



# Power Scorecard™

## Electricity from: Municipal Solid Waste



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Electricity can be produced by burning "municipal solid waste" (MSW) as a fuel. MSW power plants, also called waste to energy (WTE) plants, are designed to dispose of MSW and to produce electricity as a byproduct of the incinerator operation.

The term MSW describes the stream of solid waste ("trash" or "garbage") generated by households and apartments, commercial establishments, industries and institutions. MSW consists of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint and batteries. It does not include medical, commercial and industrial hazardous or radioactive wastes, which must be treated separately.

MSW is managed by a combination of disposal in landfill sites, recycling, and incineration. MSW incinerators often produce electricity in WTE plants. The US Environmental Protection Agency (EPA) recommends, "The most environmentally sound management of MSW is achieved when these approaches are implemented according to EPA's preferred order: source reduction first, recycling and composting second, and disposal in landfills or waste combustors last." <http://www.epa.gov/epaoswer/non-hw/muncpl/index.htm>

EPA estimates that in 1998 17 percent of the nation's MSW was burned and generated electricity (e.g., 14% in Pennsylvania, 2% in New Jersey; 2% in California), 55% was disposed in landfills, and 28% was recovered for reuse.

In the United States, there are currently two main WTE facility designs:

Mass Burn is the most common waste-to-energy technology, in which MSW is combusted directly in much the same way as fossil fuels are used in other direct combustion technologies. Burning MSW converts water to steam to drive a turbine connected to an electricity generator.

Refuse-derived fuel (RDF) facilities process the MSW prior to direct combustion. The level of pre-combustion processing varies among facilities, but generally involves shredding of the MSW and removal of metals and other bulky items. The shredded MSW is then used as fuel in the same manner as at mass burn plants.

The Power Scorecard does not consider MSW a renewable energy source, because the waste stream includes materials made from fossil resources; the sources of the plant material based content (e.g., paper and wood) are unpredictable; and the waste stream would be greatly reduced with environmentally preferable waste reduction and management practices. The EPA and the federal government and some state governments classify MSW as a renewable energy source because MSW is abundant and contains significant amounts of biomass.

### ***What are the environmental issues?***

Burning MSW can generate energy while reducing the volume of waste by up to 90 percent, an environmental benefit. Ash disposal and the air polluting emissions from plant combustion operations are the primary environmental impact control issues.

MSW contains a diverse mix of waste materials, some benign and some very toxic. Effective environmental management of MSW plants aims to exclude toxics from the MSW-fuel and to control air pollution emissions from the WTE plants.

Toxic materials include trace metals such as lead, cadmium and mercury, and trace organics, such as dioxins and furans. Such toxics pose an environmental problem if they are released into the air with plant emissions or if they are dispersed in the soil and allowed to migrate into ground water supplies and work their way into the food chain. The control of such toxics and air pollution are key features of environmental regulations governing MSW fueled electric generation.

In 1995, the EPA significantly tightened the regulation of plants using MSW to produce energy. EPA then issued a new "Maximum Achievable Control Technology" rule pursuant to the Federal Clean Air Act for the waste-to-energy industry for large MSW incinerators and WTE plants. Facilities were required to comply with the new rule by the end of 2000. Small municipal waste burners are addressed in a separate similar rulemaking, put into effect in 2000. The rule requires "maximum available pollution control technology" (including bag house particulate controls, carbon injection systems and acid control scrubbers), continuous monitoring of combustion efficiency and periodic stack testing for hazardous air emissions on all incinerator/WTE facilities. The EPA studies estimate that enforcement of this new rule will reduce emissions of mercury and dioxin from WTE plants by about 90% and 99%, respectively, from their 1990 levels. However, because trash is inherently an inefficient source of fuel, WTE plant's mercury emissions compare with coal plants on the basis of each kilowatt-hour-generated by a facility.

Burning MSW in WTE plants produces comparatively high carbon dioxide emissions, a contributor to global climate change. The net climate change impact of these emissions is lessened because a major component of trash is wood, paper and food wastes that would decompose if not burned. If left to decompose in a solid waste landfill, the material produces methane — a potent greenhouse gas.

These plants produce comparatively high rates of nitrogen oxide emissions. The on-site land use impacts are generally equal to those of coal or oil fueled plants.

#### Additional Information:

US Environmental Protection Agency. Environmental Fact Sheet: Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 1998. EPA530-F00-024. April 2000

US Environmental Protection Agency. Greenhouse Gas Emissions from Management of Selected Materials in Municipal Solid Waste. EPA530-R-98-013. September 1998.

US EPA Municipal Solid Waste <http://www.epa.gov/epaoswer/non-hw/muncpl/index.htm>

U.S. Environmental Protection Agency, Office of Solid Waste <http://www.epa.gov/osw>

U.S. Environmental Protection Agency: "Greenhouse Gas Emissions from Management of Selected Materials in Municipal Solid Waste"  
[http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/SHSU5BUMGJ/\\$File/greengas.pdf](http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/SHSU5BUMGJ/$File/greengas.pdf)

Integrated Waste Services Association - provides information from the waste to energy industry  
<http://www.wte.org>

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