year.



Environmental Performance Waste-to-Energy

U.S. EPA: “The performance of the MACT retrofit has been outstanding.”
8/10/2007


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 RESEARCH TRIANGLE PARK, NC 27711

AUG 10 2007

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Emissions from Large and Small MWC Units at MACT Compliance

FROM: Walt Stevenson *WLS*
OAQPS/SPPD/ESG (D241-01)

TO: Large MWC Docket (EPA-HQ-OAR-2005-0117)

This memorandum presents information on the overall emissions reductions achieved by large and small municipal waste combustion (MWC) units following retrofit of Maximum Achievable Control Technology (MACT). This memorandum is a companion to the memorandum titled "Emissions from Large MWC Units at MACT Compliance (note a)." Consistent with Clean Air Act (CAA) section 129, large and small MWC units completed MACT retrofits by December 2000 and December 2005, respectively. The performance of the MACT retrofits has been outstanding. Emission reductions achieved for all CAA section 129 pollutants are shown below. Of particular interest are dioxin/furan and mercury emissions. Since 1990 (pre-MACT conditions), dioxin/furan emissions from large and small MWCs have been reduced by more than 99 percent, and mercury emissions have been reduced by more than 96 percent. Dioxin/furan emissions have been reduced to 15 grams per year* and mercury emissions reduced to 2.3 tons/year.

Emissions From Large and Small MWC Units

Pollutant	1990 Emissions (tpy)	2005 Emissions (tpy)	Percent Reduction
Chloride, HCl basis*	4400	12	99.7%
Mercury	57	2.3	96%
Cadmium	9.6	0.4	96%
Lead	170	5.5	97%
Particulate Matter	18,660	780	96%
HCl	27,400	3,200	88%
SO ₂	34,100	4,600	88%
NO _x	64,900	49,500	24%

(* dioxin/furan emissions are in units of grams per year toxic equivalent quantity (TEQ), using 1989 NATO toxicity factors; all other pollutant emissions are in units of tons per year.

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Pollutant	1990-2005% reduction
Dioxin	99
Mercury	96
Cadmium	96
Lead	97
Particulate Matter	96
HCl	94
SO ₂	88
NO _x	24



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WTE & Greenhouse Gas Avoidance

Waste-to-energy plants are tremendously valuable contributors in the fight against global warming. According to the U.S. EPA MSW Decision Support Tool nearly one ton of CO₂ equivalent emissions are avoided for every ton of municipal solid waste handled by a waste-to-energy plant due to the following:

- **Avoided methane emissions from landfills.** When a ton of solid waste is delivered to a waste-to-energy facility, the methane that would have been generated if it were sent to a landfill is avoided. While some of this methane could be collected and used to generate electricity, some would not be captured and would be emitted to the atmosphere.
- **Avoided CO₂ emissions from fossil fuel combustion.** When a megawatt of electricity is generated by a waste-to-energy facility, an increase in carbon dioxide emissions that would have been generated by a fossil-fuel fired power plant is avoided.
- **Avoided CO₂ emissions from metal recycling.** Waste-to-energy plants recover more than 700,000 tons of ferrous metal for recycling annually. Recycling metals saves energy and avoids CO₂ emissions that would have been emitted if virgin materials were mined and new metals were manufactured, such as steel.

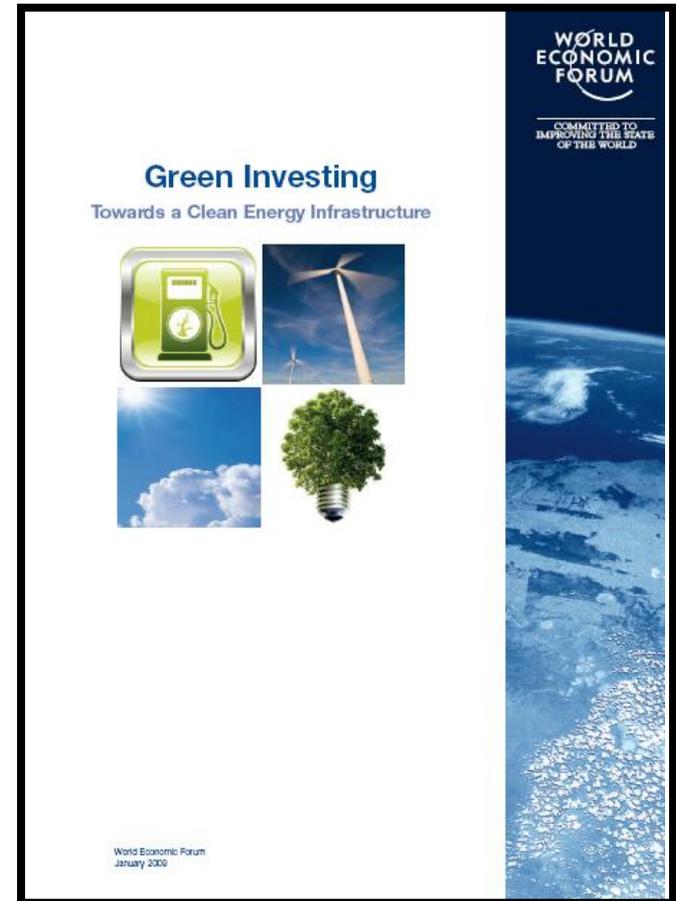


International Recognition of Waste-to-Energy as a Greenhouse Gas Reducer

The World Economic Forum in its 2009 report, “Green Investing: Towards a Clean Energy Infrastructure,” identifies waste-to-energy as one of eight technologies likely to make a meaningful contribution to a future low-carbon energy system.

The Eight Emerging Large-Scale Clean Energy Sectors include

1. Onshore Wind
2. Offshore Wind
3. Solar Photovoltaic (PV)
4. Solar Thermal Electricity Generation (STEG)
5. Municipal Solid Waste-to-Energy (MSW)
6. Sugar-based Ethanol
7. Cellulosic and Next Generation Biofuels
8. Geothermal Power



State Policies Promoting Waste-to-Energy

- 30 States, the District of Columbia, and 2 territories define waste-to-energy as renewable in state statutes or regulations.
- The State of Maryland last year passed legislation to elevate waste-to-energy from Tier 2 to Tier 1 of the state renewable portfolio standard.
- Policies that promote waste-to-energy on a level playing field with other renewables will drive investment.





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