

WASTE MANAGEMENT

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WHAT IS WASTE?

- **Waste** (or **wastes**) are unwanted or unusable materials. Waste is any substance which is discarded after primary use, or is worthless, defective and of no use.
- A by-product by contrast is a joint product of relatively minor economic value. A waste product may become a by-product, joint product or resource through an invention that raises a waste product's value above zero.
- Examples include municipal solid waste (household trash/refuse), hazardous waste, wastewater (such as sewage, which contains bodily wastes (feces and urine) and surface runoff), radioactive waste, and others.

SOURCES OF WASTE

- ❖ **Sources of waste can be broadly classified into four types: Industrial, Commercial, Domestic, and Agricultural.**
- **Industrial Waste:** These are the wastes created in factories and industries. Most industries dump their wastes in rivers and seas which cause a lot of pollution. **Example:** plastic, glass, etc.
- **Commercial Waste:** These wastes are produced in schools, colleges, shops, and offices. **Example:** plastic, paper, etc.
- **Domestic Waste:** The different household wastes which are collected during household activities like cooking, cleaning, etc. are known as domestic wastes. **Example:** leaves, vegetable peels, excreta, etc.
- **Agricultural Waste:** Various wastes produced in the agricultural field are known as agricultural wastes. **Example:** cattle waste, weed, husk, etc.

TYPES OF WASTE

❖ 5 TYPES OF WASTE

❑ **Liquid waste:** It refers to all grease, oil, sludges, wash water, waste detergents and dirty water that have been thrown away. They are hazardous and poisonous to our environment and are found in industries as well as households. Wastewater, as it is often called, is any waste that exists in liquid form.

○ **How is liquid waste removed?**

The three methods we can remove liquid wastes from wherever they're located include;

- **Containment:** This involves storing liquid waste in barrels or tanks so that they can be removed from our surroundings. Containing liquid waste prevents it from being dumped in our environment.
- **Treatment:** All liquid wastes do not need to be thrown away. You can treat and reuse them. For example, organic waste is composted and used to produce fertilizers in various stations in the UK.
- **Disposal:** If no treatment can be done on liquid waste, then it should be disposed of.

TYPES OF WASTE

- ❑ **Solid waste:** Solid waste is any garbage, sludge, and refuse found in industrial and commercial locations. The five major types of solid rubbish are;
 - **Glass and Ceramics:** Numerous companies readily recycle ceramics and glass. The catch here is that you have to dispose of them correctly.
 - **Plastic waste:** Plastic waste is any container, jar, bottle, and bag that is found in companies and houses. Plastics are non-biodegradable, and most of them cannot be recycled. Do not mix plastic rubbish with regular waste. Instead, sort them out before throwing them away.
 - **Paper rubbish:** This refers to all newspapers, packaging materials, cardboards, and other paper products. Paper is recyclable.
 - **Metals and Tins:** You can easily find tins and metals in homes because food containers and household materials are made from them. Most metals are recyclable, so take them to a scrap yard or recycling depot after use.

TYPES OF WASTE

- ❑ **Organic Waste:** It refers to rotten meat, garden and food waste. This type of rubbish is commonly found in homes. With time, they decompose and turn into manure by the action of microorganisms on them. But be careful; you should not dispose of them anywhere you like.
 - When decomposing, organic waste produces methane, so, it must not be thrown away with regular waste. Instead, get a green bin and dispose of this type of waste properly.
- ❑ **Recyclable Waste:** All discarded items like metals, furniture, organic waste that can be recycled fall under this category. Not all items are recyclable, so you have to be careful when putting things into the recycle bin. If you are not sure whether an item is recyclable or not, then check the item's packaging.

TYPES OF WASTE

The four ways of disposing of hazardous waste are



Recycling



Incineration and
Destruction



Pyrolysis



Disposing in a
landfill

- **Hazardous Waste:** It includes flammable, corrosive, toxic and reactive materials. In a nutshell, they are wastes that pose a significant or potential threat to our environment.
- **The four ways of disposing of hazardous waste are;**
 - **Recycling:** A few hazardous wastes can be recycled to form other products. For example, circuit boards and lead-acid batteries can bind to other pollutants and later used as pavement fillings. Chemical levels are reduced when hazardous wastes are converted to new products.
 - **Incineration and Destruction:** Another way of disposing of hazardous waste is to destroy or incinerate them. Incineration reduces the amount of hazardous waste and can also generate energy for use in the process.
 - **Pyrolysis:** Pyrolysis, in a very high-temperature arc under inert conditions, is an excellent way to dispose of hazardous waste. This process is used to avoid the dangers of combustion and is preferable when dealing with PCBs, organic waste and pesticides.
 - **Disposing in a landfill:** A landfill is a disposal facility where rubbish is placed in. Land treatment facilities are not landfills.

WASTE MANAGEMENT

- ❖ **Waste management** (or **waste disposal**) includes the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.
- The term ‘**Waste Management**’ collectively means the management of waste from its inception to the final stage of disposal. Thus, as one single unit, it encompasses right from the collection, disposal, recycling, to which the processes of monitoring and regulation, respectively belong to, along with the legal frameworks that enable the occurrence of waste management.
- *“**Waste management** or **waste disposal** are all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling.”*

WASTE MANAGEMENT

- Waste can be solid, liquid, or gas and each type has different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological and household. In some cases, waste can pose a threat to human health. Waste is produced by human activity, for example, the extraction and processing of raw materials. Waste management is intended to reduce adverse effects of waste on human health, the environment or aesthetics
- Waste management practices are not uniform among countries (developed and developing nations); regions (urban and rural areas), and residential and industrial sectors can all take different approaches

PRINCIPLES OF WASTE MANAGEMENT



- ❖ **Waste hierarchy:** refers to the "3 Rs" Reduce, Reuse and Recycle, which classifies waste management strategies according to their desirability in terms of waste minimisation. It is represented as a pyramid because the basic premise is that policies should promote measures to prevent the generation of waste. The next step or preferred action is to seek alternative uses for the waste that has been generated i.e. by re-use. The next is recycling which includes composting. Following this step is material recovery and waste-to-energy. The final action is disposal, in landfills or through incineration without energy recovery. This last step is the final resort for waste which has not been prevented, diverted or recovered. The waste hierarchy represents the progression of a product or material through the sequential stages of the pyramid of waste management. The hierarchy represents the latter parts of the life-cycle for each product.
- ❖ **Life-cycle of a product:** The life-cycle begins with design, then proceeds through manufacture, distribution, and primary use and then follows through the waste hierarchy's stages of reduce, reuse and recycle. Each stage in the life-cycle offers opportunities for policy intervention, to rethink the need for the product, to redesign to minimize waste potential, to extend its use. Product life-cycle analysis is a way to optimize the use of the world's limited resources by avoiding the unnecessary generation of waste

PRINCIPLES OF WASTE MANAGEMENT



❖ **Resource efficiency:**

Resource efficiency reflects the understanding that global economic growth and development can not be sustained at current production and consumption patterns. Globally, humanity extracts more resources to produce goods than the planet can replenish. Resource efficiency is the reduction of the environmental impact from the production and consumption of these goods, from final raw material extraction to the last use and disposal.

❖ **Polluter-pays principle:**

The polluter-pays principle mandates that the polluting party pays for the impact on the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the unrecoverable material.

WASTE SEGREGATION



- This is the separation of wet waste and dry waste. The purpose is to recycle dry waste easily and to use wet waste as compost. When segregating waste, the amount of waste that gets landfilled reduces considerably, resulting in lower levels of air and water pollution. It is important to remember that waste segregation should be based on the type of waste and the most appropriate treatment and disposal. This also makes it easier to apply different processes to the waste, like composting, recycling and incineration. It is important to practice waste management and segregation as a community. The process of waste segregation should be explained to the community.
- Segregated waste is also often cheaper to dispose of because it does not require as much manual sorting as mixed waste. There are a number of important reasons why waste segregation is important such as legal obligations, cost savings and protection of human health and the environment
- Recommended colour coding of containers
 - ✓ Yellow- for infectious waste
 - ✓ Brown- for chemical and pharmaceutical waste
 - ✓ Black- for general waste

DISPOSAL METHODS

- ❖ **Landfill:** A landfill is a site for the disposal of waste materials by burial. Landfill is the oldest form of waste treatment, although the burial of the waste is modern; historically, refuse was simply left in piles or thrown into pits. Landfills must be open and available to users every day. While the majority of its customers are municipalities, commercial and construction companies, residents are also allowed to use the landfill in most cases.



- ❖ **Incineration:** Incineration is a disposal method in which solid organic wastes are subjected to combustion so as to convert them into residue and gaseous products. This method is useful for disposal of both municipal solid waste and solid residue from waste water treatment. This process reduces the volumes of solid waste by 80 to 95 percent.
- Incineration is carried out both on a small scale by individuals and on a large scale by industry. It is used to dispose of solid, liquid and gaseous waste. It is recognized as a practical method of disposing of certain hazardous waste materials (such as biological medical waste). Incineration is a controversial method of waste disposal, due to issues such as emission of gaseous pollutants.



DISPOSAL METHODS



- ❖ **Recycling:** is a resource recovery practice that refers to the collection and reuse of waste materials such as empty beverage containers. This process involves breaking down and reusing materials that would otherwise be gotten rid of as trash.
- The materials from which the items are made can be made into new products. Materials for recycling may be collected separately from general waste using dedicated bins and collection vehicles, a procedure called kerbside collection.
- ❖ **Recovery:** Recoverable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes.

DISPOSAL METHODS

- ❖ **Plasma gasification:** is an extreme thermal process using plasma which converts organic matter into a syngas (synthesis gas) which is primarily made up of hydrogen and carbon monoxide.
- A plasma torch powered by an electric arc is used to ionize gas and catalyze organic matter into syngas, with slag remaining as a byproduct. It is used commercially as a form of waste treatment and has been tested for the gasification of refuse-derived fuel, biomass, industrial waste, hazardous waste, and solid hydrocarbons, such as coal, oil sands, petcoke and oil shale.



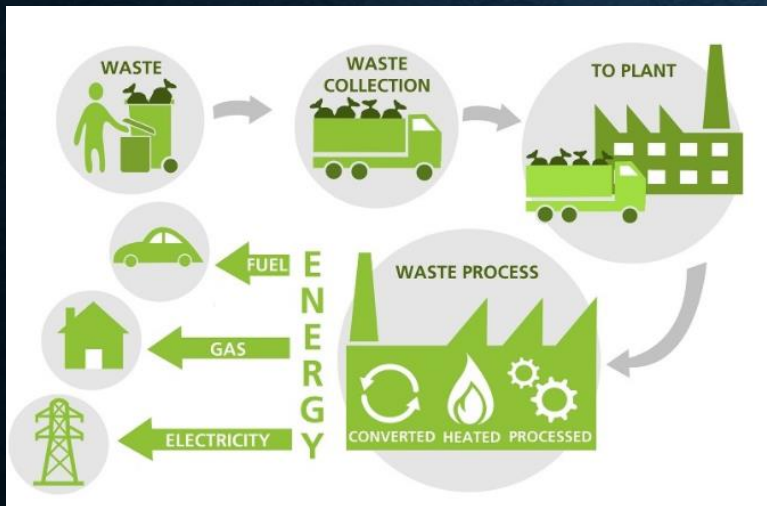
- ❖ **Composting:** Compost is organic matter that has been decomposed in a process called composting. This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner (the *compost*).
- Compost is rich in nutrients. It is used, for example in gardens, landscaping, horticulture, urban agriculture and organic farming. The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil. Compost is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover.

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Composting
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DISPOSAL METHODS

- ❖ **Waste-to-energy (WtE):** is the process of generating energy in the form of electricity and/or heat from the primary treatment of waste, or the processing of waste into a fuel source. WtE is a form of energy recovery.
- Most WtE processes generate electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol, or synthetic fuels.



- ❖ **Waste Minimisation:** Waste minimisation is a set of processes and practices intended to reduce the amount of waste produced. By reducing or eliminating the generation of harmful and persistent wastes, waste minimisation supports efforts to promote a more sustainable society.
- Waste Minimization is a waste management approach that focuses on reducing the amount and toxicity of hazardous waste generated. In addition to hazardous wastes regulated under The Resource Conservation and Recovery (RCRA), EPA encourages the minimization of all wastes.

WASTE MINIMIZATION TECHNIQUES



WHY IS WASTE MANAGEMENT IMPORTANT?

- *Its Protects the environment*
- *Recycling helps you to get money*
- *Reduces all types of waste*
- *Saves the earth and conserves energy*



Advantages and Disadvantages of Waste Management		
S.no	Advantages	Disadvantages
1	Practice is highly lucrative	Process is not always cost-effective
2	Keeps the environment clean and fresh	The resultant product has a short life
3	Saves the Earth and conserves energy	Needs More Global Buy-In
4	Reduces environmental pollution	The sites are often dangerous
5	Waste management will help you earn money	Practices are not done uniformly
6	Creates employment	Waste management can cause more problems

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