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.

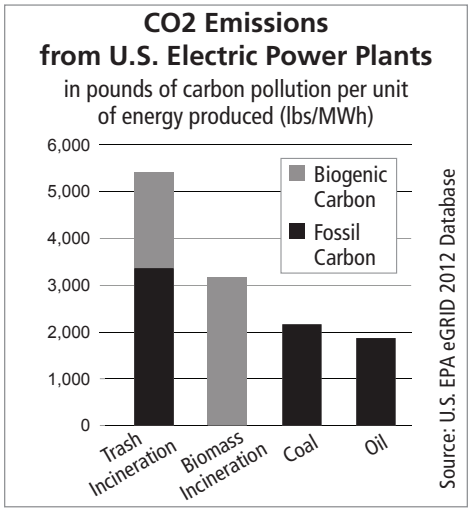
Incineration is also far more expensive than landfilling. It competes only by locating in high-priced waste markets and by locking local and county governments into long-term monopoly contracts, often with "put-or-pay" clauses. Such clauses require that a certain amount of waste be provided to the incinerator, 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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Landfills are bad, but incinerators (with ash landfilling) are worse

Incinerators do not avoid landfills. For every 100 tons of trash burned, 30 tons become toxic ash that goes to landfills. The other 70 tons don't turn into energy, but become air pollution. In terms of air pollution, and groundwater impacts, burning waste then burying ash is far worse than direct landfilling, and both are worse than a Zero Waste approach.[1]

A Zero Waste approach means zero incineration and at least 90% reduction from landfilling, with residuals biologically stabilized prior to landfilling, to minimize odors, leachate, gas formation and toxic migration.

The most recent data comparing incinerators to landfills is from air emissions data provided by the Pennsylvania Department of Environmental Protection (DEP). For 2017, this includes data on all six trash incinerators in PA and 17 landfills in DEP's southeast and southcentral regions.

Pollutant (all data in tons)	Incinerators	Landfills	Incinerators are __ times as polluting
Greenhouse Gases (CO_2e)	482,770	268,763	1.8
Total Health Damaging Pollution	1,975	1,236	1.6
Carbon Monoxide (CO)	119	22	5
Hydrochloric Acid (HCl)	17	1	21
Nitrogen Oxides (NOx)	625	6	105
Particulate Matter, Condensable	25	1	17
Particulate Matter (PM10)	26	17	1.6
Fine Particulate Matter (PM2.5)	17	4	5
Sulfur Oxides (SOx)	55	3	19
Total Suspended Particulate (TSP)	2,178	2,486	0.88
Volatile Organic Compounds (VOC)	3	9	0.34

This shows that incineration is 80% worse than landfills for the climate, and that other pollutants that directly harm human health are 60% worse from incineration. Emissions of nitrogen oxides that trigger asthma attacks are 105 times as bad as landfills.

Only two pollutants for which there was complete data showed landfills to be worse: VOCs, and TSP. However the TSP average for landfills is higher only because of one facility (Fairless Landfill) that had an unusually high number. Without that data point, the average of the other landfills is just 536 tons, which means that incineration is 4 times as polluting as these other landfills, on average. The volume accepted at the landfills is about the same (just 1.6% more) than the incinerators, so this pollution difference is not a function of the amount of waste received.

A more rigorous life cycle analysis of incineration vs. landfilling was commissioned in 2017 to look at Washington, DC's waste options. It looked at DC trucking waste to the Covanta Fairfax incinerator vs. four landfills in southeastern Virginia, one of which requires trucking waste twice as far; the other three involve trucking waste four times as far. It was analyzed on the basis of pollution impacts per ton of waste disposed.

[1] See www.zwia.org/standards/zw-definition/ and www.zwia.org/zwh or www.energyjustice.net/zerowaste/hierarchy

It found that trucking emissions were insignificant compared to the emissions of the incinerators and landfills themselves. It concluded that incineration is worse than landfilling for global warming, smog, toxic emissions, acid gas emissions, nitrogen oxide emissions, and particulate matter, even when trucking waste four times as far to landfills. On one measure, eutrophication, they were basically tied. On three of the smallest measures, landfills showed to be worse. On balance, incineration was far worse than landfilling. Because it couldn't easily be quantified, dioxin emissions (the most toxic chemicals known to science, largely emitted by incinerators) and toxic leaching from incinerator ash were not accounted for. Could they be quantified, this would weigh even more heavily against incinerators.[2]

Why are incinerators worse?

On toxic emissions, nitrogen oxides, smog, acid gases, and particulate matter emissions, it's rather obvious. Incinerators turn 70% of the tonnage into air emissions, only some of which can be captured or reduced through air pollution control devices. Most of this is not generated at landfills because they're products of combustion. The sheer volume of material being emitted through the smokestack leads to this outcome.

Regarding toxicity, incineration is worse than landfilling for two reasons:

1) Highly-toxic new chemicals like dioxins/furans, and polycyclic aromatic hydrocarbons (PAHs) are formed in the combustion process and end up in the air and ash.

2) Toxic materials already present in products, such as toxic metals in inks or electronics, are largely trapped in the product and stay stored in the landfill long-term. When burned, those toxic metals are immediately freed and released in a form that is more available for people to eventually breathe or drink. What does not end up ejected into the air becomes part of the ash. Ash can be kicked up and blow into communities during shipping, when placed on landfills as landfill cover, and where "recycled" to make internal roads in landfills. In terms of leachate, 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 toxic chemicals can leach out, polluting groundwater.

What about methane and global warming?

Landfills *are* bad for global warming, as they emit large amounts of landfill gas as organics like food scraps and yard waste rapidly degrade. Landfill gas is about half carbon dioxide and half methane. Methane was long thought to be just about 20-some times as bad as CO_2 for the climate, but is now understood to be 34 times as bad over a 100-year time span, and a whopping 86 times as bad over a 20-year horizon, which is more relevant for avoiding global warming tipping points. Even using the latest science on methane and a 20-year time horizon, the 2017 life-cycle analysis found that trucking waste four times as far to a landfill is still not as bad for the climate as burning closer to home.

According to EPA, about half (47.3%) of the carbon in municipal solid waste is from plastics and tires.[3] In a landfill, this carbon is sequestered, but when burned, it's immediately injected into the atmosphere. No carbon capture and sequestration is viable or used on trash incinerators. Carbon in more durable materials like wood, leather, and textiles in a landfill largely is sequestered as well, but would be emitted immediately

[2] http://www.energyjustice.net/files/md/montgomery/incineration_vs_landfills.pdf See slides 26-59; study conclusions are on slides 38-48. Note that the difference between the red and blue lines are between doubling the trucking distance and quadrupling the trucking distance. If trucking emissions were significant, there would be a larger difference between these lines.

[3] U.S. EPA Emissions & Generation Resource Integrated Database (eGRID) 2012 Technical Support Document, Table 3-2.

as CO_2 if burned.[4] It's primarily the food scraps and yard waste that degrade rapidly in a landfill, forming landfill gas. Most of that gas is captured and reduced to CO_2 when burned. Some of the methane that leaks out, uncaptured, oxidizes to CO_2, anyway. All told, even with the high potency of methane, overall climate impacts from incineration are worse for the aforementioned reasons.

EPA's WARM Model and other flawed analyses

Greenhouse gas comparisons that make incineration out to be better than landfills (or coal) rely on some major flawed assumptions.[5] About half of the CO_2 emissions from trash incineration are considered "biogenic" in that they come from burning food scraps, yard waste, wood, paper, and other products that were grown, as opposed to petroleum-based plastics that produce the other half. While it's been scientifically debunked repeatedly, some still embrace the "carbon neutrality" argument that counts those emissions as zero because new growing plants suck up the carbon.[6] However, the decision to burn or bury has no impact on whether plants will regrow, and it's not valid to discount nearly half of an incinerator's GHG emissions while counting the GHG emissions from landfills, which are entirely "biogenic" (the plastics in landfills aren't forming GHGs). The sun's rays do not interview carbon molecules in the atmosphere, ask where they came from, and choose whether to not to heat them up. Carbon in a landfill or in a tree is not the same as carbon in the atmosphere. In debunking the biomass carbon neutrality myth, scientists have pointed out that it relies on a form of double-counting, as international carbon accounting protocols already account for tree and plant growth in their models, and for it to be subtracted or ignoring carbon emitted from biogenic carbon emitting sources is hiding the actual climate impacts.

EPA data shows that emissions of CO_2 from wood burning (biomass incineration) is 50% worse than coal, per unit of energy, and that trash incineration is 150% worse (2.5 as bad). A study commissioned by the Commonwealth of Massachusetts found that for wood burning ("biomass"), it takes 45 years on average for that extra pulse of CO_2 to be reabsorbed by newly growing trees. This is not carbon neutrality, but just getting back down to the level of coal burning. No carbon neutrality can be possible within a meaningful timeframe since we do not have decades to avert the worse global warming tipping points.

Another major flaw is subtracting emissions from coal power plants as if any energy generation at an incinerator displaces coal. In fact, because of trash incineration being considered renewable energy in Maryland, no fossil fuels displacement can honestly be assumed. If trash were not burned, electric suppliers will be required to replace that with other Tier 1 renewable resources with Maryland's Renewable Portfolio Standard – and would most likely be replaced by emission-free wind power. Also, subtracting avoided methane emissions from landfills is a dishonest way to do a comparison between incinerators and landfills. Similarly, one would not do a comparison where the landfills can subtract incinerator emissions, or where coal power plant owners can plant enough trees and pretend that their actual stack emissions are negative.

If one is rightfully concerned about the greenhouse gas impacts in the waste system, then it's imperative that incineration is not used, and that readily degradable organics (food scraps and yard waste) are kept out of landfills.

[4] Morris, Jeffrey, "Recycle, Bury, or Burn Wood Waste Biomass?: LCA Answer Depends on Carbon Accounting, Emissions Controls, Displaced Fuels, and Impact Costs," Journal of Industrial Ecology, August 2016. https://doi.org/10.1111/jiec.12469
[5] http://www.energyjustice.net/incineration/climate
[6] http://www.energyjustice.net/biomass/climate

Groundwater

There is no good data to do a comparison of groundwater damage from landfilling unburned trash vs. trash incinerator ash. However, some informed common sense goes a long way. It's not the size of landfills that is harmful, but their toxicity. As described above, incineration creates new toxic chemicals like dioxins/furans, depositing much of them in the ash, and makes existing toxic chemicals more readily available to blow away or leach into groundwater by increasing the surface area.

Ashes and Ash Testing

Two types of ash are produced when trash or other solid fuels are burned: bottom ash and fly ash. Bottom ash, which is what remains on the grate of the boiler, makes up about 90% of the ash. The remainder is "fly ash" – smaller particles that are caught in the air pollution controls. Fly ash is far more toxic and is impregnated with heavy metals and dioxins. Prior to 1994, when incinerator ash was tested with the EP Tox test, the fly ash tested hazardous 94% of the time and the bottom ash tested hazardous 36% of the time. In some other nations, and in two international treaties, incinerator ash is categorically defined as hazardous waste. Until 1994, the U.S. Environmental Protection Agency categorically exempted incinerator ash from hazardous waste regulation. In May 1994, the U.S. Supreme Court ruled that incinerator ash that tests hazardous for toxic heavy metals such as lead and cadmium must be disposed of in hazardous waste landfills rather than in typical municipal solid waste landfills. If incinerators were made to pay for the expense of disposing of their ash as hazardous waste, they'd be out of business overnight. In response to that ruling, EPA saved the industry by changing the test and permitting new practices that consistently avoid a hazardous waste designation. The TCLP test manipulates the pH so that the laboratory test occurs at a pH where lead does not leach out. The use of lime injection in air pollution scrubbers also helps manipulate the pH and EPA allows incinerators to mix the fly and bottom ashes so that the dilution and the injected lime helps the combined ash pass the test. Phosphoric acid can also be used to prevent leaching long enough to pass the test. In real-world, long-term environments, the toxic metals in ash leach out and can be expected to do more damage to groundwater than unburned trash, especially if organics and liquids are kept out of landfills to minimize leachate formation.

What SHOULD we do?

There are three major options for how to manage waste, all of which end in landfilling in some way:

1) Landfill directly
2) Incinerate and landfill toxic ash
3) Zero waste with material recovery and biological treatment prior to stabilized landfilling

Studies comparing landfilling and incineration to zero waste approaches have found – not surprisingly – that avoided production (reduction and reuse), recycling and composting are better for the climate than burning or burying materials,[7] and that the "leftovers" are best handled with a material recovery and biological treatment (MRBT) process before landfilling.[8] Material recovery means mechanically removing extra recyclables that are still discarded. Biological treatment means stabilizing any residual organic material with an anaerobic digestion process so that any gas generation is done in an enclosed system where gases can be easily captured, avoiding having a gassy, stinky landfill. Following the Zero Waste Hierarchy provides the best results.[9]

[7] http://www.eunomia.co.uk/reports-tools/the-potential-contribution-of-waste-management-to-a-low-carbon-economy/
[8] http://www.ecocycle.org/specialreports/leftovers
[9] http://zwia.org/standards/zero-waste-hierarchy/

Energy-from-Waste Emissions

Covanta WHITE PAPER

Like all combustion processes (e.g. cars, trucks, fossil-fuel power plants, landfill gas to energy) and nearly all waste management processes (e.g. landfilling, composting, anaerobic digestion, recycling), Energy-from-Waste (EfW) facilities have air emissions. To minimize emissions, EfW facilities employ sophisticated air pollution control equipment. Emissions are monitored both continuously and with periodic testing. Due to combustion and emissions control, 99.9% of what is coming out of the stack are normal components of air, including water vapor, nitrogen, oxygen, and CO_2.

The installation of the sophisticated air pollution control equipment was primarily driven by the Clean Air Act Amendments of 1990 and its Maximum Available Control Technology (MACT) requirement. Following implementation of these requirements, emissions from the industry dropped dramatically, both as the result of closure of outdated facilities and the installation of new air pollution control equipment (Table 1). In reviewing the data, the U.S. EPA noted that "[t]he performance of the MACT retrofits has been outstanding."

Table 1. Change in U.S. EfW Emissions, 1990-2005[1]

Dioxins & Furans	▼99%
Mercury	▼96%
Cadmium	▼96%
Lead	▼97%
Particulate Matter	▼96%
Hydrochloric acid (HCl)	▼94%
Sulfur Dioxide (SO_2)	▼88%
Nitrogen Oxides (NO_x)	▼24%

Emissions from Covanta's facilities ***continue*** to decrease. Since the start of the company's sustainability program in 2007, emissions of pollutants at Covanta operated facilities, as measured over three-year period from 2015-2017, have decreased by up to 68% (Figure 1). As a result, Covanta's facilities operate well below federal standards (Figure 2).

Figure 1. Covanta Emissions Reductions Since 2007

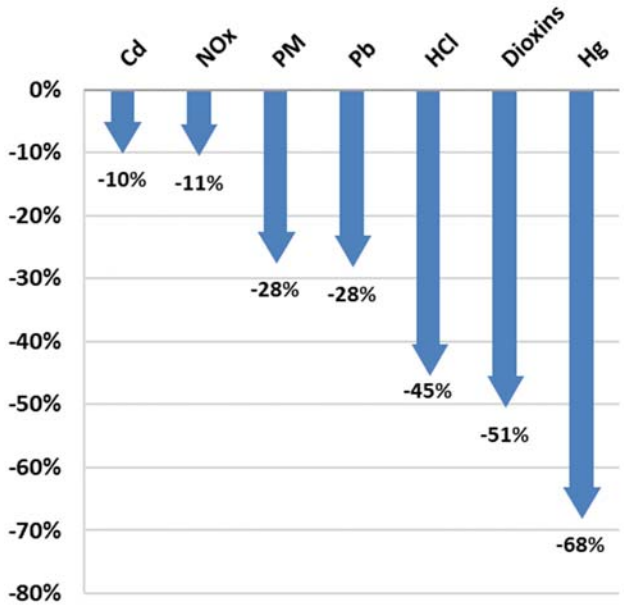
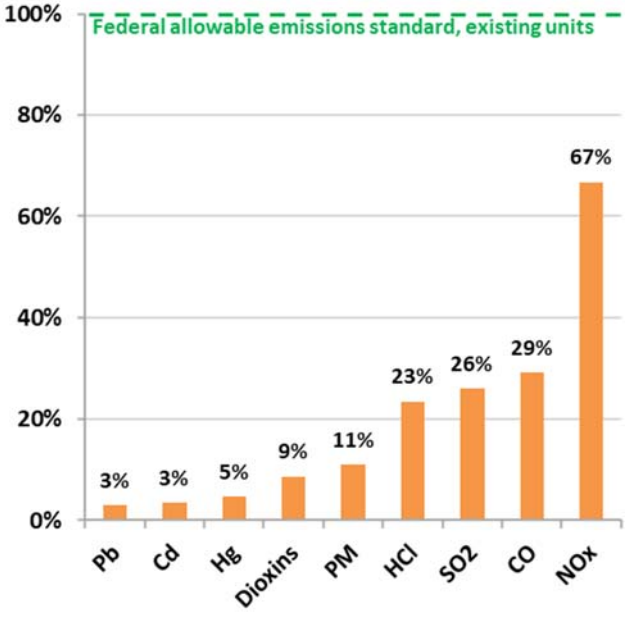


Figure 2. Covanta 2015-2017 U.S. EfW Emissions compared to federal standards



How Are Emissions Measured and Monitored?

Air emissions from EfW facilities are heavily regulated by both the U.S. EPA and state environmental agencies. Emissions from EfW facilities are determined both through routine stack tests (performed at least once a year) and through continuous emissions monitors (CEMS). CEMS monitor flue gases continuously for carbon monoxide (CO), nitrogen

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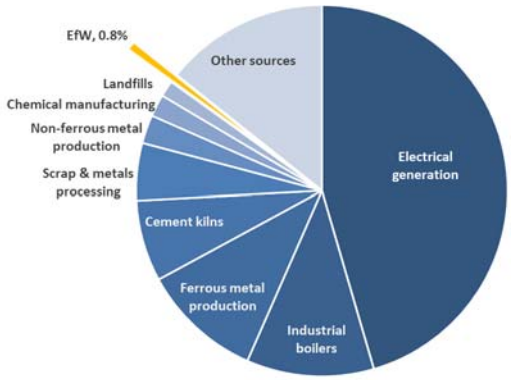
oxides (NO_x), sulfur dioxide (SO_2), opacity, and carbon dioxide and/or oxygen. Facility operators monitor these parameters and adjust as needed to ensure proper operation and compliance. For example, monitoring CO levels continuously allows operators to respond to changes in the waste (e.g. wetter than normal waste that may have been collected during a rainstorm) to ensure complete and efficient combustion.

Other regulated pollutants are checked through a rigorous stack testing program performed by a regulator-approved third-party. The operating parameters under which the stack test is conducted (e.g. activated carbon addition rate, steam flow rate) set the standard for the facility's operation until the next stack test is completed. Operating the combustion process and air pollution control equipment in accordance with these standards ensures compliance. These tests are scheduled well in advance of their performance, and contrary to myth, facility operators do not remove plastics from the waste stream or alter operations in any way to improve emissions performance during the test.

Are EfW Facilities Major Sources of Mercury & Dioxins in the U.S.?

No. Some opponents to EfW facilities cite old data or retain a perception of the industry formed prior to the advent of modern air pollution control. In fact, according to recent peer-reviewed research by Columbia University scientists, the total dioxin emissions of all U.S. EfW plants in 2012 represented less than one-tenth of one percent of total sources of dioxin.[2] Similarly, EfW facilities are a minor source of mercury in the U.S., representing just 0.8% in 2014, roughly half that emitted from landfills (Figure 3). Scrap metal processing and recycling emits 7 times as much mercury as U.S. EfW facilities.[3]

Figure 3. U.S. 2014 Mercury Emissions by Source



What About Nanoparticles?

The vast majority of particulate matter, including nanoparticulate is removed via the air pollution control (APC) equipment installed at EfW facilities. Nanoparticulate that are emitted agglomerate relatively quickly into larger particles, increasing in size and correspondingly decreasing in number within minutes.[5] Other local sources of nanoparticulate are likely more significant. Recent published studies have concluded that EfW's emissions were negligible relative to typical exposures in urban environments[6] and highways.[7] One of the peer reviewed papers concludes that emissions of ultrafine particles from EfW stacks are lower than one single high-duty vehicle.[8]

"The [nanoparticle concentrations] produced by MSW incineration plants are generally reported similar to rural background"[4]

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Energy-from-Waste & Health Risk

Covanta WHITE PAPER

Do Emissions from EfW Present Health Risks?

Study after study have shown that living near an Energy-from-Waste (EfW) facility EfW facility with modern air pollution control equipment does not have adverse impacts on health.

- A recent review of air quality health risk assessments and health surveillance programs surrounding EfW facilities done for Portland, Oregon determined that there was ***not a predictive or actual increase in health issues***, including for those in vulnerable or sensitive "at-risk" populations such as children or the elderly.[1]
- Three years prior, a similar comprehensive review of published risk assessment, biomonitoring, and epidemiology studies, performed for Metro Vancouver concluded that modern EfW facilities "***do not pose unacceptable health risks to local residents***."[2]
- Public Health England found negative health impacts associated with well-regulated EfW facilities likely to be very small, ***if even detectable***.[3]
- Long-term biomonitoring near three Dutch EfW facilities found "***no potential risk*** with respect to human consumption quality of the investigated crops and products in the vicinity."[4]

How are Health Risks Studied?

The potential health risks of an emissions source, like an Energy-from-Waste facility, are typically studied in one of three primary ways:

Biomonitoring

Measurement of chemicals or their metabolites (products of chemical compounds that have been transformed in the body) in blood, urine, breast milk, or tissues. Measures actual uptake or accumulation of chemicals in a potentially exposed population.

Health Risk Assessment

A systematic process to provide quantitative estimates of potential human health impacts of predicted, modeled, or measured emissions.

Epidemiology Study

Assessment of documented health issues or events (e.g. birth outcomes, cancer incidence) relative to an air or other emissions source.

- The Massachusetts Department of Public Health found prevalence of childhood asthma in the Merrimack Valley—where several EfW facilities are located—***was not associated*** with emissions of particulate matter (PM10) or volatile organic compounds (VOCs) from the local stationary sources.[5]
- A 2019 UK study found ***no evidence*** that exposure to, and living near, a modern EfW facility in compliance with current standards was associated with any excess risk of adverse birth outcomes.[6]
- A health risk assessment performed for the Montgomery County facility in Maryland found a ***very low chance*** for occurrence of potential carcinogenic health effects, and no expectation of non-carcinogenic health effects as a result of facility emissions.[7]
- A biomonitoring study in Portugal that measured dioxin in both exposed and control population groups concluded that emissions from EfW ***did not impact dioxin blood levels*** of nearby residents.[8]

COVANTA Powering Today. Protecting Tomorrow.

Do Emissions from EfW Facilities Cause Asthma?

No one knows exactly what causes asthma.[9,10,11] Allergies and asthma both tend to run in families, so genetics is suspected as a factor. Environmental factors, including respirator infections in infancy and early childhood, other allergies, and exposures to allergens, certain irritants, or exposure to viral infections as a child also likely play a role. Obesity is also a risk factor for the development of asthma.[12]

One theory is the "hygiene hypothesis", which postulates that our focus on hygiene and sanitation has reduced childhood exposures to infections and other environmental factors affecting the development of children's immune systems and increasing their risk for atopy and asthma.[10]

NIH National Heart, Lung, and Blood Institute

"The exact cause of asthma isn't known. Researchers think some genetic and environmental factors interact to cause asthma, most often early in life. These factors include:

- An inherited tendency to develop allergies, called atopy (AT-o-pe)
- Parents who have asthma
- Certain respiratory infections during childhood
- Contact with some airborne allergens or exposure to some viral infections in infancy or in early childhood when the immune system is developing

If asthma or atopy runs in your family, exposure to irritants (for example, tobacco smoke) may make your airways more reactive to substances in the air.

Some factors may be more likely to cause asthma in some people than in others. Researchers continue to explore what causes asthma."

Source: U.S. Department of Health & Human Services[10]

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Trash incineration FACT CHECK: Covanta's "*Energy-from-Waste Emissions*" flyer

By Mike Ewall, Energy Justice Network, 215-436-9511, mike@energyjustice.net; www.energyjustice.net/incineration

Covanta: *"Like all combustion processes (e.g. cars, trucks, fossil-fuel power plants, landfill gas to energy) and nearly all waste management processes (e.g. landfilling, composting, anaerobic digestion, recycling), Energy-from-Waste (EfW) facilities have air emissions."*

Fact: Covanta's emissions are FAR greater than any of these things. Whether you compare their pollution to the amount you'd get processing the same amount of waste with another method, or producing the same amount of energy with another method, trash incineration is the dirtiest option. Covanta's air emissions are even shown to be dirtier than burning coal – and this is even after their "sophisticated air pollution control equipment" (that isn't state-of-the-art, anyway).

Dirtier than coal: Compared to coal power plants in Maryland, the Covanta incinerator, to produce the same amount of energy, releases 15% more fine particulate matter, 60% more arsenic, 68% more global warming pollution, and 94% more nitrogen oxide (NOx) pollution (which triggers asthma attacks). Even more stark, it emits 3.5 *times* as much chromium, 11 times as much lead, 21 times as much cadmium, 26 times as much mercury, and 50 times as much hydrochloric acid.[1]

Covanta: "Emissions are monitored both continuously and with periodic testing."

Fact: This is true, but misleading, since only four pollutants are continuously monitored, and none of the toxic ones. For dioxins, mercury, lead, beryllium, cadmium, particulate matter, sulfuric acid, hydrofluoric acid, they test just once a year. If we regulated speeding the way we do smokestacks, this annual stack testing is like setting a speed limit and allowing drivers to drive all year with no speedometer. Once a year, on the highways, a speed trap would be set, with signs leading up to it warning "slow down, speed trap ahead" ...and letting the driver's brother run the speed trap (they 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.

What is an "Energy-from-Waste (EfW)" facility?

Covanta's facilities are properly described as trash incinerators. EPA regulates them as "Municipal Waste Combustors," and has stated multiple times that this is synonymous with "incinerator." Energy-from-Waste is just the latest public relations twist from an industry that avoids the "'i' word" as they call it.

Before this, it was "trash-to-steam," or "waste-to-energy" – both of which are scientifically invalid PR terms, as trash is turned into far more than water vapor when burned, and waste cannot be literally turned into energy without violating the laws of physics.

In reality, trash is turned into toxic ash and air pollution, and produces less energy than would be saved by composting or recycling what is burned. The industry admits that they're primarily waste facilities, and that energy production is a secondary function, but the PR effort makes them out as if they're primarily energy facilities, making something good out of something bad.

Covanta: U.S. trash incinerator emissions have fallen dramatically between 1990 and 2005, with over 90% reductions in dioxins, mercury, cadmium, lead, particulate matter and hydrochloric acid.

Fact: As Covanta admits, the industry-wide reductions are from a combination of incinerators closing as well as installation of pollution controls on some existing facilities. Most of this reduction is due to incinerators closing down, not existing ones installing substantial pollution controls. Nearly half of the industry (86 of 185 trash incinerators) closed between 1990 and 2005, including many that were exceptionally old and dirty. These closures were largely the result of community activist pressure and the industry's poor economics. A lot of the "cleanups" and closures are also the result of stricter air pollution regulations ("MACT retrofits") that environmentalists fought for in the first place. In the cases where existing facilities reduced their air emissions by adding pollution controls, this simply transfers a lot of those pollutants from the air to the ash that is landfilled, making groundwater more toxic.

[1] The coal data is from the adjacent Dickerson Generating Station (60% coal, 38% gas, 2% fuel oil), and the two power plants in the state that are 100% coal (Morgantown Generating Station and Warrior Run). Data is from EPA's 2017 National Emissions Inventory, EPA's 2016 eGRID database (for global warming pollution), and Energy Information Administration's Form 923 data on electricity production.

Covanta: Air pollution from our trash incinerators is below federal standards.

Fact: They would be illegal to operate if built today. Federal standards allow these decades-old facilities to operate under much weaker standards than if they were permitted and built in the past decade. The standards are also weak compared to those in other countries. Also, nearly all of the pollutants they monitor are self-tested just once a year, underestimating their emissions.

Covanta: We have a "rigorous stack testing program performed by a regulator-approved third party."

Fact: Polluters like Covanta choose and hire their own testing company, and the testing companies know that if they show results that their client doesn't like, they may not be hired again. Even some "regulator-approved third party" testing labs have been busted for falsifying data.

Some incinerators are allowed to just test one boiler each year, and to pick which one they test, as they do at the Wheelabrator Baltimore trash incinerator. It's not unusual that if an incinerator stack test shows a high level, they assume it's a mistake and test again until they get a more acceptable result. State regulatory agencies allow them to get away with this, and allow averaging of multiple test results to get an acceptable passing result. Even when emissions are above limits, companies sometimes don't get fined, or are allowed to negotiate with the state to reduce the amount of a fine. They pay the fines as the cost of doing business, and fines are not significant enough to deter pollution or to get companies to install better pollution controls.

Covanta: "contrary to myth, facility operators do not remove plastics from the waste stream or alter operations in any way to improve emissions performance during the test."

Fact: This is no myth. Covanta was once busted by the Connecticut Attorney General for tampering with their continuous emissions monitors to make it look like their emissions were lower than reality.[2] They were busted most recently in Oklahoma in a criminal investigation conducted by the EPA, relating to "improprieties in the recording and reporting of emissions data." No fines were assessed.[3] We know from Covanta worker experiences at multiple plants that altering the waste stream for stack tests is common at Covanta facilities, where they'll stockpile material that burns cleaner, like cardboard, and use that during their stack test, which is illegal. Similar activity was once exposed at an incinerator in Columbus, Ohio.[4]

Covanta: "Some [incinerator opponents] cite old data."

Fact: Covanta is using 1990-2005 and 2014 data. Our data is in the past decade and is the newest available.

Covanta: Incinerators are not large sources of mercury and dioxins, and emit roughly half the mercury that landfills do and 1/7th that of scrap metal recycling.

Fact: If this were true, it's still awful because there are 8 times as many landfills, accepting a much higher volume of waste. The amount of mercury emitted is far higher if incinerated than if landfilled. However, the newest EPA data (2017) shows that incinerators release 3.1 times as much mercury as landfills: 534 lbs from 59 trash incinerators vs. 171 lbs from over 480 landfills in the EPA National Emissions Inventory.

This same logic error is used when comparing to mercury from scrap metal recycling. There are far more scrap metal recyclers than trash incinerators. Fair comparisons look at the amount of a pollutant per ton of waste disposed – or per amount of electricity produced if comparing to energy sources. Whether comparing fairly to landfills or to coal power plants, incinerators come out worse. Covanta's false comparisons are for PR purposes.

Also, their supposedly small amount of dioxin only looks at air emissions (most of their dioxin emissions at in their toxic ash), and underestimates the emissions by 30-50 times for lack of continuous monitoring.

Covanta: "research by Columbia University scientists"

Fact: Columbia University scientists are the "tobacco scientists" of the incineration industry. They're referring to WTERT, an academic think tank that aggressively promotes incineration because they're thoroughly funded by the incinerator industry, including Covanta.[5] We've looked at some of their research and have found clear flaws in their methodology, which is obviously in the pursuit of pro-incinerator "academic" information.

Covanta: Nanoparticles are removed by controls

Fact: Nanoparticles are too small to monitor or control, and studies purporting to assess this cannot be trusted for lack of accurate monitoring technology.

[2] See the 3rd violation on page 37 of this 93-page compilation of Covanta violations through 2006: www.energyjustice.net/files/incineration/covanta/violations2006.pdf.

[3] "Tulsa Matter," Covanta's 2019 10-K SEC filing for FY2018, p.104.

[4] www.americanhealthstudies.org/wastenot/wn302.htm

[5] www.seas.columbia.edu/earth/wtert/sponsor.html

Trash incineration FACT CHECK: Covanta's "*Energy-from-Waste & Health Risk*" flyer

By Mike Ewall, Energy Justice Network, 215-436-9511, mike@energyjustice.net; www.energyjustice.net/incineration

Do trash incinerators trash public health?

Several health studies say yes. Trash incinerators – often rebranded with public relations terms such as "waste-to-energy," "energy from waste," or "resource recovery" – are the most polluting way to manage waste or to make energy.[1] There are health studies that find connections to cancers, heart disease, birth defects, respiratory problems, and other health impacts.

A 2019 study published in the *International Journal of Environmental Research and Public Health* sums up the research this way (each number references a study):

"Although various uncertainties limit the overall interpretation of the findings, there is evidence that ***people living in proximity to an incinerator have an increased risk of all types of cancer*** *[12,13],* ***including stomach, colorectal, liver, renal, pleural and lung cancer, gallbladder and bladder for men, non-Hodgkin lymphoma and leukemia, and childhood-cancer/leukemia*** *[13,14]. Studies on incinerators in France and in Italy have suggested an* ***increased risk of non-Hodgkin lymphoma*** *(NHL) [15],* ***soft-tissue sarcoma*** *[16,17],* ***lung cancer*** *[18],* ***and neoplasia of the nervous system and liver*** *[12]. Although the studies conducted by Shy et al. [19] and Lee and Shy [20] did not show respiratory effects. Other studies have reported* ***increases in respiratory diseases or symptoms in populations residing near incinerators*** *[21–24]* ***and in children*** *[25,26]. Other epidemiological studies on incinerators have shown an* ***excess risk of cardiovascular diseases*** *[21,23,24,27,28]* ***and urinary diseases*** *[21]."*[2]

The study found that that men with higher exposures to incinerator pollution had statistically significant increases in death from **lymphohematopoietic cancers** (leukemia, non-Hodgkin lymphoma, multiple myeloma, etc.), **cardiovascular diseases**, and "natural causes;" and in women, increased death from **acute respiratory disease**.

A 2013 study of incinerators in Spain is very clear when discussing their findings. The conclusion states: "**Our results support the hypothesis of a statistically significant increase in the risk of dying from cancer in towns near incinerators** and installations for the recovery or disposal of hazardous waste."[3]

An extensive literature review published in 2013 found the research inconclusive for many diseases, with some studies finding significant health impacts, but more studies unable to do so. However, some of the stronger trends that emerged were for **larynx cancer** ("three ecological studies and one cohort study found convincing associations"), **birth defects and reproductive disorders** (including cleft palate, urinary tract defects, spina bifida, and cardiac defects), a **decrease in respiratory function and an increase in respiratory wheezing in children**.[4]

A 2013 study of eight incinerators in Italy found that "maternal exposure to incinerator emissions, even at very low levels, was associated with **preterm delivery**."[5]

A 2011 study, also from Italy, found that women with the highest levels of exposure to heavy metals from incinerator pollution suffered **increased death in general, and specifically from heart disease**. In men, they found increased hospitalization for **chronic heart failure and heart attacks**.[6]

After noting the challenging nature of different health study methods, a 2004 review of incinerator health studies found that, "analysis by specific cause, notwithstanding the poor evidence for each disease, has **found nevertheless significant results for lung cancer, non-Hodgkin lymphoma, soft tissue sarcomas and childhood cancers**."[7]

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[1] Energy Justice Network, Incineration, www.energyjustice.net/incineration

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The ABCs of knowledge about health effects from industrial air pollution:

A→B Incinerators (A) release chemicals (B)

B→C Those chemicals (B) cause health effects (C)

A→C Incinerators (A) cause health effects (C)

Don't let polluters take your common sense away. We know that trash incinerators are among the largest air polluters (A → B), and that the pollutants they release cause a wide range of health problems (B → C). Some health studies can show the connection (A → C), but many cannot due to a range of reasons discussed below.

There are gaps in knowledge in all of the above.

A → B: There is continuous emissions monitoring data on just 3-4 pollutants from incinerators and other industrial facilities. Other pollutants are tested once per year, if at all. We have a basic idea of which pollutants are released and in what quantities. However, this data is underestimated since industry refuses to use modern continuous monitoring technology for most pollutants, and federal and state environmental agencies don't require it. (Some local governments, like Baltimore, now do.[8]) Also, incinerator operators have been caught manipulating their tests to make emissions seem lower.

B → C: We have a good idea of what these pollutants do to human and environmental health. There are thousands of studies on health effects from chemical exposures, but it can never be complete. With hundreds of thousands of chemicals in industrial use and many more created each year, not all chemicals are studied for every possible health impact. Certain chemicals are studied in depth, but most are barely understood.

Historically, many studies are of healthy, adult, white male workers, and don't address racial health disparities, or reflect the impacts of chemicals on more sensitive populations: women, children, the elderly, or people with compromised immune systems or other existing health problems. Combinations of chemical exposures are rarely studied, and sometimes 2+2=5 when people are expose to combinations of chemicals. So-called "safe" and allowable exposure levels are based on one chemical at a time, without looking at sensitive populations or the existing body burden of chemical exposures accumulated over a lifetime.

A → C: It's nearly impossible to design a perfect health study connecting a specific pollution source to specific health problems in a specific population of people.

Why is it hard for a health study to find a connection?

Other sources of pollution: Incinerators are often located next to other industrial source of air pollution, so it's nearly impossible to determine what health effects came from one vs. another, or the combination.

Pollution moves: It depends a lot on wind direction and distance. Some pollutants fall very locally, while others (like dioxins) reach as far as the Arctic. Some of the most toxic pollutants, like dioxins and mercury, climb up the food chain in animal fat. Animal products are shipped all over, so this further dilutes the health impacts as dietary exposure routes are spread far beyond any study area.

People move: Diseases (especially cancer) can take decades to manifest. People move in and out of the community over time. Many also move daily for work, which can change their exposure levels significantly. All of this dilutes the affected population studied.

Can't quantify the dose: We usually don't know how much exposure to pollution each person receives. Studies often use distance, which isn't as good as modeling exposure or taking biological samples for pollutants known to be released.

Given the uncertainties, it's impressive when a study manages to find health impacts, and many have.

A → B → C studies: Some studies use modeling to calculate expected damage to health. They'll take the emissions data, use air modeling to calculate how much of a given chemical will reach people, and then factor in health consequences.

A 2017 study of just one pollutant (particulate matter) from the Wheelabrator Baltimore trash incinerator found that this pollution causes an estimated $55 million in annual damage to health in people across several states, primarily from premature death.[9]

A 2011 study looked at six major pollutants from 17 U.S. industries and found that, more than any other industry, the economic health damage from trash incinerators outweighed the industry's economic benefits.[10] Even oil refineries and fossil fuel power plants were less harmful.

[8] Baltimore Clean Air Act. www.cleanairbmore.org/cleanairact

[9] Written Report of George D. Thurston Regarding the Public Health Impacts of Air Emissions from the Wheelabrator Facility, Nov. 20, 2017. www.cleanairbmore.org/uploads/wheelabrator-health-impacts.pdf

[10] Muller, Nicholas Z., Robert Mendelsohn, and William Nordhaus. 2011. "Environmental Accounting for Pollution in the United States Economy." American Economic Review, 101 (5): 1649-75. www.aeaweb.org/articles?id=10.1257/aer.101.5.1649

How Covanta Misleads

Covanta: "Study after study have shown that living near an Energy from Waste (EfW) facility EfW facility [sic] with modern air pollution control equipment does not have adverse impacts on health."

Fact: Covanta ignores the fact that there are other "studies after studies" that DO show health impacts in communities around trash incinerators. (See page 1.)

It's hard to say, without researching every facility examined in each study, whether each facility has "modern air pollution control equipment," however Covanta defines that. Only one trash incinerator out of 72 in the U.S. uses "modern air pollution control equipment," though, and it's located right next to an old trash incinerator in Florida that does not, so no health study in the U.S. could meet Covanta's criteria.[11]

How does Covanta get away with arguing that the heath studies are on their side?

He who pays the piper calls the tune. The first two of their eight health study citations are to literature reviews. One was conducted by HDR, a large consulting company that does engineering work to build trash incinerators.[12] The other was hired by Metro Vancouver, which runs a trash incinerator and has proposed building several more, amid much controversy. They hired Intrinsik, a consulting company that describes themselves as having "over 30 years of helping our clients achieve their goals."[13] Covanta also cites Columbia University scientists who are with a "tobacco science" outfit that is funded by the incinerator industry to promote incineration.[14] The remaining studies are cherry-picked from a large body of available research.

In the literature reviews they cite, they leave out some of the studies that found health effects, and of the ones that did find health impacts, they either gloss over them while admitting their findings, or they find reason to exclude the results.

The "recent review" cited first by Covanta is a report by HDR claiming to be a literature review of "air quality health risk assessments and health surveillance programs surrounding WTE facilities" which "determined that there was not a predictive or actual increase in health issues…." However, the report itself admits that it "was not a formal systematic review of the literature,"[15] though Covanta describes it as "comprehensive."

Covanta then summarizes Intrinsik's report as saying that incinerators "do not pose unacceptable health risks to local residents." However, the report talked about real risks, including increased birth defects, higher dioxin levels in people's blood, and "non-cancer" risks that were "unacceptable." Other studies in the report found health problems, but at levels deemed "acceptable" by government regulations. Intrinsik outright dismisses a study from Spain which found statistically significant increased cancer deaths in towns around trash incinerators. The study was dismissed because Spain's incinerators were "old" (10-20 years) and the study had no mention of what air pollution controls the incinerators used. Except for a handful of expanded or rebuilt facilities, Covanta's U.S. fleet is now 25-40 years old as of 2020. At the time of the Intrinsik review, they would have been 19-34 years old, making Spain's incinerators seem young by comparison. Also, Intrinsik didn't bother to look up info on the air pollution controls. We did, and found that they all have scrubbers and baghouses, similar to Covanta's fleet.

Covanta's pollution triggers asthma attacks. Covanta's incinerator pollution is a major source of the nitrogen oxides (NOx) that trigger asthma attacks. Covanta is correct that the exact *cause* of asthma is unknown. They use this fact to distract from the fact that they trigger asthma attacks in those who already have asthma. The American Lung Association has written to Washington, DC City Council objecting to a contract to burn waste at the highly polluting Covanta plant in Lorton, VA due to concern over asthma and other respiratory problems.[16]

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[11] "Modern air pollution control equipment" includes Selective Catalytic Reduction (SCR) for reducing emissions of nitrogen oxides (NOx) that trigger asthma attacks, keeping NOx below the modern limit of 45 parts per million (ppm). The only incinerator with this equipment in the U.S. is West Palm Beach #2, in Florida. This new plant started in 2015 and Covanta has taken over operation of this county-owned facility. No other facility in Covanta's fleet uses these modern controls. The best of their other incinerators get their NOx levels down to around 85-90 ppm – twice the modern limit. They do this with Selective Non-Catalytic Reduction (SNCR), which lacks the catalyst needed to reduce NOx much further. Some of their incinerators lack these and other basic controls, including the biggest incinerator in the nation, in Chester, PA, which lacks 2 of the 4 common controls (SCR/SNCR controls for NOx and carbon injection for toxic chemicals like dioxins and mercury). See www.ejnet.org/chester/pollutioncontrol.html for a list of pollution controls at Covanta incinerators. Chester's environmental health has been studied and is very poor. Their childhood asthma hospitalization rate is 3 times the state average, in part due to Covanta's excessive NOx emissions. See www.ejnet.org/chester/asthma.html Covanta is the largest industrial air polluter in Chester and the worst in the 7-county Philadelphia region. See www.energyjustice.net/files/pa/philly/top10.pdf

[12] www.cleanairbmore.org/uploads/NMWDAConsultants.pdf (see p.2)

[13] www.intrinsik.com/about/

[14] www.seas.columbia.edu/earth/wtert/newwtert/sponsors/

[15] www.oregonmetro.gov/sites/default/files/2017/07/06/Metro_WTE_Landfill_HIA_Final_with_appendices_20170706.pdf (see p.184)

[16] See: www.energyjustice.net/files/dc/AmericanLungLetter.pdf

How polluting is the trash incinerator in Montgomery County?

The "Montgomery County Resource Recovery Facility" in Dickerson, Maryland is a county-owned trash incinerator operated by Covanta, the nation's largest trash incineration corporation. It's the #1 industrial air polluter in Montgomery County. On top of their routine air pollution, they've had more uncontrolled waste pile fires requiring an off-site emergency response than any other incinerator in Covanta's 40-plant U.S. fleet, despite being the newest.

The latest available data from EPA's National Emissions Inventory shows that Covanta's Dickerson incinerator released:

Pollutant (in pounds except CO2e)	**2014**	**2017**	**Health Effects**
Global Warming Pollution (in tons of CO_2 equivalents)	611,773	629,162	Extreme weather, disease, crop damage, species extinction
Nitrogen Oxides	853,428	883,419	triggers asthma attacks, chronic respiratory disease and stroke
Hydrochloric Acid	159,184	116,405	irritates eyes, skin, and nose, damages lungs
Sulfur Dioxide	139,809	205,058	triggers asthma attacks; chronic respiratory and heart diseases; stroke
Carbon Monoxide	120,321	77,996	headaches and dizziness; increases lifetime risk of heart disease
Particulate Matter	102,091	58,792	heart attacks, stroke, irregular heartbeat, aggravated asthma, decreased lung function, difficulty breathing
Fine Particulate Matter	98,760	53,393	same as above, but worse, get deep into lungs and into blood stream
Volatile Organic Compounds	4,387	3,864	eye, nose and throat irritation, headaches, loss of coordination and nausea, liver, kidney and central nervous system damage, cancer
Ammonia	3,588	3,633	nose and throat irritation
Formaldehyde	124	120	eyes, skin, and nose irritation; increases lifetime risk of cancer
Beryllium	76	0.2	lung cancer; harms liver, kidneys, heart, nerves and lymphatic system
Lead	58	42	damages nervous system and kidneys, lowers IQ, increases likelihood of antisocial behavior
Mercury	24	17	damage to nervous, digestive, and immune systems, lowers IQ
Hexachlorobenzene	12	11	liver, kidney, and thyroid cancers
Chromium (VI)	4	4	lung cancer, shortness of breath, coughing, and wheezing
Cadmium	2	4	kidney disease; lung cancer
Arsenic	2	3	lung, skin, bladder, and liver cancers; irritation of the skin and mucous membranes and effects in the brain and nervous system

To put the smaller numbers in perspective, mercury is one of the toxic pollutants for which there is no known safe level of exposure. Lead and dioxins also have no "safe" level, and dioxins are the most toxic chemicals known to science, and incinerators are a major source (but good data is lacking). The incinerator reported releasing 24 lbs of mercury into the air in 2014, not counting that which gets into the air and water via the ash. A highly cited Minnesota study found that if approximately one gram of mercury (the amount in a single fever thermometer) is deposited to a 20-acre lake each year from the atmosphere, this small amount, over time, can contaminate the fish in that lake to the point where they should not be eaten.[17] 24 pounds of mercury equals 10,886 grams. That means the incinerator, in a typical year, is releasing enough mercury sufficient to keep nearly 11,000 20-acre lakes so contaminated that the fish are not safe to eat.

But what about buildings and mobile sources? Aren't they a bigger source of pollution to worry about?

Yes, for some pollutants, the fossil fuels burned to heat buildings or move vehicles are the largest share of pollution compared to industry. However, the incinerator is the largest polluter of all industrial sources, and is a big share of the total even when compared to everything (vehicles, buildings, etc.). The incinerator is responsible for 10% of the county's total global warming pollution, 99.5% of the cancer-causing hexachlorobenzene, 95% of the hydrochloric acid, 64% of the chromium (VI), 40% of the mercury, 24% of the cadmium, 16% of the sulfur dioxide, 12% of the lead, 5% of the arsenic, and 3% of the nitrogen oxide pollution in the county.

[17] "One Gram of Mercury Can Contaminate a Twenty Acre Lake: An Clarification of This Commonly Cited Statistic," Summary Prepared by Interstate Mercury Education and Reduction Clearinghouse, 2004. www.newmoa.org/prevention/mercury/mercurylake.pdf