

FACT SHEET: Trash Incineration (“Waste-to-Energy”)

Incineration 101

Municipal solid waste (trash) **incineration is the most expensive and polluting way to manage waste or to make energy.** Only about 10% of U.S. trash in the U.S. is burned. The rest is recycled, composted or landfilled. The number of incinerators operating in the U.S. has crashed from 187 in 1991 to 66 remaining in mid-2023. Despite hundreds of attempts, no new trash incinerators have been built at a new site in the U.S. since 1995, though a handful have expanded.



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, or plastics made from oil. Burning these materials creates a demand for “waste” and discourages 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 – especially the larger ones -- are disproportionately located where people of color live. 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 lower-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. To make the same amount of energy as burning coal, trash incinerators release 28 times as much dioxin air pollution, 27 times as much hydrochloric acid, 6.2 times as much lead, 5.2 times as much mercury, 3.3 times as much nitrogen oxides (NO_x), 2.4 times as much cadmium, and 65% more carbon dioxide (CO₂).

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 H₂O (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, CO₂, SO₂, 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 SO₂ (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 toxic chemicals are formed by burning, and since existing toxics become 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:

- Respiratory, cardiovascular, and urinary diseases.
- Increases in pre-term babies and babies born with spina bifida or heart defects.
- Increased cancers, especially: larynx, lung, colorectal, liver, stomach, renal, bladder, gallbladder, 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 (EIA) 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. Subsequent EIA reports stopped listing trash incinerators because literally no one is building new ones in the U.S.

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). Our national recycling rate sits around 33% and the sector has been estimated to be providing about 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 contracts demanding a certain amount of waste generation, and because incinerators need recyclable materials, like paper, tires, wood and plastics, to be able to burn effectively. State renewable energy policies subsidize incinerators (and landfills that burn their gas for energy) as renewable energy sources, but not recycling and composting. Burning trash, “biomass” and landfill gas crowds out wind power in renewable energy mandates.

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.

Worse than Landfills, even for the Climate

The industry pretends they're a climate solution, even while life cycle assessment studies show that incineration is worse than landfilling for the climate... and far worse when factoring in other environment and human health impacts. Multiple accounting tricks are used to make incineration look preferable on climate. One is that they don't count over half of their CO₂ emissions that they call “biogenic” (coming from burning paper and other organic material) because plants and trees regrow. Yet, the choice of incinerator vs. landfill does nothing to change whether plants and trees regrow. Climate scientists have long debunked the notion of “biogenic carbon neutrality” as a form of double counting with climate models that already assume plants and trees are regrowing. Yes, methane emissions from landfills are a serious issue. However, incinerators immediately pump all of the carbon in waste into the atmosphere, while much of the carbon placed in landfills stays there (especially plastics and wood that don't readily break down). Most landfill gas is captured and burned, converting it back to CO₂, which is 82 times less potent than methane. Landfill methane can also be avoided by composting food scraps and yard waste.

Real Solutions for Energy and Waste

We can meet all of our electricity and heating needs with conservation, efficiency, wind, solar and energy storage.

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 material recovery and biological treatment before landfilling to get out more recyclables, and digest the remaining waste first to reduce volume and water weight, and minimize odors and gas generation at landfills.