Waste Management Strategies

The actions to reduce the output of solid waste generally fall into 3 broad categories;

1) **Output Approach**

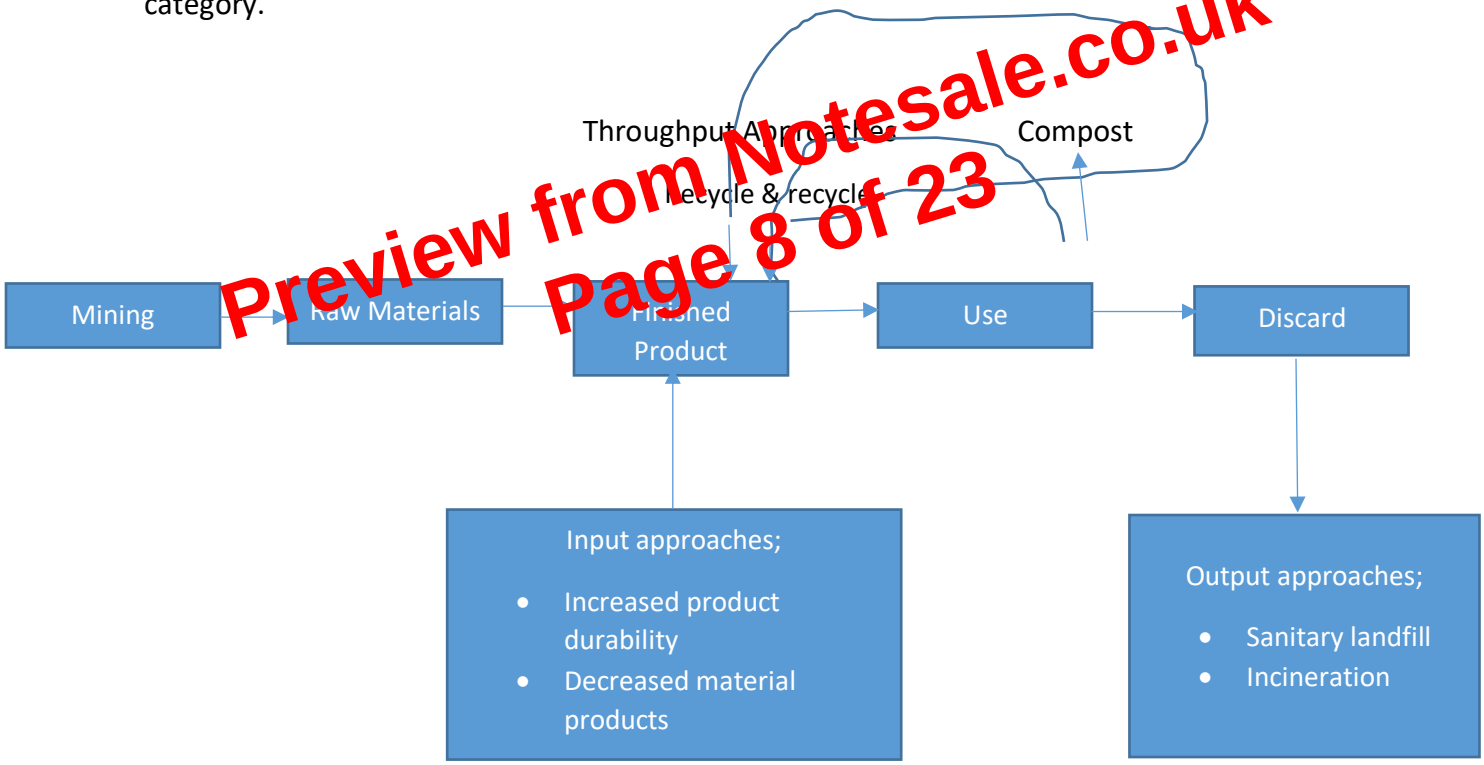
This is the traditional response to solid waste and consists of ways to deal with trash flowing out of towns and cities. It involves incinerating trash or dumping in landfills.

2) **Input Approach**

This is a more sustainable strategy and consists of activities that reduce the amount of materials entering the production-consumption cycle. For example, efforts to reduce consumption and waste by increasing product durability.

3) **Throughput Approach**

This consists of ways to direct materials back into the production-consumption system, creating a closed loop (cyclic) system like those found in nature. Reuse and recycling fall under this category.



LECTURE 4; 16TH OCT 2018

Site Selection for Landfills

The ideal site for landfills should be:

- Hydraulically acceptable pausing no potential threat to water quality when used for waste disposal.
- Situated so as to give minimum length of haul for the vehicles that bring waste to the site. The location of a landfill, to minimize the distance, from the waste collection area is important, particularly if the operator does not collect the waste.
- Free from running or static water.
- Situated at a distance of more than 200 meters from any dwelling. This is based on operational and aesthetic requirements.
- Having good access from highway systems and not interfering with existing traffic patterns. Large waste haulage vehicles (particularly liquid waste) require reasonably good roads.
- Having electrical, water and sewage facilities nearby. This is good for staff welfare and maintenance.
- Having a sufficient store for materials suitable for covering each individual layer of waste.
- Having an estimated life long enough to justify weigh-bridge facilities.

Note: In practice, most sites cannot meet all these criteria. Each potential site is therefore to be evaluated, and the cost calculated for engineering the site to make it comply.

Landfill Operations

During landfill operations, the waste collection vehicles are weighed at a weigh-bridge on arrival and their load is inspected for waste that do not accord with the landfill's waste acceptance criteria. The waste collection vehicles then use the existing road network on their way to the tipping phase or working front where they unload their contents. The compactors or bulldozers are used to spread and compact the waste on the working phase. Before leaving the landfill boundaries, the waste collection vehicles pass through a wheel-cleaning facility. If necessary, they return to the weigh-bridge in order to be weighed without their load. Through the weighing process, the daily incoming waste tonnage can be calculated and listed in databases. Typically, in the working phase, the compacted waste is covered with soil daily. Chipped wood may also be used as an alternate daily cover. The space that is occupied daily by the compacted waste and the covered material is called a daily cell. Waste compaction is critical

women and young children are most at risk from the consumption of contaminated fish and shellfish.

Currently, ocean dumping is generally banned worldwide. The motivation for banning ocean dumping gained momentum when contaminated wastes sewage-derived microorganisms were discovered in public beaches, shellfish beds were contaminated with toxic metals and fish were infected by lesion-causing parasites. Coastal areas continually impacted by nutrients in waste products that run off the land eventually suffer from increases in toxic algal blooms and decreased oxygen levels, both of which can kill fish populations.

LECTURE 5; 23RD OCT 2018

INCINERATION

This is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration and other high temperature waste treatment systems are described as **thermal treatment**. Incineration of waste materials converts the waste into ash, flue gas and heat. The ash is mostly formed by the inorganic constituents of the waste and may take the form of solid lumps or particulates carried by the flue gas. The flue gases must be cleaned of gaseous and particulate and pollutants before they are dispersed into the atmosphere. In some cases, the heat generated by incineration can be used to generate electric power. Incineration with energy recovery is one of the several Waste-to-Energy (WtE) technologies such as gasification, plasma arc gasification, pyrolysis and anaerobic digestion. Incineration may also be implemented without energy and material recovery.

Incinerators reduce the original solid mass of waste by 80-85% and the volume by 95% depending on composition and degree of recovery of materials such as metals from the ash for recycling. This means that, while incineration completely replaces landfilling, it significantly reduces the necessary volume for disposal. Garbage trucks often reduce the volume of waste using an inbuilt compressor before delivery to the incinerator. Alternatively, at landfills, the volume of the uncompressed garbage can be reduced by approximately 70% by using a stationary steel compressor. Incineration has particularly strong benefits for the treatment of certain waste types in the niche areas such as clinical waste and certain hazardous waste where pathogens and toxins can be destroyed by high temperatures. Examples include chemical multi-product plants with diverse toxic or very toxic waste water streams which cannot be rooted to a conventional waste water treatment plant.