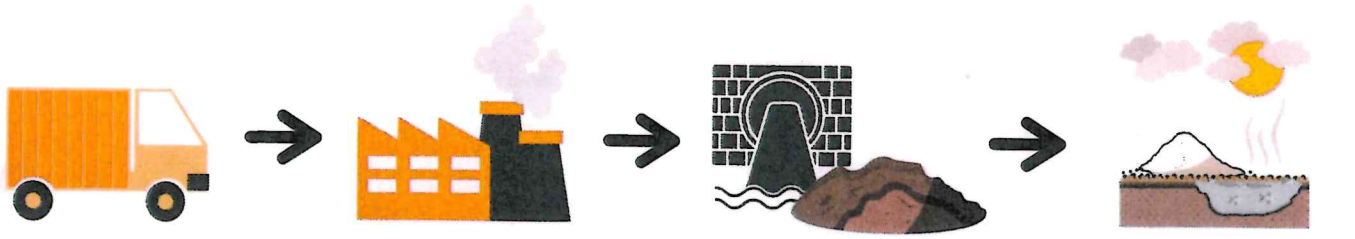
*7/17/24 - From Rebecca Creshkoff & Linda Reik *

POLLUTION AND HEALTH IMPACTS OF WASTE-TO-ENERGY INCINERATION



Emissions from hauling waste to incinerators

Emissions from burning trash in incinerators

Generation of ash and waste water

Residue disposal at landfills

INCINERATION RESULTS IN POLLUTION IN EACH PHASE OF THE PROCESS, FROM WASTE HAULING TO MANAGING AIR EMISSIONS AND RESIDUES

WASTE HAULING Large, heavy-duty diesel sanitation trucks that collect and haul municipal solid waste release harmful substances. Diesel fumes, which **contain up to 40 types of hazardous air pollutants** including nitrogen oxides, particulate matter, carbon monoxide, and volatile organic compounds are carcinogens according to the National Cancer Institute. **Host communities face health burdens and risks associated with chronic exposure to such diesel particulates.**

BURNING TRASH IN INCINERATORS **releases various types of emissions** including lead, mercury, dioxins and furans, particulate matter, carbon monoxide, nitrogen oxides, acidic gases (i.e., SOx, HCl), metals (cadmium, lead, mercury, chromium, arsenic, and beryllium), polychlorinated biphenyls (PCBs), and brominated polyaromatic hydrocarbons (PAHS). Direct exposure to such toxins risks the health of facility workers and residents in nearby communities while indirect exposure, through the food chain, poses global risks.

ASH & RESIDUES While advanced air pollution control equipment removes some of the toxic pollutants from the exhaust, it concentrates them in other byproducts, such as ash and wastewater. Approximately 26 - 40% of waste becomes bottom ash. **The more pollutants an air pollution control system removes, the more toxic its fly ash is.** Incineration also generates new toxic chemicals such as dioxins and furans, which can leach into soil and groundwater and accumulate in food chains.

RESIDUES REQUIRE SPECIAL TREATMENT & SEPARATE DISPOSAL, but they are mostly sent to landfills where the ash can spread via wind and air. Some ash is mixed into concrete, buried in salt mines, mixed into asphalt for roads, or even spread on agricultural lands, mislabeled as soil fertilizer.

Source: The New School Tishman Environment and Design Center (2019). U.S. Solid Waste Incinerators: An Industry in Decline; Center for International Environmental Law (2019). Plastic & Health:The Hidden Costs of Plastic Planet; Tait, P. W. et al. (2019). The health impacts of waste incineration: a systematic review. Australian and New Zealand Journal of Public Health; National Research Council (2000). Waste Incineration and Public Health; Michelle Allsopp, Pat Costner, and Paul Johnston (2001). Incineration and Human Health. Environmental Science and Pollution Research 8.2.

WASTE PRODUCTS OF INCINERATION

Incineration creates another waste management issue, as it produces highly toxic by-products, such as fly ash, bottom ash, and wastewater. Pollutants remaining in the ashes threaten air and water quality and pose health risks for workers and nearby communities, whether they end up in landfills, cement kilns, mines, or agricultural lands. While the ash must be properly treated and disposed in hazardous waste landfills in order to minimize the environmental health impact, many companies attempt to use the toxic ash for road and construction material or food production, reintroducing the toxins in the environment.

BOTTOM ASH

- Bottom ash, also known as "slag", comes from the furnace. It constitutes 75-85% of the total ash generated in an incinerator.
- It is approximately 10% by volume and 20- 35% by weight of the solid waste.
- Mixed bottom ash can carry high levels of dioxins and heavy metals, and the leachability of dioxins and furans also increases when bottom ash is mixed with fly ash.

FLY ASH

- Fly ash is particulate matter in flue gases, which contain hazardous substances such as mercury, dioxins, and furans.
- The toxicity of fly ash is greater than bottom ash because filters and scrubbers capture toxins in the waste and concentrate them in fly ash. Fly ash is also readily windborne and more likely to leach.

OTHER RESIDUES

- Waste incineration also produces other residues, such as boiler ash and wastewater
- Some incinerators produce scrubber salts, filter cake, and sludge depending on the pollution control system.
- The residues may contain dioxins and high levels of other persistent organic pollutants.
- The toxins in the residues are available to leach and travel, especially in contact with rainwater.

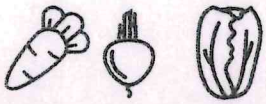
Source:
IPEN Dioxin, PCBs and Waste Working Group (2015). After Incineration: The Toxic Ash problem; The New School Tishman Environment and Design Center (2019). U.S. Solid Waste Incinerators: An Industry in Decline; Center for International Environmental Law (2019). Plastic & Health:The Hidden Costs of Plastic Planet.

ROUTES OF HUMAN EXPOSURE

The pollutants in air emissions, water and residues can enter human body through:

Breathing harmful air

Drinking polluted water



Eating food that was grown in contaminated soil

Eating fish, meat or dairy high in the food chain

STUDIES ON DIRECT HEALTH IMPACTS OF INCINERATION

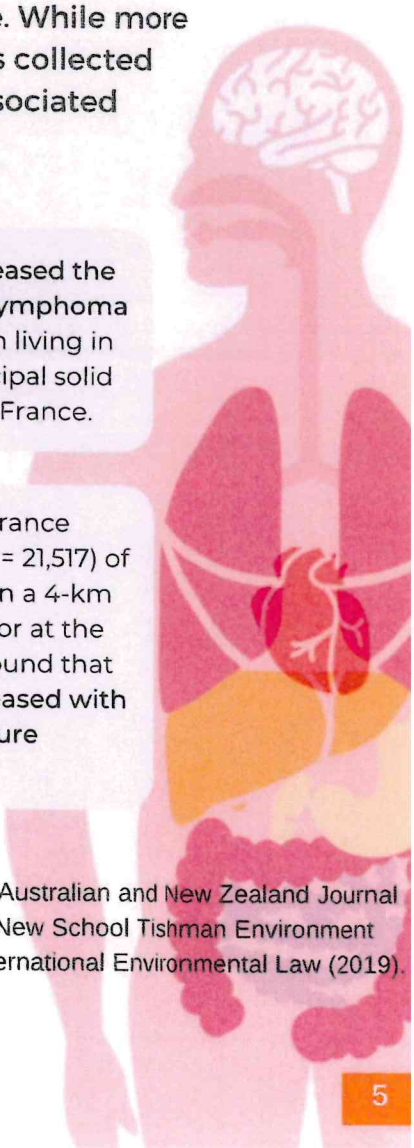
Despite limitations in methodology and data sources, existing epidemiological studies provide sufficient evidence of direct health impacts of incinerators, which range from neoplasia to congenital anomalies, infant deaths and miscarriage. While more research can be done on newer incinerators when enough data is collected over time, the findings of existing studies suggest serious risks associated with incinerators, both for nearby and distant populations.

A study analyzed the occurrence of miscarriages in women aged 15-49 years residing near seven incinerators in Northern Italy (2002-2006), and found that **an increase of PM10 caused by incinerators was associated with an increased risk of miscarriage.**

A 2005 study in Japan found that proximity of schools to municipal waste incineration plants may be associated with **an increased prevalence of wheeze, headache, stomach ache, and fatigue** in school children.

Dioxin emissions **increased the risk of non-Hodgkin's lymphoma** among the population living in the vicinity of a municipal solid waste incinerator in France.

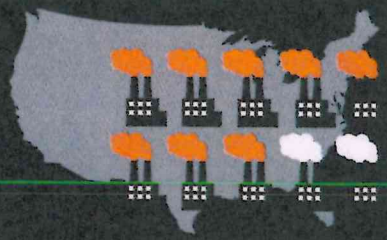
Another study in France considered all births (n = 21,517) of women residing within a 4-km radius of an incinerator at the time of delivery and found that **pre-term delivery increased with increased exposure** (2003-2010).



Source: Tait, P. W. et al. (2019). The health impacts of waste incineration: a systematic review; Australian and New Zealand Journal of Public Health; National Research Council (2000). Waste Incineration and Public Health; The New School Tishman Environment and Design Center (2019). U.S. Solid Waste Incinerators: An Industry in Decline; Center for International Environmental Law (2019). Plastic & Health:The Hidden Costs of Plastic Planet.

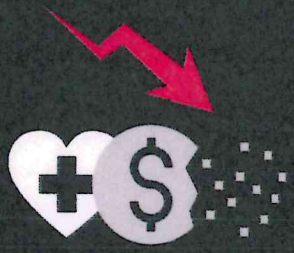
ENVIRONMENTAL JUSTICE COMMUNITIES AT HIGHER RISKS

Incinerators are disproportionately built in low-income and socio-politically marginalized communities, burdening them with air pollution from incinerators, diesel trucks transporting waste, toxic ash, noise pollution, accidents, and much more.

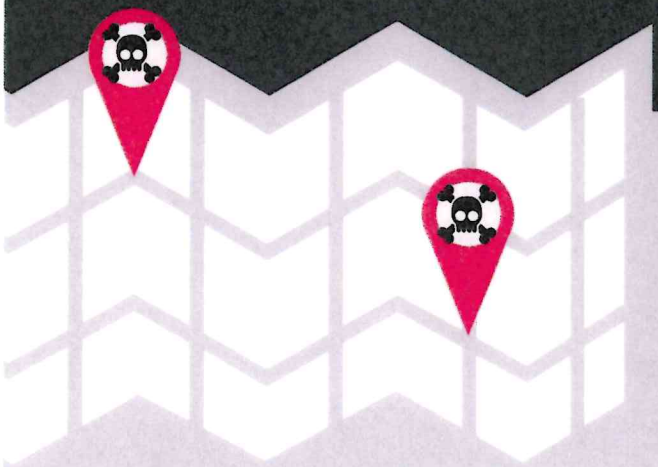


In the U.S., 8 out of every 10 MSW incinerators are located in low-income communities and communities of color.

Residents face adverse environmental health impacts, public debt due to costly construction and maintenance of incinerators, and the stigma of being a dumping ground.



Often, the communities are already overburdened with disproportionate amounts of pollution from a multitude of sources, such as coal power plants and petrochemical plants.



Source: The New School Tishman Environment and Design Center (2019). U.S. Solid Waste Incinerators: An Industry in Decline; See Lara Schwarz, Tarik Benmarhnia & Lucie Laurian (2015). Social Inequalities Related to Hazardous Incinerator Emissions: An Additional Level of Environmental Injustice, 8(6) Envtl. Just; Marco Martuzzi, Francesco Mitis & Francesco Forastiere (2010). Inequalities, inequities, environmental justice in waste management and health (2010), 21(6) The Eur. J. of Pub. Health 21, 21-26; Ana Isabel Baptista & Kumar Kartik Amarnath (2017). Garbage, Power, and Environmental Justice: The Clean Power Plan Rule, 403 Wm. & Mary Envtl. L. & Pol'y Rev. 41.

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