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**

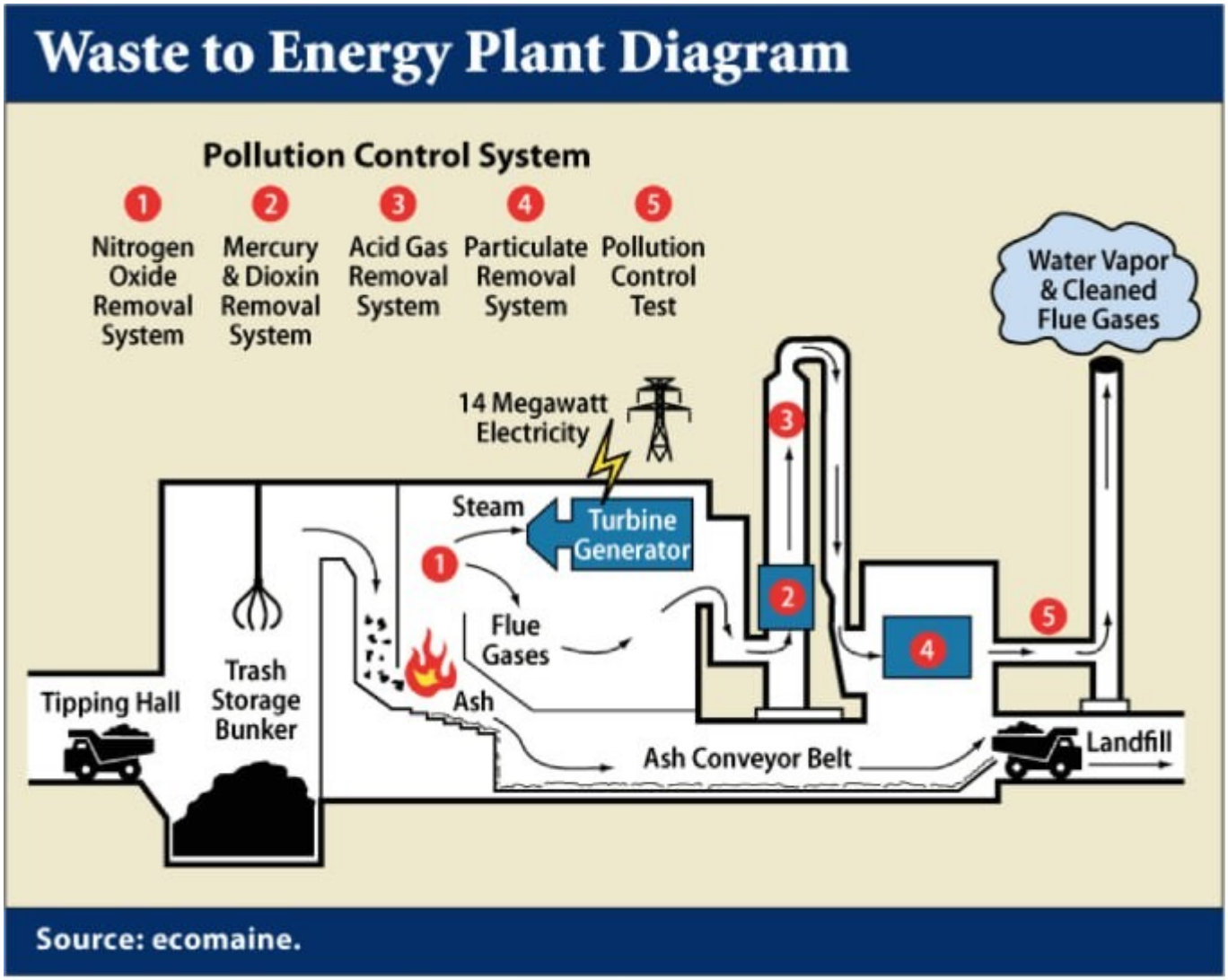


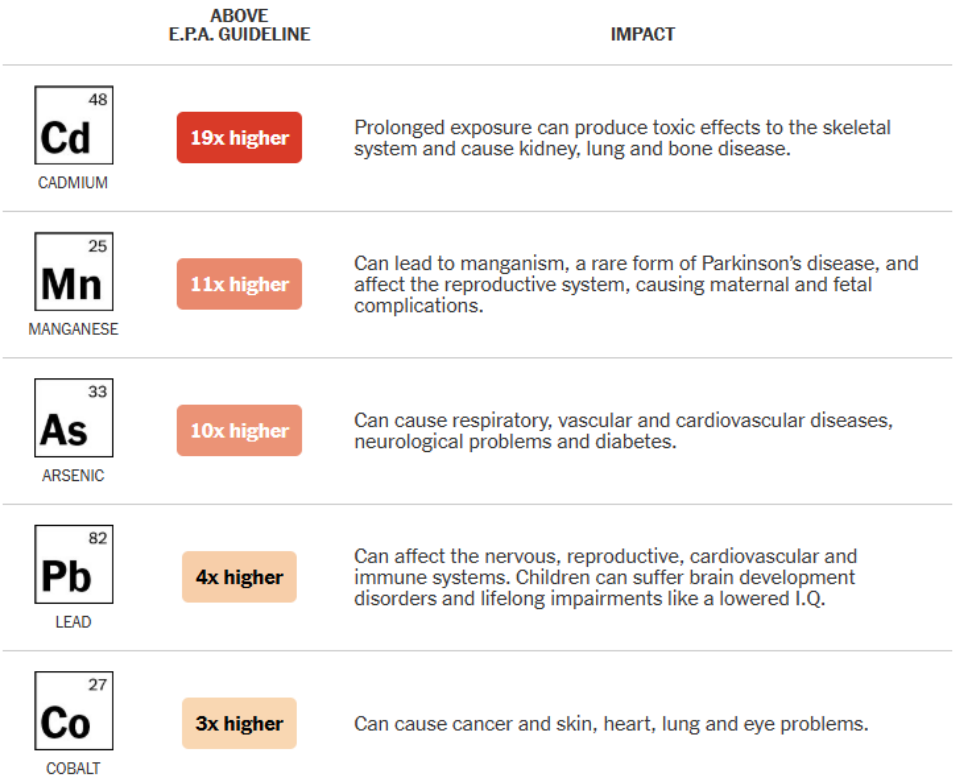
Figure 1 typical WTE diagram

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.



- **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 CO_2 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