

Incineration

Burning solid waste (the Incineration") has been a common means of disposal throughout history. IN early nine-tees incineration had become one of the most common methods of waste disposal in industrial countries worldwide.

Despite their history, the use of incinerators today is a controversial issue in many countries. Many are afraid of the potential health effects that may result from improperly regulated facilities.

On the one side, incinerators reduce the volume of waste by more than 90%, a significant reduction of waste that would otherwise go into a landfill.

Incineration at high temperatures also destroys many of the toxics and pathogens in medical and other hazardous wastes, in addition to reducing the volume, however on the other side, incinerators represent a special environmental threat, because the combustion process releases and combines toxic materials in household and medical waste into super-toxic air emissions and tons of super-toxic ash.

Most of the modern incinerators in current operation are waste-to-energy facilities, which use the combustion process to generate steam and electricity, however on the other side incineration is also a wasteful technology, as it destroys a huge source of reusable and recyclable materials.

Incineration based waste-to-energy facilities reduce the amount of waste going to landfills and the need to use expensive fossil fuels.

Resistance to incinerators in many countries, however, is focusing on potentially hazardous emissions, such as dioxins and furans, which can be produced by the incomplete combustion of compounds containing chlorine, such as polyvinyl chloride (PVC).

Estimations show that more than 80% of the dioxin produced is from municipal and medical waste incinerator air emissions. Tons of mercury, lead, and other heavy metals are emitted in vapor form as well from incinerator stacks.

The incinerator industry has known all these facts for years. Analyses of dioxin and other emissions from municipal waste incineration, overall efficiency of incineration as compared with comprehensive recycling, and the toxicity of ash were published early in the development of "modern" incinerators.

In order to prevent toxic emissions such as metals, inorganic acid gases and particulate matter, incineration systems have to be equipped with after-burners and air pollution control devices, like scrubbers, filtration units, membranes and electromagnetic precipitators.

The choice of an incinerator depends on the wastes' combustibility and its characterization as liquid, sludge, solid or gaseous. The wastes' combustibility characteristics (ignition temperature, flash point, flammability limits) determine the required operating temperature, oxygen concentration and residence time.

The types of incinerators are presently in common use worldwide:-

- Rotary Klin with rotating waste in cylindrical containers (850-1,650°C).
- Fluidized Bed with combustion vessel with inert granular material (750-1,000°C).
- Liquid Injection using atomized waste (650-1,650°C).
- Multiple Hearth for sewage sludge combustion (750-1,000°C).
- Catalytic Combustion using catalysts is suitable for low-organic concentration (gaseous) wastes.
- Waste Flare suitable for high-organic, non-hazardous (gaseous) waste.
- Direct Flame incinerators are used when waste gas contains solid particles.

Rotary Klin, Fluidized Bed and Liquid incinerators are most prevalent in the waste incineration industry because of their applicability to large scale and their versatility.

Incineration Technology Pros and Cons:

Pros:-

- Waste Volume Reduction
- Partial Destruction of Combustible Toxins
- Destruction of Pathogenically Contaminated Material
- Ability to Reclaim Metals (aluminium)
- Usefulness of the Residue (road building)
- Energy Recovery (heat, electric power)

Cons:-

- Air Pollution Problems
- Ash must be Landfilled
- High Capital & Operation Costs

- Waste Water Problems
- Recyclable Materials Destroyed in Incinerator

Summary

Two following aspects have to be compared before taking final decision on waste disposal.

- Incineration technology investment & operation costs.
- Available space for landfill sites, landfills operation costs and the storage capacity.

It is obvious that the best solution for many areas would be a reasonable combination of recycling (separation of recyclable materials from the waste), incineration and landfill (non-usable incineration residue).