Energy Justice Network

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Testimony before
House Economic Matters Committee

OPPOSING

House Bill 377 – Renewable Energy Portfolio Standard – Revisions

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Good afternoon. My name is Mike Ewall, and I'm the founder and director of a national organization called Energy Justice Network. Energy Justice works at the local level with grassroots community groups throughout Maryland and the rest of the country to support efforts to stop polluting and unnecessary energy and waste industry facilities, most notably incinerators of all sorts.

Let me be clear: we support clean, renewable energy. We support wind and solar power. However, clean energy cannot come at the expense of poisoning Maryland communities with incinerator pollution.

NOT Clean Energy:

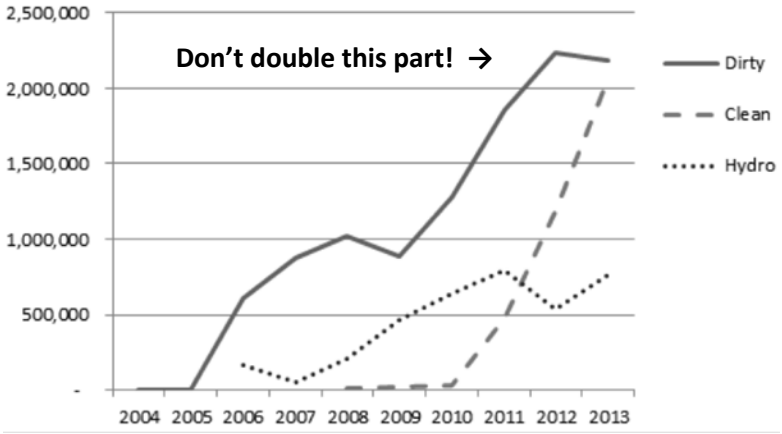
Advocates of this bill have been misleading legislators, the public and their constituents when they advertise it as "doubling wind and solar."

When people think of renewable energy, they think of (and want) just wind and solar. **However, Maryland has one of the dirtiest renewable energy mandates in the nation. Over the first decade of Maryland's RPS, 60% of the Tier I requirements came from smokestack technologies, and only 21% from wind and solar.** Maryland is the only state to put trash incineration – which is far dirtier than coal by every measure – in Tier I, on par with wind. Burning biomass and landfill gas is also filthy.

The environmental community is divided. We all want more clean energy, but a growing number of organizations see that it cannot come at the price of incentivizing more smokestacks.

RECOMMENDATION: Do not double the RPS without *first* putting a cap on the amount of smokestack RECs can be used. **Senate Bill 760 caps the combustion sources at 2013 levels** so that the RPS is no longer an engine for driving additional pollution sources in and around Maryland.

Maryland Tier I RPS credits in a nutshell:



Dirty "Renewable Energy" in Maryland

In 2013, 44% of the Tier I "renewables" used to meet Maryland's Renewable Energy Portfolio Standard were from smokestack (combustion) technologies, down from a historical average of 60% over the first decade of the policy. Wind and solar added up to 41% of Tier I – less than the total from the air-polluting sources.

15% was hydroelectric, which is not meaningful since, unlike wind and solar that are newly developed and make an impact displacing other sources, hydroelectric dams (environmental impacts aside) are old, existing facilities that were paid off many years ago. Diverting ratepayer funds to buy renewable energy credits (RECs) from them makes no difference for the environment. It doesn't help keep them open (they're not as risk of closure), nor does it increase their capacity. It just takes extra ratepayer money that should otherwise go to developing new wind and solar and puts it in the pockets of the utilities that own dams.

Of the combustion technologies, black liquor made up 23% of the total RECs in 2013, trash incineration made up 11%, landfill gas 5%, biomass 3%, and blast furnace gas 1%. **All of these are polluting and dangerous and most are worse than coal for the climate**, if not also for many other pollutants.

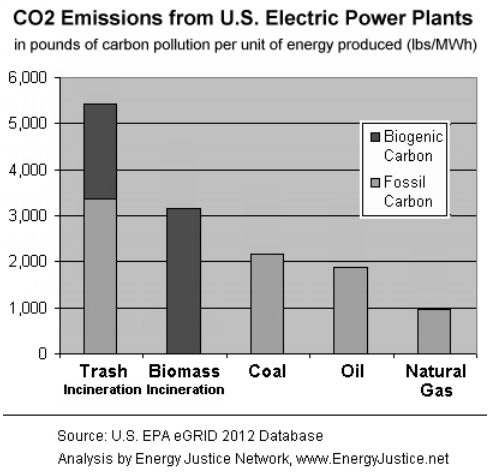
Source: PJM Environmental Information Services, Generation Attribute Tracking System (GATS), "RPS Retired Certificates (Reporting Year)," www.pjm-eis.com/reports-and-news/public-reports.aspx

Public opinion strongly supports wind and solar power, but is strongly against biomass and waste incineration. A 2012 survey of over 1,000 adults found that more than 81% of Americans across the political spectrum believe that biomass energy should be used only after less polluting and water-intensive options are explored."

Trash incineration is even less popular, with communities throughout Maryland and the world working hard to stop incinerators of all sorts. For well over a decade, I've been helping Maryland communities protect themselves from the threat of biomass incinerators, trash incinerators and landfill gas burning projects. For financial reasons, Frederick and Carroll Counties just pulled out of an incinerator plan that met a decade of opposition. A huge (second) trash incinerator proposed for Baltimore is encountering public opposition as well. While fully permitted, financing isn't forthcoming, construction is put on hold due to clean air law violations, and an array of public entities just decided to terminate their energy contract relationship with the company (Energy Answers). Despite these failed projects, there are still up to six other waste incinerators being pursued in Maryland communities, risking pollution and economic trouble.

A Renewable Portfolio Standard is to promote CLEAN energy in order to protect public health, conserve resources and combat climate change. Sadly, the resources taking up the majority of Tier I have done the opposite. They pollute the air and water, harm public health, destroy resources, and harm the climate. The burning of trash, biomass and landfill gas is all worse for global warming than coal, with higher CO2 emissions per MWh. Trash incineration ("waste-to-energy") is dirtier than coal on all measures. Biomass and landfill gas are comparable to coal for some other pollutants.

Trash incineration is the most expensive and polluting way to manage waste or to produce energy. It is more expensive to build or operate than any other form of energy, according to the Energy Information Administration.[1] It is more expensive than landfills according to the incinerator industry's own trade association president, and other industry data.[2] EPA's data shows that incinerators are more polluting per unit of energy than coal power plants on every pollutant for which there is national data available. They emit 28 times as much dioxin, 6 times as much mercury, 2.5 times as much carbon dioxide (CO_2), 3.2 times as much nitrogen oxides (NOx), and 20% more sulfur dioxides.[3] A Maryland-specific analysis has found that trash incinerators in the state release nearly 6 times more lead than coal plants per unit of energy, and twice as much carbon monoxide.[4] Incinerators do not replace landfills, but – after polluting the air – still require smaller, *more toxic* landfills to handle the ash.



Note: the most recent science shows that, while natural gas smokestack CO2 emissions are lowest, methane leakage makes natural gas (and landfill gas) far worse for the climate than coal.

Environmental Justice and Lack of Monitoring: Often located in low-income and minority communities, incinerators are poorly monitored, requiring only once a year testing for most pollutants.[5] The Wheelabrator BRESCO incinerator in Baltimore, during an annual test, was found to be violating toxic mercury air pollution limits in recent years, but no one knows whether this is a regular occurrence since there is no testing 364 days of the year.[6]

Further information on incineration, and more documentation on the statements above are available upon request. Most can be found in the factsheet, powerpoint and other resources available at the following webpages:

Trash incineration: www.energyjustice.net/incineration
Landfill gas: www.energyjustice.net/lfg/ Poultry waste incineration: www.energyjustice.net/fibrowatch/
Biomass incineration: www.energyjustice.net/biomass/ & www.energyjustice.net/files/biomass/woodybiomass.pdf

[1] "Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants," U.S. Energy Information Administration, April 2013. See Table 1, p.6 in www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf Summary charts here: www.energyjustice.net/incineration/expensive-energy
[2] See www.energyjustice.net/incineration/expensive-waste for links to statements and data from the incineration and waste industry trade associations.
[3] CO_2, SOx and NOx data from U.S. EPA, eGRID 2012 data, www.epa.gov/egrid/. Other data calculated from EPA reports on dioxin and mercury emissions. See www.energyjustice.net/incineration/worsethancoal for complete citations.
[4] "Waste-To-Energy: Dirtying Maryland's Air by Seeking a Quick Fix on Renewable Energy?" Environmental Integrity Project, Oct. 2011, Chart 2, p.5 and Chart 4, p.7. www.environmentalintegrity.org/documents/FINALWTEINCINERATORREPORT-101111.pdf
[5] www.ejnet.org/toxics/cems/
[6] "Maryland fines Wheelabrator Baltimore $77,500 for air pollution," Baltimore Business Journal, Dec 13, 2011. www.bizjournals.com/baltimore/news/2011/12/13/maryland-fines-wheelabrator-baltimore.html

FACT SHEET: Woody Biomass Incineration

Biomass: Expensive and Unnecessary

Burning woody "biomass" may technically be renewable, if trees are replanted, but it is not clean or needed. By most measures, biomass incineration is more polluting than coal.

Through conservation, efficiency, wind, solar and energy storage, we can meet all of our energy needs without needing nuclear power, or the burning of biomass, waste or fossil fuels.[1,2] Biomass is one of the most expensive ways to make electricity, second only to trash incineration.[3] Money wasted on biomass would go further and create more jobs if spent on demand reduction and zero-emission renewables, yet renewable energy mandates and subsidies undermine clean solutions whenever they support biomass.

"Renewable" Doesn't Mean Clean

Burning biomass emits particulate matter (PM), nitrogen oxides (NO_X), carbon monoxide (CO), carbon dioxide (CO_2), sulfur oxides (SO_X), toxic heavy metals (such as arsenic, mercury, lead, cadmium and chromium), acid gases, dioxins and furans, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), other hazardous air pollutants (HAPs), and even radioactive pollutants.

A typical 50 megawatt biomass incinerator permitted between 2008 and 2012 has expected annual emissions of 230 tons of nitrogen oxides, 248 tons of carbon monoxide, 85 tons of particulate matter, 40 tons of volatile organic compounds, and 25 tons of hazardous air pollutants.[4] Emissions of toxic metals and dioxins can be even higher if more contaminated types of biomass are burned, such as painted or treated construction / demolition wood waste. EPA recognizes that even the best-performing biomass plants emit as much or more air pollution as coal plants.[5]

Dirtier Than Coal

By most of these measures (with notable exceptions on sulfur and mercury), burning biomass is as polluting or worse than burning coal, and far worse than natural gas. For some pollutants, this is because biomass is actually more contaminated than coal. In other cases, burning one ton of biomass may release less of a pollutant than burning one ton of coal, but since about two tons of biomass must be burned to create the same energy as one ton of coal, biomass can be more polluting per amount of energy produced. A third reason biomass is often more polluting than coal is that the regulatory requirements for air pollution controls on biomass facilities are weaker, so even where burning two tons of trees would produce less pollution than one ton of coal, the air pollution from the tree burner may be greater because it is not required to capture as much of its pollution as the coal power plant must.

The latest EPA data shows that biomass emits 98% as much NOx as bituminous coal, 51% more CO_2,[6] and comparable levels of particulate matter – but biomass is worse for small particulate matter (PM10) and far worse for the finest and most dangerous particulate matter (PM2.5).[7] Dioxins (the most toxic chemicals known to science) are released at rates 7 times higher than coal, and 167 times higher if burning salt-laden wood, like marine pilings.[8]

The "Carbon-Neutral" Myth

Biomass burning releases 51% more CO_2 than coal, creating a carbon debt that is not overcome for decades. It takes 40 years of trees grown to replace those burned in order to suck up enough CO_2 so that the biomass is *as bad as* coal – and centuries before it can be called "neutral."[9] However, these trees are unlikely to be left undisturbed for so many decades, making "carbon-neutrality" a fantasy. Unfortunately, we do not have decades to waste. Biomass burning cooks the climate faster than coal, and the atmosphere reacts the same whether the extra pulse of CO_2 came from a "biogenic" source or not. It is critical that we avoid global warming tipping points in the coming decades.

Bait and Switchgrass – Burning Toxic Wastes

"Green" biomass is often a foot in the door for more toxic waste streams. Biomass incinerators that start off burning "clean wood chips" often seek to burn more contaminated fuels like construction / demolition wood waste, tires, plastics or trash, since the facilities can get paid to take these wastes, rather than pay for their fuel. Economic pressures encourage use of dirtier fuels.

Keeping Coal Alive

Biomass co-firing at existing coal power plants is often proposed to keep coal plants alive that would otherwise close due to the expense of pollution control upgrades. This is encouraged by renewable energy policies and by regulatory loopholes that ignore biomass CO_2 emissions.

"Clean Wood" Isn't Clean

Even "clean" wood, straight from a forest, is contaminated with pollutants that trees absorb from the environment and can become significant sources of toxic pollution when burned. Some trees are especially good at taking up mercury, particularly willow and poplar (two species widely promoted for biomass use). When accounting for the lack of requirements for mercury controls on biomass plants, a wood burning biomass plant can release more mercury per unit of energy than a coal power plant with mercury controls.

Lead, cadmium, copper, iron and zinc are also taken up by trees.[10,11] Pine and larch are well-known accumulators of lead, and willow is considered a hyperaccumulator of cadmium.[12] Lead and cadmium are highly toxic and large portions (23% of lead and 60% of cadmium) can escape pollution controls and get into the air when burned.[13] Copper, iron and zinc are catalysts for dioxin formation and will boost the toxicity of the air emissions and ash.[14] Researchers have found that toxic metal concentrations in normal wood ash are "disturbingly high" when tested[15] and would be classified as hazardous waste in Europe,[16] and have been turned away from normal landfills in Germany.[17]

When the small (12-megawatt) Bio Energy plant in Hopkinton, New Hampshire was burning clean wood chips, from 1983 to 2002, it annually emitted about 600 pounds of lead and 8 pounds of mercury, "apparently naturally occurring in trees or absorbed through the soil," according to the state Department of Environmental Services.[18]

Wood Waste

So-called "wood waste" is often promoted as woody biomass. This could include cuttings from lumber mills or unused portions of trees from logging operations. Diverting lumber mill wood waste to biomass burners displaces that wood from its previous use (often already burned on-site for biomass or reused in pulp or paper-making), causing indirect pressure on forests as new logging is needed to fill the replace that wood's previous use. Woody material considered "waste" from logging is not waste, but provides habitat for small mammals when left on the forest floor and should be left for the forest to recover.[19]

Construction / Demolition / Disaster Debris

Another common type of "wood waste" is construction and demolition debris (known as "C&D"). With help from global warming-induced natural disasters, an increasing amount of disaster debris now also fits in this category. Utility poles, railroad ties, wood pallets and marine pilings carry similar dangers. On average, 13% of C&D waste is wood. Much of that wood is contaminated, both with non-wood materials that isn't well-separated, and with contaminants found in treated and painted wood.

Wood waste can come contaminated with wood preservatives, binders, paints, glues, chlorine bleach, plastic laminating materials, chlorinated adhesives, or phenol and urea formaldehyde resins, nails/staples, or other non-wood materials. Treated woods are usually coated with creosote, pentachlorophenol, or chromated copper arsenate (CCA). Pentachlorophenol is a chlorinated compound that is contaminated with dioxin and creates more dioxin when burned. CCA, the most widely used wood treatment chemical, releases arsenic when burned and the chromium in the wood is converted to the toxic form (chromium VI) when burned. The copper in CCA (and in the new, arsenic-free, wood treatment chemicals) boosts dioxin when burned. It is difficult to sort out CCA-treated wood. Even where workers are specially trained to remove it, contamination rates of 9-10% have been found in the allegedly CCA-free wood piles. Contamination rates of 5% are enough for the ash to be considered hazardous waste, and rates of 1-2% still result in significant toxic metal emissions.[20] Although arsenic is no longer used in new wood treatment, this will be a problem for decades to come as it takes many years before treated wood hits the waste stream.[21]

Old painted wood can contain lead and mercury. While lead in paint was phased out in 1978 and mercury in 1991, this toxic painted wood can still end up in wood waste stream from demolition and remodeling of older homes. One biomass incinerator that threatened to reopen to burn C&D wood in Hopkinton, New Hampshire was permitted in 2003 to release an astounding 2.6 tons of lead per year and up to 31 pounds of mercury (nearly four times the mercury released when the plant burned "clean wood chips").[22,23]

Biomass Incineration's Polluting Impacts

Biomass ash contains toxic metals and dioxins and should be handled as hazardous waste, not as fertilizer, though it sometimes is, resulting in contamination of farms.[24,25] A 2012 Wall Street Journal analysis found that 80% of U.S. biomass incinerators have been cited for air or water violations in the past five years.[26]

Medical & Health Professionals Speak Out

Numerous medical professionals have come out opposed to biomass incineration, due to the health effects of biomass air pollutants, including the American Academy of Family Physicians, American Lung Association, Washington State Medical Association and the Massachusetts Medical Society.[27] Read their statements and others' online at: http://www.energyjustice.net/biomass/health/

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[1] "Near-Term Practical and Ultimate Technical Potential for Renewable Resources – DRAFT," National Renewable Energy Laboratory , January 16, 2006. http://www.energyjustice.net/files/solutions/NREL_Renew.pdf

[2] Mark Jacobson, "A Plan for a Sustainable Future: How to get all energy from wind, water and solar power by 2030," Scientific American, November 2009. http://www.stanford.edu/group/efmh/jacobson/Articles/I/susenergy2030.html

[3] "Updated Capital Cost Estimates for Electricity Generating Plants," Energy Information Administration, November 2010, p.7, Table 1. http://www.eia.gov/oiaf/beck_plantcosts/ (direct link: http://www.eia.gov/oiaf/beck_plantcosts/pdf/updatedplantcosts.pdf).

[4] "'Renewable' biomass power cuts forests, pollutes the air, drains rivers, and worsens global warming," Partnership for Policy Integrity biomass factsheet, April 2012. http://www.pfpi.net/wp-content/uploads/2012/04/PFPI-biomass-factsheet.pdf

[5] *Id*., note 3.

[6] eGRID 2012 Database, U.S. Environmental Protection Agency, 2009 data released on 5/10/2012. http://www.epa.gov/cleanenergy/energy-resources/egrid/

[7] U.S. EPA WebFIRE Application. http://cfpub.epa.gov/webfire/

[8] "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 1-14. http://cfpub.epa.gov/ncea/CFM/recordisplay.cfm?deid=159286

[9] Manomet Center for Conservation Sciences, "Biomass Sustainability and Carbon Policy Study," June 2010, p.26, Exhibit 2-7. http://www.manomet.org/manomet-study-woody-biomass-energy; see also studies available under global warming section in the sidebar at http://www.energyjustice.net/biomass/

[10] Danny R. Jackson, William J. Selvidge and Beverly S. Ausmus, "Behavior of heavy metals in forest microcosms," Water, Air & Soil Pollution 10 (1978) 3-11. http://www.springerlink.com/content/u46p0735345t6053/

[11] Clemens Reimanna, Rolf Tore Ottesen, Malin Andersson, Arnold Arnoldussen, Friedrich Koller, Peter Englmaier, " Element levels in birch and spruce wood ashes: green energy?" Science of the Total Environment 393 (2008) 191-197. http://www.sciencedirect.com/science/article/pii/S0048969708000429

[12] *Id*.

[13] Michal Šyc, Michael Pohorelý, Petra Kameníková, Jan Habart, Karel Svoboda, Miroslav Puncochár, "Willow trees from heavy metals phytoextraction as energy crops," Biomass and Bioenergy, 2012;37:106–113. http://www.sciencedirect.com/science/article/pii/S0961953411006441

[14] Mike Ewall, "Metals as Catalysts for Dioxin Formation," (compilation of over a dozen published research papers documenting the phenomenon), December 2003. http://www.ejnet.org/dioxin/catalysts.html Copper is the most potent catalyst.

[15] Note 11 *supra*.

[16] Ribbing C., "Environmentally friendly use of non-coal ashes in Sweden," Waste Management 27 (2007) 1428–35. http://www.sciencedirect.com/science/article/pii/S0956053X07001092

[17] K. Pohlandt-Schwandt, "Treatment of Wood Ash Containing soluble chromate," Biomass and Bioenergy 16 (1999) 447-462. http://www.sciencedirect.com/science/article/pii/S0961953499000136

[18] Stephanie Ebbert, "N.H. plant's plan to burn debris fuels town fears," Boston Globe, September 20, 2004. http://www.boston.com/news/local/articles/2004/09/20/nh_plants_plan_to_burn_debris_fuels_town_fears/

[19] "Forestry's Waste Wood Offers Habitat for Small Forest-Floor Animals," ScienceDaily (Oct. 24, 2012). http://www.sciencedaily.com/releases/2012/10/121024124625.htm

[20] Monika Blassino, Helena Solo-Gabriele & Timothy Townsend, "Pilot scale evaluation of sorting technologies for CCA treated wood waste," Waste Manage Res 2002: 20: 290–301, 297. http://wmr.sagepub.com/content/20/3/290.abstract

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[22] Modification of Title V Operating Permit issued to Bio Energy LLC by New Hampshire Department of Environmental Services, July 25, 2003. http://www2.des.state.nh.us/OneStopPub/Air/3301300101FY03-0132TypePermit.pdf

[23] Note 18 *supra*.

[24] Tom Gascoyne, "Fly in the ashes: Waste from co-generation plant tests high for dioxins," Chico News & Review, July 5, 2012. http://www.newsreview.com/chico/fly-in-the-ashes/content?oid=6579788

[25] Note 11 *supra*.

[26] Justin Scheck & Ianthe Jeanne Dugan, "Wood-Fired Plants Generate Violations," Wall Street Journal, July 23, 2012. http://online.wsj.com/article/SB10001424052702303740704577524822063133842.html

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Energy Justice Network

FACT SHEET
Trash Incineration ("Waste-to-Energy")

www.energyjustice.net/incineration/

Incineration 101

Municipal solid waste (trash) **incineration is the most expensive and polluting way to manage waste or to make energy.** Only 11.7% of U.S. trash in the U.S. is incinerated. The rest is recycled, composted or landfilled.

Incineration is a dirty word, and industry knows it, so they use other terms to make it sound good, like resource recovery, trash-to-steam, waste-to-energy and energy from waste. All of these terms are untruthful and misleading. The most aggressive in arguing that they are not incinerators are specific

types of incinerators using technologies known as gasification, pyrolysis and plasma arc. In the U.S. and in the European Union, these technologies are legally defined and regulated as incinerators. They share the same fundamental problems with conventional incinerators, but they operate in two stages, first turning the waste into a gas, then burning it, letting the companies pretend that they aren't actually incinerating (burning) the waste itself.

In reality, incinerators are **waste-OF-energy** facilities. Incinerators destroy resources that are better reused. If the same materials burned in trash incinerators were recycled or composted, they would save 3–5 times more energy than incinerators can make from burning them, since raw materials don't need to be extracted and produced all over again. Most of the energy in materials, like paper, was spent making them, but is not physically present in the paper itself.

Not Renewable

Incineration is not renewable energy. While many state renewable energy laws count it as renewable energy, municipal waste is non-renewable, consisting of discarded materials such as paper, plastic and glass that are derived from finite natural resources such as forests that are being depleted at unsustainable rates. Burning these materials creates a demand for "waste" and discourages much-needed efforts to conserve resources, reduce packaging and waste and encourage recycling and composting.

Environmental Racism

Incinerators are an environmental racism issue. Incinerators for trash, hazardous waste, sewage sludge and other types of waste are typically located in communities of color and low-income communities. At least with hazardous waste facilities, race is more of a factor than class, so it's not just that people of color tend to live in low-income communities. Some are located in relatively affluent communities of color.

Dirtier Than Coal

To make the same amount of energy, burning trash pollutes the air far more than burning coal, even though incinerators are generally newer and have more air pollution controls than coal power plants. Trash incinerators release 28 times as much dioxin air pollution than coal, about six times more lead and mercury, 3.2 times more nitrogen oxides (NO_x), 2.5 times as much carbon dioxide (CO_2), twice as much carbon monoxide (CO) and 20% more sulfur dioxide (SO_2).

Sometimes called "trash-to-steam" plants, incinerators cannot turn trash into mere water vapor, as there are all sorts of elements in waste, not just hydrogen and oxygen to make H_2O (water). Trash contains toxic metals like arsenic, lead and mercury, halogens like chlorine that produce acid gases and ultratoxic dioxins and furans when burned, carbon, sulfur and nitrogen compounds that form some of the above-mentioned pollutants, and much more.

Incinerators are really "trash-to-toxic-ash-and-toxic-air-pollution" facilities. Imagine that you throw an old pen "away" and it goes to a nearby landfill. There are metals in the pen, some of which may be toxic, as well as plastics and inks that may be chlorinated. Buried in a landfill, it will take a very long time before any of those chemicals can reach you in a form that you can breathe or drink. However, if that pen were sent to an incinerator, any toxic materials in the pen are instantly made available for breathing and drinking through a combination of air pollution and the toxic ash produced, which still goes to a landfill, but now can blow around and leach into groundwater more readily. In addition to making toxic elements more available, burning creates new pollutants that weren't there to begin with, including acid gases, NO_x, CO, CO_2, SO_2, dioxins and furans.

Incinerators, like nearly all facilities with smokestacks, do not monitor what they are putting into the air on a day-to-day basis. Permits only tend to require three pollutants — CO, NO_x and SO_2 (none of the toxic ones) — to be monitored on a continuous basis. Several other pollutants are tested once per year; many not at all. Annual testing is like having a speed limit where a speed trap is set just one day a year, there are signs warning "speed trap ahead" and the driver's brother runs the speed trap (the companies do their own testing). In reality, incinerators are "speeding" many other days of the year, with excessive emissions during startup, shutdown and malfunction times, when testing is not done.

Incinerators do not replace landfills, but require smaller, more toxic, landfills for their ash. Any pollutants captured in air pollution controls are added to the ash, so the cleaner the air, the more toxic the ash. Ash is more toxic than unburned trash because new toxins were formed by burning, and since existing toxins are more available. Think of coffee beans vs. coffee grounds. Pour water over beans and you won't get coffee, but grind them up and increase their surface area, pour water over them, and you get coffee. Ash is similar in that its higher surface area means more toxins can leach out, polluting groundwater.

Health Effects

Incinerators are bad for people's health. Studies have found, in communities around incinerators:

- Increases in pre-term babies and babies born with spina bifida or heart defects.
- Increased cancers, especially: larynx, lung, colorectal, liver and stomach cancers, leukemia (blood cancer), childhood cancers, soft-tissue sarcoma and non-Hodgkin's lymphoma.
- Increased dioxins in the blood of incinerator workers.

Most Expensive — Bankruptcies and Bailouts

Studies done for U.S. Energy Information Administration in 2010 and 2013 show that trash incinerators are, by far, the most expensive way to make energy. Even though trash incinerators get paid to take their fuel, they're the most expensive to build and most expensive to operate and maintain – even worse than nuclear and biomass. They're nine times more expensive to build than a conventional natural gas power plant and 30 times more expensive to operate. They even cost about twice as much to build as solar and nearly four times as much as wind.

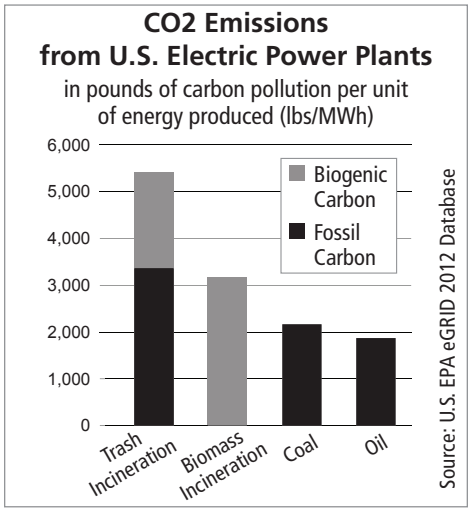
Incineration is also far more expensive than landfilling. It competes only by locating in high-priced waste markets and by locking local and county governments into long-term monopoly contracts, often with "put-or-pay" clauses. Such clauses require that a certain amount of waste be provided to the incinerator, or the governments pay the full amount, even if not providing enough waste. This discourages waste reduction, recycling and composting, because the community can't save money by doing these things. It also allows the incinerator company to fill that extra capacity with waste from other places, getting paid twice for the same capacity.

Expensive incinerators have driven some local governments into bankruptcy. The most spectacular examples have been Harrisburg, Pennsylvania (the largest city bankruptcy at the time, filed in 2011), and Claremont, New Hampshire, where 29 towns filed for bankruptcy due to "put-or-pay" contracts. In other cases, massive bailouts have been necessary, such as the $1.5 billion in state bailouts for New Jersey's five incinerators, and the $1.2 billion in debt payments at the Detroit incinerator, contributing to that city's bankruptcy. In most other cases, the expense of incineration is covered other ways, such as through hidden fees on property tax assessments, by accepting more profitable industrial wastes, and/or by cranking up fees on the captive local community while offering discounted waste disposal to outlying areas to compete with landfills and attract waste to meet capacity.

Incinerators are terrible ways to produce jobs. For every 10,000 tons of waste processed per year, incinerators and landfills create one job, while recycling facilities create 10 jobs and reuse, remanufacturing and repairing materials creates far more (20-300 jobs depending on the material). With a national recycling rate of less than 33%, the U.S. recycling industries currently provide over 800,000 jobs. A national recycling rate of 75% would create 1.5 million jobs.

Competition with Recycling and Clean Energy

Incineration competes with waste reduction, recycling and composting, both through its contracts demanding a certain amount of waste generation, and by virtue of the fact that incinerators need recyclable materials, like paper, tires, wood and plastics, to be able to burn effectively. Within renewable energy policies, incinerators (and landfills that burn their gas for energy) often get subsidized as renewable energy, but recycling and composting do not. Burning trash, "biomass" and landfill gas crowds out wind power in renewable energy mandates.



The "Carbon-Neutral" Myth

While EPA data shows that trash incineration is 2.5 times as bad as coal for global warming (CO_2 pollution per amount of energy produced), the industry pretends that they're carbon negative! They pull off this trick by comparing themselves to methane emissions from landfills, and by not counting the portion of emissions from burning paper and other organic material. Even if you don't count that "biogenic" fraction of what is in waste, the CO_2 emissions from the rest (plastics and such) is still 55% worse than coal. However, the "carbon neutral" myth has been repeatedly busted in recent years, since it takes trees centuries to suck all of the carbon back up, even if trees were replanted and left to grow for that long. It's true that landfills are worse than incinerators for global warming, but this can be avoided by keeping clean compostable organics out of landfills, and by digesting dirty organics before landfilling them, so that their methane can be contained and used for energy in a cleaner way.

It Doesn't Work in Europe

Incinerator pushers like to point across the ocean and claim that incineration works in Europe and Japan, where they rely heavily on incineration. Incinerators in these countries are also very polluting, still compete with recycling, and some European countries have found themselves having to import waste from neighboring countries just to keep their incinerators fed with enough waste to operate.

Real Solutions for Energy and Waste

We can meet all of our electricity needs with conservation, efficiency, wind, solar and energy storage. Sometimes incinerators are used for heating as well, but those needs are best met with conservation, efficiency, geothermal, air-source heat pumps and solar hot water.

The "zero waste" alternative aims to eliminate incinerators and cut use of landfills by at least 90%. Some communities, especially San Francisco, are well on their way. These solutions involve maximizing source reduction, reuse, recycling and composting. For whatever is left, it must be examined to see what failed to get diverted upstream, so products can be redesigned or phased out. Any remainder should go through mechanical and biological treatment before landfilling to get out more recyclables, and digest the remaining waste first, avoiding gassy landfills and their global warming impacts.

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FACT SHEET: Landfill Gas

Toxic Landfill Gas: More than Methane

"Landfill gas" is not the same as "natural gas" or "methane." They are three separate terms that mean different things. The term "landfill methane" is deceiving as it implies that landfill gas is simply methane.

Landfill gas is about 45-55% methane, with the remainder being mostly carbon dioxide (CO_2). It also contains hundreds of toxic contaminants known as Non-Methane Organic Compounds (NMOCs) as well as inorganic toxic contaminants like mercury and sometimes even radioactive contaminants like tritium. NMOCs include such toxic compounds as benzene, toluene, chloroform, vinyl chloride, carbon tetrachloride, and 1,1,1 trichloroethane, which, although less than 1% by weight, are hazardous.

A study of women living near 38 New York landfills where gas is escaping found a significant four-fold increased risk of bladder cancer and leukemia.

What the Regulations Require

Laws requiring collection of landfill gas are not based on the global warming impact of methane, but on the toxic hazards of NMOCs.

Federal regulations require that if the landfill has a total permitted capacity greater than or equal to 2.5 million cubic meters of waste, the landfill's annual Non-Methane Organic Compound (NMOC) emissions must be estimated. If the NMOCs are estimated at more than 55 tons per year, the landfill must adhere to rules that include submitting compliance reports, installing a gas collection system, "destroying" landfill gas at 98% efficiency, and adhering to specified operation and maintenance procedures. Since matter cannot be created or destroyed, burning gas doesn't "destroy" it, but just changes it into a different set of pollutants. While burning the gas is most common, non-burn alternatives for managing the gas exist.

Landfill Gas: To Burn or Not to Burn

There are non-burn options for managing the toxins as well as the methane and CO_2 in landfill gas. These are rarely done, however, as the typical method is to flare (burn) the gas.

Landfill gas advocates argue that if gas isn't burned for "green" energy, that it'll just be vented into the atmosphere, contributing to global warming. In fact, at most landfills where gas would be used for energy production, gas is already being captured and flared, so the comparison is false. It's typically a matter of burning it one way (flaring) vs. another (producing energy from the gas). Using internal combustion engines or turbines to produce electricity from landfill gas is more polluting than flaring, with far higher nitrogen oxide and particulate matter emissions, but lower carbon monoxide emissions.

Some justify burning landfill gas since the small amount of energy produced would displace some need for more electricity from other – allegedly dirtier – sources like coal.

Dirtier than Fossil Fuels

A report by the Environmental Protection Agency documents that burning landfill gas releases more pollution per unit of energy produced than burning non-renewable natural gas and - by some measures (carbon monoxide, CO_2, NMOCs and methane) – is even dirtier than coal.

Toxins Not Filtered Out

Toxic contaminants are not filtered out of landfills gas before it's burned. Nearly all projects that utilize landfill gas filter out only sulfur and water vapor.

Dioxins and Furans

The many chlorinated contaminants in landfill gas can create dioxins (and related chemicals called furans) when burned. Dioxins are the most toxic chemicals known to science. The most potent form of dioxin is proven to be a known human carcinogen, causing cancer at doses so low that scientists have affirmed that there is no "safe" dose small enough not to cause cancer. Dioxin is also known to cause severe reproductive and developmental problems (at levels 100 times lower than those associated with its cancer causing effects). Dioxin is well-known for its ability to damage the immune system, interfere with hormonal systems, reduce sperm counts, and cause endometriosis, birth defects, diabetes, learning disabilities, immune system suppression, lung problems, skin disorders, lowered testosterone levels and much more.

Dioxin emissions cannot be measured since the air emissions are released at a temperature above the dioxin formation range, meaning that the dioxins will still be forming as the emissions cool down after they leave the burner and are traveling in the air.

Mercury Worse than Coal Plants

Mercury is found in landfill gas in concentrations comparable to those found in the exhaust gas of coal-fired power plants, yet most is released in a more dangerous form. Mercury in landfills comes from fluorescent bulbs, thermometers, batteries, latex paint, dental amalgam filling capsules and contaminated plumbing. Mercury scrubbed from coal power plant exhaust can also be dumped in landfills. Landfill environments can form methylated forms of mercury (the most dangerous kind). This form of mercury is fat-soluble and can readily climb the food chain, making animal products highly contaminated. When landfill gas is burned, methyl mercury is converted back to less-dangerous elemental mercury, yet since most landfill gas isn't captured, most escapes as methyl mercury.

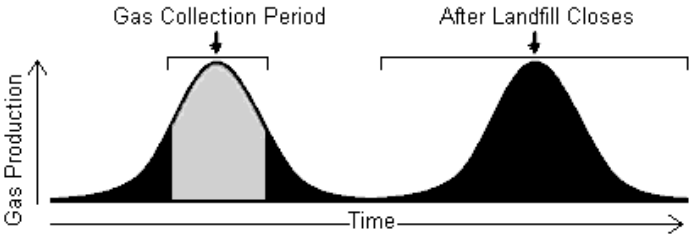
Only about 10% of Landfill Gas gets Captured

Not all landfills are required to collect their gas. About half of the waste is buried in smaller landfills that aren't required to collect the gas because the estimated NMOC levels are too low. EPA's rules mandating gas collection at larger landfills cover only 54% of the waste in the ground.

Even if public policies promoted gas collection at these other landfills, gas production may not be great enough to make operating a gas collection system economically viable. It may also be technically unworkable if there isn't enough gas to maintain needed pressure.

At landfills where gas *is* collected, gas is only collected during the prime gas production years during the operating life of the landfill (the first wave of gas production). Much gas generation occurs before collection systems are installed and after they're removed.

Roughly half of the total gas generated by landfills will occur after the gas collection systems are removed and the landfill is closed. Once the landfill cover breaks down and water once again penetrates the site, a second wave of gas will be produced, at a time when no gas collection is required and when the landfill operator has almost certainly walked away, leaving the liability with the public.



Even while gas collection systems are operating, much of the gas still isn't collected, due to various limitations inherent in gas collection systems. Gas collection wells cannot be placed too deeply in the landfill, since they'd risk puncturing the bottom liner as the landfill settles over time. Gas cannot be collected too close to the surface without the risk of drawing outside air into the system. Some gas gets caught in pockets that won't reach the collection wells. Also, gas collection systems can clog.

EPA assumes that gas collection systems collect 75% of the gas, yet this is a best-case scenario. EPA assumes this is always the case, but on average, only about 50% of the gas is collected – and this is during only about 32% of the landfill's lifetime gas generation. Another 12% of the time, the collection rate is far lower, averaging around 25%. The rest of the time, no gas gets collected.

The International Panel on Climate Change now estimates a landfill lifetime gas capture rate of only 20%. This is over the lifetime of landfills where gas is collected. Factoring in the landfills where gas isn't collected, only about 10% of all landfill gas produced at U.S. landfills will ever be collected.

Thus, it's quite deceptive to promote the burning of landfill gas for electricity in the name of combating global warming. The emphasis must be on gas *prevention* (keeping organic wastes out of landfills).

Global Warming Pollution

Burning landfill gas for energy releases 20-40% more greenhouse gas pollution than flaring, since more gas escapes unburned when landfills are managed in order to increase methane concentration to allow for effective energy use. EPA estimates that landfills are responsible for 2% of U.S. greenhouse gas emissions, yet average lifetime greenhouse gas emissions from landfills are really at least four times higher than EPA assumptions.

Encourages Landfill Mismanagement

Landfills can make significant profits by selling electricity from burning landfill gas – as much as $1-2 per ton of waste dumped. Landfills selling their power as "green" energy through energy marketers or using the power to meet a state Renewable Portfolio Standard can make as much as $5/ton or more. This subsidizes landfills, encouraging poor waste management practices. By creating incentives to produce as much gas as possible, landfills are encouraged to accept as much organic waste as possible. It also encourages operators to delay covering the working face of the landfill, so that more rainwater will enter the landfill. This practice increases community exposure to odors, mercury and other toxins.

Green Marketing

Landfill gas is not clean, green or renewable and shouldn't be considered such. Allowing landfill gas to count in green energy programs like Green-*e* has enabled energy marketers and utilities to sell products that are 95% landfill gas and only 5% wind to customers who assume they're getting mostly wind power. Since landfill gas is cheaper than wind, allowing both technologies to compete evenly within green pricing programs and renewable energy mandates means landfill companies will gain where wind power would otherwise benefit.

Alternatives

The proper thing to do with landfill gas is as follows:

1) Ban organic wastes from landfills. Compost clean organics; digest the rest, then monofill it (place in separate landfill cells), so that the landfill won't be gassy and smelly.

2) At existing landfills, landfill operators ought to collect as much gas as possible (without trying to maximize gas production or methane concentrations) and filter the toxins in the gas into a solid medium like a carbon filter. The carbon filters ought to be containerized and stored on-site. They should not go to a carbon "regeneration" or "recycling" facility, since they simply incinerate the chemicals – letting them back out into the environment by burning them out of the carbon filters.

3) Once the gas is purified, it may be acceptable to burn it for steam or electricity, however, this may not be possible without mismanaging the landfill and releasing more gas. Other alternative technologies include piping it into natural gas lines, producing hydrogen or segregating the CO_2 and methane to be sold as industrial chemical feedstocks.

If landfill gas is burned for electricity, it should not be considered renewable, since that allows it to compete with (and undercut) clean sources like wind power. Subsidizing landfill companies also puts source reduction, reuse, recycling and composting at a competitive disadvantage.

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