

Waste to energy incinerator (WTE)

Why in news?

A recent investigative report by the New York Times on Delhi's Waste-To-Energy (WTE) incinerators, said that it makes more harm than its benefits.

What is waste to energy incinerator?

- **Waste-to-energy incinerator** - It is a facility to burn municipal solid waste (trash) at high temperatures to generate heat which is then used to produce steam, powering a turbine to generate electricity.
- **Waste type** - Typically handles municipal solid waste (MSW) from household waste and commercial waste, in urban areas.
- **Significance** - It is essentially a system that converts waste into usable energy through the process of incineration.
- **Generates electricity** from the solid waste
- **Avoids landfilling** in large cities
- **Recover valuable resources** such as metals that can be sent for recycling and kept in the economy.
- **Steps involved in this process**

Waste to Energy Plant Diagram

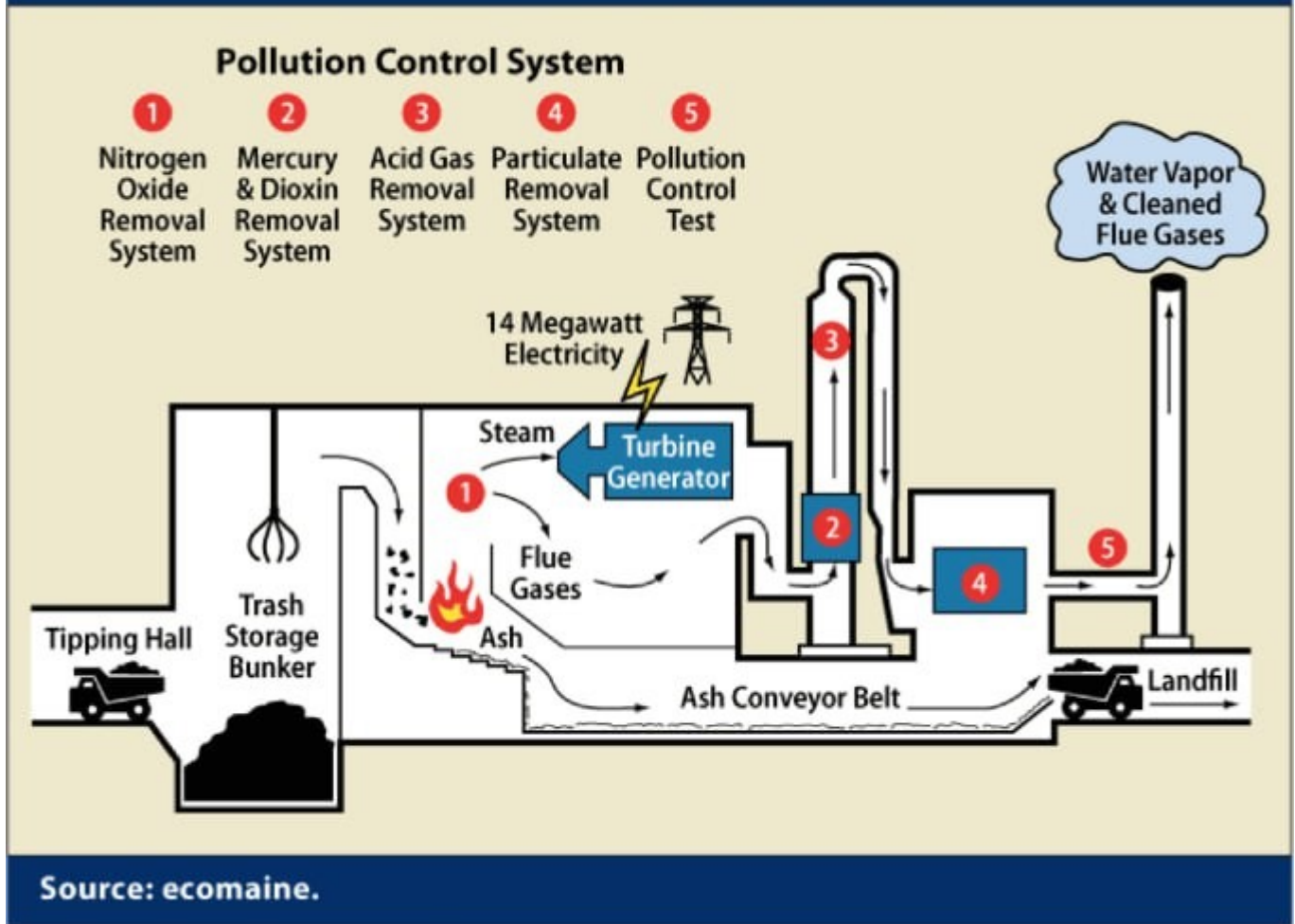


Figure 1 typical WTE diagram






Status of waste to energy incineration plants in India

- A total of 14 waste-to-energy plants have been installed in India, out of which seven plants were closed.
- These plants processing approximately 11,000 tons of municipal solid waste (MSW) per day, with a cumulative installed capacity of 132.1 MW.
- Delhi's first WTE incinerator, commissioned in 2010 in Okhla, was designed to process 2000 tons of garbage daily.
- Recently Tamil Nadu government proposed to build waste to energy incineration plants to dispose the landfills in Chennai.

What are the issues in WTE Incinerators?

- **Lack of proper disposal mechanism** - Improper disposal and illegal dumping of ashes produced in the process.
- While this process does generate electricity, it also produces two types of ash,
 - **Bottom ash** - Comprising about *20-30% of the original waste* volume that remains as sediments after combustion.
 - **Fly ash** - Captured by air pollution control devices, is more problematic due to its concentration of toxic substances in air form.

- **Failure to sort waste** - Hazardous materials like batteries and e-waste are burned without proper segregation, increasing toxic emissions.
- **Release of toxic gases** - WTE incinerators release toxic gases due to burning unsegregated waste, low calorific value and high moisture content wastes.

	ABOVE E.P.A. GUIDELINE	IMPACT
 48 Cd CADMIUM	19x higher	Prolonged exposure can produce toxic effects to the skeletal system and cause kidney, lung and bone disease.
 25 Mn MANGANESE	11x higher	Can lead to manganism, a rare form of Parkinson's disease, and affect the reproductive system, causing maternal and fetal complications.
 33 As ARSENIC	10x higher	Can cause respiratory, vascular and cardiovascular diseases, neurological problems and diabetes.
 82 Pb LEAD	4x higher	Can affect the nervous, reproductive, cardiovascular and immune systems. Children can suffer brain development disorders and lifelong impairments like a lowered I.Q.
 27 Co COBALT	3x higher	Can cause cancer and skin, heart, lung and eye problems.

- **Economic viability** - Dependence on carbon credit markets for financing needs will disrupts the project when there is a fall of carbon markets.
- **Lack of monitoring and enforcement** - Despite rules that prohibit the ash from being dumped in residential areas, open-bed trucks with incinerated trash spread to neighborhoods.
- **Public discontent** - Protests and lawsuits due to growing health concerns from local communities.

What are the impacts?

- **Environmental impacts**
 - **Air pollution** - Toxic pollutants like dioxins, heavy metals, and particulate matter, from the smoke billowing and the ashes dumped near homes worsen the air quality.
 - **Ground water Contamination** - Due to the dumping of ashes in open area the groundwater is contaminated.
 - **Carbon emissions** - Incineration of mixed waste produces toxic particles, including carbon monoxide, nitrogen oxides, and Sulphur dioxide due to inefficient burning.
 - High levels of CO₂ and other greenhouse gases negate the "**green**" claims of WTE plants.
- **Health impacts**

- **Respiratory diseases** - The lead and arsenic-laced smoke and ash which contains as many as *eight times the permissible levels* of heavy metals such as cadmium.
 - Inhalation of pollutants leads to *asthma, bronchitis, and other lung ailments*.
- **Neurological and cardiovascular risks** - Long-term exposure linked to nervous system disorders and heart diseases.
- **Impact on vulnerable groups** - The chemicals and heavy metals in the air and soil can cause *birth defects, cancer* and other life-threatening conditions in children and old ages.
- **Risk in pregnancy** - Persistent organic pollutants like *Dioxins and Furans* released during combustion interfere with hormone regulation and fetal development.
 - In Delhi the area around the plant sees the rise in miscarriages, lesions on their skin.

What lies ahead?

- Strict enforcement of guidelines and rules in handling ashes and air filtration system.
- Adopt safer technologies and invest in waste segregation are crucial for a sustainable solution.
- Decentralized waste management in households and by local communities for sustainable waste management.
- Balanced approach to align energy needs with ecological integrity is essential for India's future.
- Promotion of Co-processing of waste at cement plants as an effective waste management solution.

Reference

1. [New York Times | Green' Revolution Poisoning India's Capital](#)
2. [The Hindu |Waste-To-Energy Incineration Is Disastrous to Health](#)