

Module-4: Solid Waste Management

Solid Waste Management may be defined as the discipline associated with the control of generation, collection, storage, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations.

1. Municipal solid waste(MSW)

The municipal solid waste consists of everyday items we use and then throw away, such as packaging, grass clippings, bottles, furniture, clothing, food scraps, newspapers, appliances, paint, and batteries. These come from our homes, businesses, schools, and hospitals.

2. E-waste

E-waste is any electrical or electronic equipment that's been discarded. E-waste is particularly dangerous due to toxic chemicals that naturally leach from the metals inside when buried. Most electronics contain some form of toxic materials, including beryllium, cadmium, mercury, and lead, which pose serious environmental risks to our soil, water, air, and wildlife.

When E-waste gets buried at a landfill, it can dissolve in microscopic traces into the gross sludge that permeates at the landfill. Eventually, these traces of toxic materials pool into the ground below the landfill. This is known as leaching.

The more E-waste and metals at the landfill, the more of these trace toxic materials show up in the groundwater.

3. Bio-medical waste

Biomedical wastes are wastes generated from biological and medical sources such as the diagnosis, prevention, or treatment of diseases. Common generators of biomedical waste include hospitals, health clinics, nursing homes, emergency medical services, medical research laboratories, offices of physicians, dentists, veterinarians, home health care etc.

Biomedical wastes may contain infectious materials such as discarded blood, unwanted microbiological cultures and stocks, identifiable body parts (including those as a result of amputation), other human or animal tissue, used bandages and dressings, discarded gloves, other medical supplies that may have been in contact with blood and body fluids, and laboratory waste that exhibits the characteristics described above. Waste sharps such as needles, scalpels, lancets and other devices capable of penetrating skin are also considered as biomedical wastes.

4. Metallic and Non-metallic wastes

Metallic waste is formed in large quantities upon machining various devices and alloys. The chemical composition of metallic waste comprises mainly aluminium, magnesium, iron (steel) tungsten etc.

Non-metallic wastes include plastics, rubbers, fibers, lubricants etc from industries and other sources.

5. Collection & Disposal of municipal solid wastes

Littering of municipal solid waste shall be prohibited in cities, towns and in urban areas notified by the State Governments. To prohibit littering and facilitate compliance, the following steps shall be taken by the municipal authority, namely

- Organizing house-to-house collection of municipal solid wastes.
- Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas.
- Wastes from slaughter houses, meat and fish markets, fruits and vegetable markets, which are biodegradable in nature, shall be managed to make use of such wastes.
- Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose.
- Collected waste from residential and other areas shall be transferred to community bin vehicles.
- Construction or demolition wastes or debris shall be separately collected and disposed off following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws.
- Waste (garbage, dry leaves) shall not be burnt.
- Stray animals shall not be allowed to move around waste storage facilities or at any other place in the city or town.

3R's

The principle of reducing waste, reusing and recycling resources and products is often called the "3Rs." Reducing means choosing to use things with care to reduce the amount of waste generated. Reusing involves the repeated use of items or parts of items which still have usable aspects. Recycling means the use of waste itself as resources. Waste minimization can be achieved in an efficient way by focusing primarily on the first of the 3Rs, "reduce," followed by "reuse" and then "recycle."

Energy recovery

Energy recovery from waste is the conversion of non-recyclable waste materials into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolyzation, anaerobic digestion and landfill gas recovery. This process is often called waste to energy.

Sanitary landfill

This is a method of controlled disposal of municipal solid waste on land. The method was introduced in England in 1912 (where it is called controlled tipping). Waste is deposited in thin layers (up to 1 metre, or 3 feet) and promptly compacted by heavy machinery (e.g., bulldozers); several layers are placed and compacted on top of each other to form a refuse cell (up to 3 metres, or 10 feet, thick). At the end of each day the compacted refuse cell is covered with a layer of compacted soil to prevent odours and windblown debris. All modern landfill sites are carefully selected and prepared (e.g., sealed with impermeable synthetic bottom liners) to prevent pollution of groundwater or other environmental problems. When the landfill is

completed, it is capped with a layer of clay or a synthetic liner in order to prevent water from entering. A final topsoil cover is placed, compacted, and graded, and various forms of vegetation may be planted in order to reclaim otherwise useless land.

6. Collection & Disposal of hazardous wastes

Hazardous waste is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Hazardous waste is generated from many sources, ranging from industrial manufacturing process wastes to batteries and may come in many forms, including liquids, solids gases, and sludges.

Hazardous waste can be treated by chemical, thermal, biological, and physical methods. Chemical methods include ion exchange, precipitation, oxidation and reduction, and neutralization. Among thermal methods is high-temperature incineration, which not only can detoxify certain organic wastes but also can destroy them. Biological treatment of certain organic wastes, such as those from the petroleum industry, is also an option. One method used to treat hazardous waste biologically is called landfarming. In this technique the waste is carefully mixed with surface soil on a suitable tract of land. Microbes that can metabolize the waste may be added, along with nutrients. In some cases a genetically engineered species of bacteria is used.

7. Carbon credit

A carbon credit is a permit that allows the owner to emit a certain amount of carbon dioxide or other greenhouse gases. One credit permits the emission of one ton of carbon dioxide or the equivalent in other greenhouse gases. Companies that pollute are awarded credits that allow them to continue to pollute up to a certain limit. That limit is reduced periodically. Meanwhile, the company may sell any unneeded credits to another company that needs them.

Private companies are thus doubly incentivized to reduce greenhouse emissions. First, they must spend money on extra credits if their emissions exceed the cap. Second, they can make money by reducing their emissions and selling their excess allowances.

8. Carbon footprint

A carbon footprint is the total amount of greenhouse gas emissions that come from the production, use and end-of-life of a product or service. It includes carbon dioxide - the gas most commonly emitted by humans - and others, including methane, nitrous oxide, and fluorinated gases, which trap heat in the atmosphere, causing global warming. Usually, the bulk of an individual's carbon footprint comes from transportation, housing, energy and food.

Emissions from India rank third in the global list, accounting for 2.46 billion metric tonnes of carbon or 6.8% of the total global emissions. India's per capita carbon emissions are, however, still low at 1.84 tonnes compared to the United States' 16.21 tonnes.

World is now trying for net zero emission or carbon neutrality. Net-zero or carbon-neutrality, does not mean that a country would bring down its emissions to zero. Instead, it is a state in which a country's emissions are compensated by absorption and removal of greenhouse gases from the atmosphere.

9. Environmental management in the fabrication industry

Environmental management can be considered all of the practices, policies, and procedures that our facility undertakes in order to comply with government legislations for environment. Generally speaking, this means monitoring and controlling the release of chemicals and other by-products to the local air, water, or waste streams.

10. ISO 14000

ISO 14000 is a set of standards created to help companies around the world reduce their adverse impact on the environment. Organizations that adopt ISO 14000 may obtain certification that proves their compliance with environmentally friendly practices.

Benefits of ISO 14000

Obtaining ISO 14000 certification can be considered a sign of a commitment to the environment, which can be used as a marketing tool for companies. It may also help companies meet environmental regulations that are imposed by governments in which they do business.

ISO 14000 certification can open the doors to new business. Some companies prefer to use suppliers that are ISO 14000–certified suppliers. Their customers may also pay more for products that are environmentally friendly.