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## Trash Incineration More Polluting than Coal

Trash incinerators are the dirtiest way to make electricity by most air pollution measures. Even with air pollution control equipment in place, trash incinerators emit more pollution than (largely uncontrolled) coal power plants per unit of energy produced. Coal power plants are widely understood as the most air-polluting source of energy, but few realize how much worse trash incinerators are for air quality.

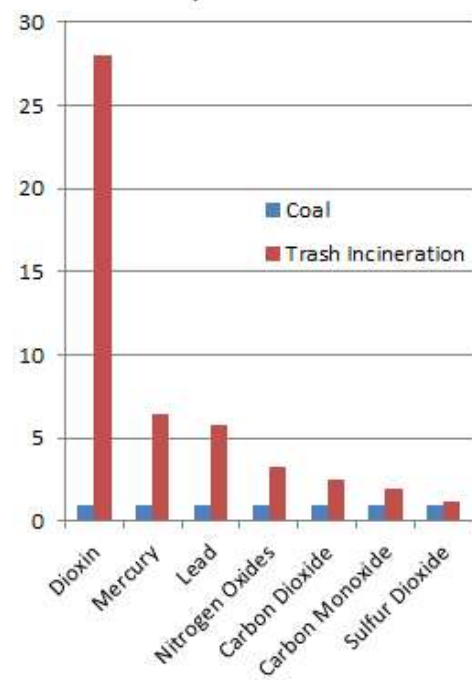
**Dioxins/furans:** Trash incinerators are well known to be the largest source of the most toxic man-made chemicals known to science – dioxins (<http://www.ejnet.org/dioxin/>). The latest national inventory of dioxin emissions – by the U.S. Environmental Protection Agency in 2006, looking at data from 1987, 1995 and 2000 – shows that trash incineration has gone from the largest source of dioxin emissions in 1987 and 1995 to the 4th largest source in 2000. However, if one accounts for the lack of continuous monitoring (<http://www.ejnet.org/toxics/cems/>) and the consequent massive underestimation of dioxin emissions from incineration, trash incineration is still the largest source of dioxins, despite the cleanup or closure of some of the dirtiest incinerators.[1]

Between 2000 and 2005, new dioxin emissions limits were put into effect for trash incinerators, requiring the worst dioxin polluting incinerators to clean up or shut down. EPA and the trash incinerator industry tout that dioxin emissions from trash incinerators have been reduced by over 99% between 1990 and 2005. Even with this large reduction, and without even accounting for the aforementioned underestimation from lack of continuous monitoring, trash incinerators release 28 times as much dioxin than coal power plants do to produce the same amount of energy.[1],[2],[3]

**Mercury** is another notoriously toxic pollutant released from incinerators. It is a potent neurotoxin that accumulates in the fatty tissue of fish once in the environment. Mercury emissions from trash incineration were a close second to coal power plants in the early 1990s, which is rather incredible given the much larger size of coal power plants and the fact that there are about five times as many coal plants as incinerators. Pollution controls required on trash incinerators reduced the industry's mercury emissions 96% by 2005.[3],[4] However, even with this dramatic industry-wide reduction, trash incinerators still put out 6.4 times as much mercury as coal plants do to produce the same amount of energy, according to the

To make the same amount of energy as a coal power plant, trash incinerators release 28 times as much dioxin than coal, 2.5 times as much carbon dioxide (CO<sub>2</sub>), twice as much carbon monoxide, three times as much nitrogen oxides (NO<sub>x</sub>), 6-14 times as much mercury, nearly six times as much lead and 70% more sulfur dioxides.

Number of times more polluting trash incineration is compared to coal



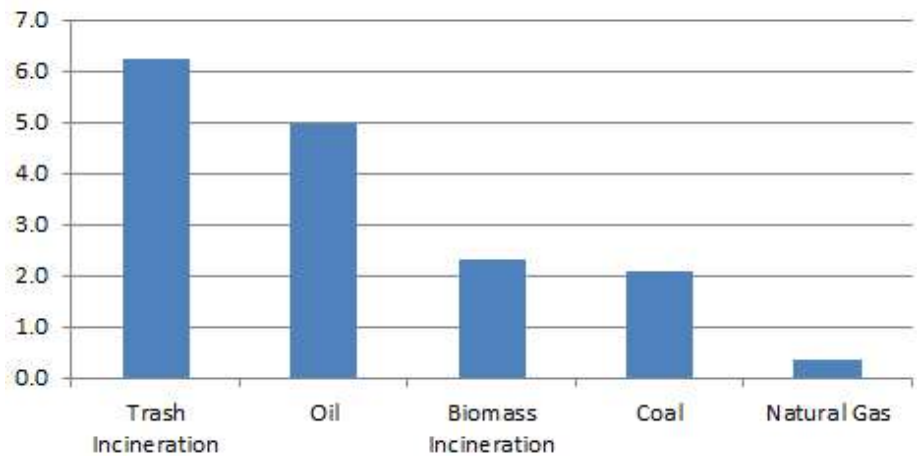
latest available national data from 2005.[2],[4] A state-wide analysis by the New York State Department of Environmental Conservation found that, in 2009, the state's 10 trash incinerators released 14 times as much mercury per unit of energy than the state's 8 coal power plants – high enough that the total amount of mercury coming from the incinerators was higher than the emissions from the coal plants, even without adjusting for the fact that the coal plants are far larger facilities.[5]

**Lead** is another well-known toxin that diminishes intelligence and – by lowering dopamine levels in the brain – may even be tied to increases in violent behavior and cocaine addiction.[6],[7],[8] Trash incinerators release nearly six times as much lead as coal plants do to produce the same amount of energy.[9]

**Nitrogen oxide (NOx)** pollution primarily contributes to eye, nose, throat and lung irritation and respiratory problems like shortness of breath that can trigger asthma. Trash incinerators release three times as much NOx as coal plants do to produce the same amount of energy.[10]

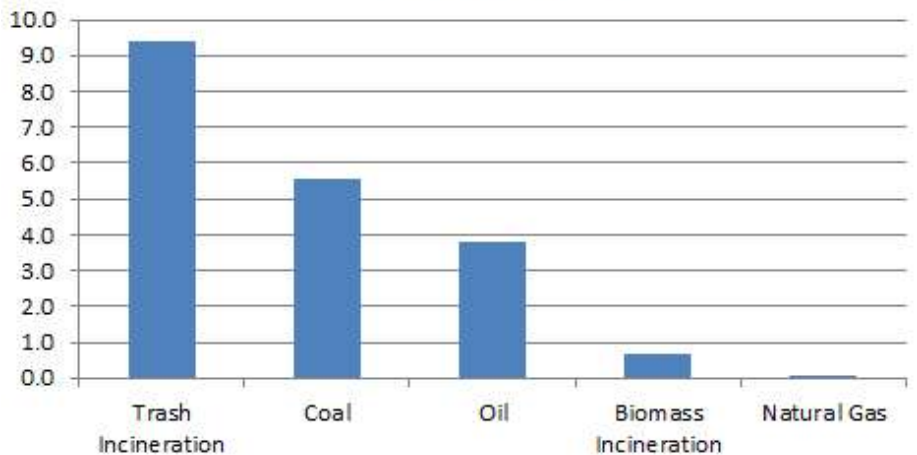
**Carbon monoxide (CO)** is also released from trash incinerators at rates twice as high as coal power plants.[9] Both NOx (directly) and CO (indirectly) contribute to the formation of ground-level ozone pollution, aggravating asthma.[11],[12]

### NOx (lbs/MWh)



**Sulfur dioxide (SO2)** – famous as a cause of acid rain – is also bad for lungs, with even short exposures to ambient levels causing “bronchoconstriction and increased asthma symptoms.”[13] Trash incinerators release 70% more SO2 as coal plants do to produce the same amount of energy.[10]

### SO2 (lbs/MWh)

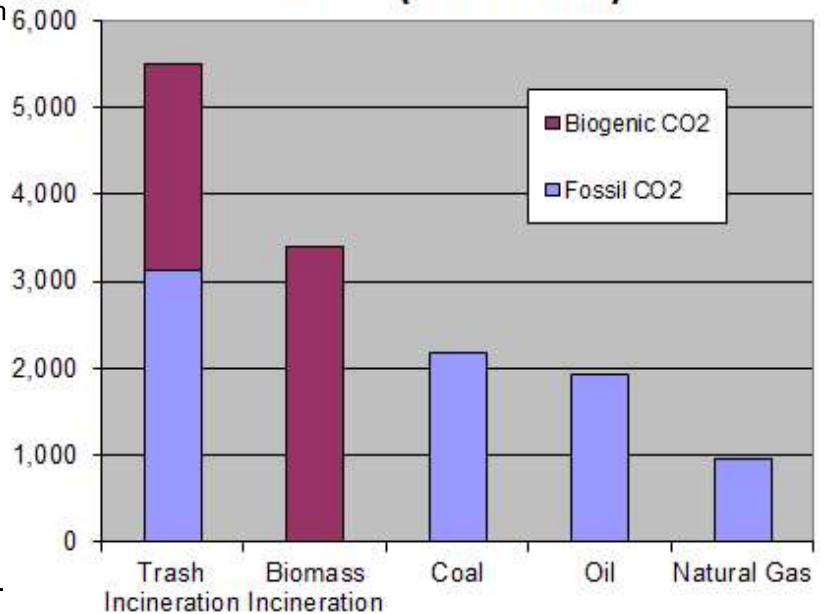


**Carbon dioxide (CO2)** – the prime global warming pollutant – is released at a rate 2.5 times that of coal power plants.[10] The industry argues that the “biogenic” portion of these emissions (that from burning paper and other organic material) should not count because trees will regrow and take the CO2 back out of the air.[14] However, studies of the alleged “carbon neutrality” of biomass incineration have shown that biomass is not truly carbon neutral (<http://www.energyjustice.net/biomass/climate>), as it can take many decades for trees to reabsorb the pulse of CO2 emitted by incineration – meanwhile, the climate is heating up at a higher rate.[15] This also presumes that somewhere, trees are being replanted in sufficient numbers to eventually take up this extra carbon pollution (and that those trees aren’t being counted toward offsetting some other climate damage... and that the trees will not be cut

back down as soon as it's profitable to use them).

Even if one accepts EPA's assumption that carbon trapped in a tree is the same as carbon in the air and that the "biogenic" carbon emissions from incinerators should be counted as zero, the fossil portion of the emissions from trash incinerators (such as that from burning plastics) is still 50% greater than the CO<sub>2</sub> emissions from burning coal.

## CO<sub>2</sub> (lbs/MWh)



### Sources:

1. "An Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States for the Years 1987, 1995, and 2000," U.S. EPA, November 2006, Table ES-2.

<http://cfpub.epa.gov/ncea/CFM/recordisplay.cfm?deid=159286> (<http://cfpub.epa.gov/ncea/CFM/recordisplay.cfm?deid=159286>) The largest sources in 2000 are considered to be backyard burn barrels (498.5 grams), followed by medical waste incineration (378 g), sewage sludge applied to land and emissions from sludge incineration (89.7 g) and trash incineration (83.8 g). The backyard burn barrel estimate is not subject to drastic differences based on test methods. 95% of medical waste incinerators have closed between 2000 and 2009. Most of the sewage sludge dioxin emissions are from land application rather than sludge incineration (since far more is dumped on farm fields than is burned). EPA admits in their inventory report (p 3-23): "Because all tests were conducted under normal operating conditions, some uncertainty exists about the magnitude of emissions that may have occurred during other conditions (e.g., upset conditions, start up, and shut down)." If the medical waste, sludge incineration and trash incineration numbers are adjusted upwards by 30-50 times to account for the fact that a 6-hour stack test each year underestimates dioxin emissions ([http://www.ejnet.org/toxics/cems/1998\\_DeFre\\_OrgComp98\\_Underest\\_Dioxin\\_Em\\_Inv\\_Amesa.pdf](http://www.ejnet.org/toxics/cems/1998_DeFre_OrgComp98_Underest_Dioxin_Em_Inv_Amesa.pdf)) by this amount, compared to using continuous monitoring (<http://www.ejnet.org/toxics/cems/>) (and if the aforementioned differences in the medical waste and sludge incineration data are accounted for), trash incineration would still be the largest dioxin pollution source by far.

2. U.S. Environmental Protection Agency, Emissions & Generation Resource Integrated Database, eGRID2002 and eGRID2007 (for 2000 and 2005 electric generation data). <http://www.epa.gov/egrid/> (<http://www.epa.gov/egrid/>)
3. "Emissions from Large and Small MWC Units at MACT Compliance," U.S. Environmental Protection Agency memorandum, August 10, 2007. [http://energyrecoverycouncil.org/userfiles/file/070810\\_Stevenson\\_MWC\\_memo.pdf](http://energyrecoverycouncil.org/userfiles/file/070810_Stevenson_MWC_memo.pdf) ([http://energyrecoverycouncil.org/userfiles/file/070810\\_Stevenson\\_MWC\\_memo.pdf](http://energyrecoverycouncil.org/userfiles/file/070810_Stevenson_MWC_memo.pdf))
4. "EPA Report on the Environment, A-Z Indicators List: Mercury Emissions, Exhibit 2-39 – Mercury emissions in the U.S. by source category, 1990-1993, 2002, and 2005," U.S. Environmental Protection Agency, December 2009. <http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewInd&lv=list.listbyalpha&r=216615&subtop=341> (<http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewInd&lv=list.listbyalpha&r=216615&subtop=341>) (chart) and [http://oaspub.epa.gov/eims/eims.roereport.getfile?p\\_download\\_id=11217](http://oaspub.epa.gov/eims/eims.roereport.getfile?p_download_id=11217) ([http://oaspub.epa.gov/eims/eims.roereport.getfile?p\\_download\\_id=11217](http://oaspub.epa.gov/eims/eims.roereport.getfile?p_download_id=11217)) (data).
5. New York State Department of Environmental Conservation, "Matter of the Application of Covanta Energy Corporation for Inclusion of Energy from Waste Facilities as an Eligible Technology in the Main Tier of the Renewable Portfolio Standard Program. Case No. 03-E-0188," Aug. 19, 2011. <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={DEEA097E-A9A6-4E53-898C->

0BC2F4C60CC4} (<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={DEEA097E-A9A6-4E53-898C-0BC2F4C60CC4}>)

6. Canfield, et. al., "Intellectual Impairment in Children with Blood Lead Concentrations below 10 micrograms per Deciliter," N Engl J Med 2003; 348:1517-1526, April 17, 2003.  
<http://www.nejm.org/doi/full/10.1056/NEJMoa022848> (<http://www.nejm.org/doi/full/10.1056/NEJMoa022848>)
7. Lidsky and Schneider, "Lead neurotoxicity in children: basic mechanisms and clinical correlates," Oxford Journals, Medicine, Brain, Volume 126, Issue 1, Pp. 5-19, 2002. <http://brain.oxfordjournals.org/content/126/1/5.full> (<http://brain.oxfordjournals.org/content/126/1/5.full>) (lead exposure increases aggression)
8. Nation, Smith & Bratton, "Early developmental lead exposure increases sensitivity to cocaine in a self-administration paradigm," Pharmacol Biochem Behav. 2004 Jan; 77(1):127-35.  
<http://www.ncbi.nlm.nih.gov/pubmed/14724050> (<http://www.ncbi.nlm.nih.gov/pubmed/14724050>)
9. "Waste-To-Energy: Dirtying Maryland's Air by Seeking a Quick Fix on Renewable Energy?" Environmental Integrity Project, Oct. 2011. [http://environmentalintegrity.org/wp-content/uploads/2011-10\\_WTE\\_Incinerator.pdf](http://environmentalintegrity.org/wp-content/uploads/2011-10_WTE_Incinerator.pdf) ([http://environmentalintegrity.org/wp-content/uploads/2011-10\\_WTE\\_Incinerator.pdf](http://environmentalintegrity.org/wp-content/uploads/2011-10_WTE_Incinerator.pdf)) This 2007-2009 data from Maryland shows trash incinerators to release 5.8 times more lead on average than coal plants in the state (Chart 2, p.5.) and shows trash incinerators to release 1.9 times more CO on average than coal plants in the state (Chart 4, p.7.).
10. U.S. Environmental Protection Agency, Emissions & Generation Resource Integrated Database, eGRID Version 1.0, 9th Edition, (2010 data), released February 24, 2014. <http://www.epa.gov/egrid/> (<http://www.epa.gov/egrid/>) Data summarized and analyzed by Energy Justice Network here: <http://www.energyjustice.net/egrid> (<http://www.energyjustice.net/egrid>)
11. U.S. Environmental Protection Agency, <http://www.epa.gov/groundlevelozone/basic.html> (<http://www.epa.gov/groundlevelozone/basic.html>) (NOx)
12. Massachusetts Department of Environmental Protection [http://www.mass.gov/dep/air/aq/aq\\_co.htm](http://www.mass.gov/dep/air/aq/aq_co.htm) ([http://www.mass.gov/dep/air/aq/aq\\_co.htm](http://www.mass.gov/dep/air/aq/aq_co.htm)) (CO).
13. EPA <http://www.epa.gov/airquality/sulfurdioxide/health.html> (<http://www.epa.gov/airquality/sulfurdioxide/health.html>)
14. Lisa Gibson, 'Good News for Forest Biomass,' Biomass Magazine, 1/25/2012.  
<http://biomassmagazine.com/articles/6110/good-news-for-forest-biomass> (<http://biomassmagazine.com/articles/6110/good-news-for-forest-biomass>)
15. Studies compiled here: <http://www.energyjustice.net/content/biomass-library-scientific-reports#climate> (<http://www.energyjustice.net/content/biomass-library-scientific-reports#climate>)



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