

Waste

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Waste and ***wastes*** are unwanted or unusable materials. Waste is any substance which is discarded after primary use, or it is worthless, defective and of no use.

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.



Solid waste being shredded

Contents

- 1 Definitions
 - 1.1 United Nations Environment Program
 - 1.2 United Nations Statistics Division, *Glossary of Environment Statistics*
 - 1.3 European Union
- 2 Types
- 3 Reporting
- 4 Costs
 - 4.1 Environmental costs
 - 4.2 Social costs
 - 4.3 Economic costs
- 5 Resource recovery
- 6 Energy recovery
- 7 Education and awareness
- 8 Gallery
- 9 See also
- 10 References
- 11 External links

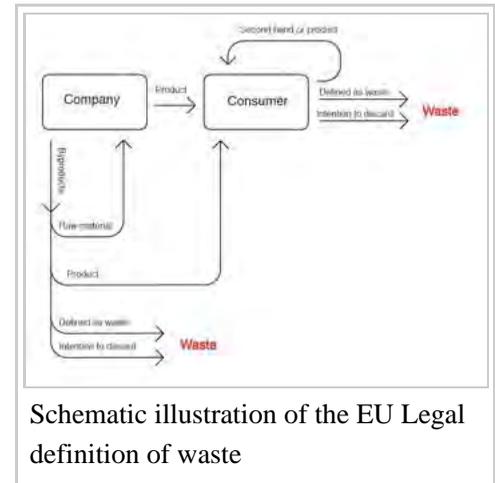
Definitions

United Nations Environment Program

According to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal of 1989, Art. 2(1), "'Wastes' are substance or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law".^[1]

United Nations Statistics Division, *Glossary of Environment Statistics*

"Wastes are materials that are not prime products (that is products produced for the market) for which the initial user has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded."^[2]



European Union

Under the Waste Framework Directive 2008/98/EC, Art. 3(1), the European Union defines waste as "an object the holder discards, intends to discard or is required to discard."^[3] For a more structural description of the Waste Directive, see the European Commission's summary (<http://ec.europa.eu/environment/waste/legislation/a.htm>).

Types

There are many waste types defined by modern systems of waste management, notably including:

- Municipal waste includes household waste, commercial waste, and demolition waste
- Hazardous waste includes industrial waste
- Biomedical waste includes clinical waste
- Special hazardous waste includes radioactive waste, explosive waste, and electronic waste (e-waste)

Reporting

There are many issues that surround reporting waste. It is most commonly measured by size or weight, and there is a stark difference between the two. For example, organic waste is much heavier when it is wet, and plastic or glass bottles can have different weights but be the same size.^[4] On a global scale it is difficult to report waste because countries have different definitions of waste and what falls into waste categories, as well as different ways of reporting. Based on incomplete reports from its parties, the Basel Convention estimated 338 million tonnes of waste was generated in 2001.^[5] For the same year, OECD estimated 4 billion tonnes from its member countries.^[6] Despite these inconsistencies, waste reporting is still useful on a small and large scale to determine key causes and locations, and to find ways of preventing, minimizing, recovering, treating, and disposing waste.

Costs

Environmental costs

Inappropriately managed waste can attract rodents and insects, which can harbour gastrointestinal parasites, yellow fever, worms, the plague and other conditions for humans, and exposure to hazardous wastes,

particularly when they are burned, can cause various other diseases including cancers. Toxic waste materials can contaminate surface water, groundwater, soil, and air which causes more problems for humans, other species, and ecosystems.^[7] Waste treatment and disposal produces significant green house gas (GHG) emissions, notably methane, which are contributing significantly to global warming.^[5]

Social costs

Waste management is a significant environmental justice issue. Many of the environmental burdens cited above are more often borne by marginalized groups, such as racial minorities, women, and residents of developing nations. NIMBY (not in my back yard) is the opposition of residents to a proposal for a new development because it is close to them.^[8] However, the need for expansion and siting of waste treatment and disposal facilities is increasing worldwide. There is now a growing market in the transboundary movement of waste, and although most waste that flows between countries goes between developed nations, a significant amount of waste is moved from developed to developing nations.^[9]

Economic costs

The economic costs of managing waste are high, and are often paid for by municipal governments;^[10] money can often be saved with more efficiently designed collection routes, modifying vehicles, and with public education. Environmental policies such as pay as you throw can reduce the cost of management and reduce waste quantities. Waste recovery (that is, recycling, reuse) can curb economic costs because it avoids extracting raw materials and often cuts transportation costs. "Economic assessment of municipal waste management systems – case studies using a combination of life-cycle assessment (LCA) and life-cycle costing (LCC)".^[11] The location of waste treatment and disposal facilities often reduces property values due to noise, dust, pollution, unsightliness, and negative stigma. The informal waste sector consists mostly of waste pickers who scavenge for metals, glass, plastic, textiles, and other materials and then trade them for a profit. This sector can significantly alter or reduce waste in a particular system, but other negative economic effects come with the disease, poverty, exploitation, and abuse of its workers.^[12]

Resource recovery

Resource recovery is the retrieval of recyclable waste, which was intended for disposal, for a specific next use.^[13] It is the processing of recyclables to extract or recover materials and resources, or convert to energy. This process is carried out at a resource recovery facility.^[14] Resource recovery is not only important to the environment, but it can be cost effective by decreasing the amount of waste sent to the disposal stream, reduce the amount of space needed for landfills, and protect limited natural resources.^[15]

Energy recovery

Energy recovery from waste is using non-recyclable waste materials and extracting from it heat, electricity, or energy through a variety of processes, including combustion, gasification, pyrolyzation, and anaerobic digestion.^[16] This process is referred to as waste-to-energy.



Waste not the Waste. Sign in Tamil Nadu, India

There are several ways to recover energy from waste. Anaerobic digestion is a naturally occurring process of decomposition where organic matter is reduced to a simpler chemical component in the absence of oxygen.^[16] Incineration or direct controlled burning of municipal solid waste to reduce waste and make energy. Secondary recovered fuel is the energy recovery from waste that cannot be reused or recycled from mechanical and biological treatment activities.^[16] Pyrolysis involves heating of waste, with the absence of oxygen, to high temperatures to break down any carbon content into a mixture of gaseous and liquid fuels and solid residue.^[16] Gasification is the conversion of carbon rich material through high temperature with partial oxidation into a gas stream.^[16] Plasma arc heating is the very high heating of municipal solid waste to temperatures ranging from 3,000-10,000 °C, where energy is released by an electrical discharge in an inert atmosphere.^[16]

Using waste as fuel can offer important environmental benefits. It can provide a safe and cost-effective option for wastes that would normally have to be dealt with through disposal.^[16] It can help reduce carbon dioxide emissions by diverting energy use from fossil fuels, while also generating energy and using waste as fuel can reduce the methane emissions generated in landfills by averting waste from landfills.^[16]

There is some debate in the classification of certain biomass feedstock as wastes. Crude Tall Oil (CTO), a co-product of the pulp and papermaking process, is defined as a waste or residue in some European countries when in fact it is produced “on purpose” and has significant value add potential in industrial applications. Several companies use CTO to produce fuel,^[17] while the pine chemicals industry maximizes it as a feedstock “producing low-carbon, bio-based chemicals” through cascading use.^[18]

Education and awareness

Education and awareness in the area of waste and waste management is increasingly important from a global perspective of resource management. The Talloires Declaration is a declaration for sustainability concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources. Local, regional, and global air pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. Several universities have implemented the Talloires Declaration by establishing environmental management and waste management programs, e.g. the waste management university project. University and vocational education are promoted by various organizations, e.g. WAMITAB and Chartered Institution of Wastes Management.

Gallery



Vegetable waste being dumped in a market in Hyderabad



Weapon scraps



Agobox; Bio-medical Waste



Hospital waste



Waste collected in a tricycle

See also

- Biological hazard
- Chemical hazards
- Environmental dumping
- Fly-tipping
- Garbage truck
- Global waste trade
- Human waste
- List of waste management acronyms
- Litter
- Midden
- Waste by country
- Waste collection
- Waste converter
- Waste Atlas

References

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External links

-  Media related to Waste at Wikimedia Commons
- Medical waste disposal (<http://www.securewaste.net/>)
- Waste (https://www.dmoz.org/Society/Issues/Environment/Waste_and_Recycling/) at DMOZ
- Cambio verde: waste-food exchange project in Curitiba, Brazil (<http://member.clintonglobalinitiative.org/Page.aspx?pid=3633>)
- Waste area (<http://www.atiksahasi.com>)
- Resource Productivity and Waste (http://www.oecd.org/topic/0,3699,en_2649_34395_1_1_1_1_37465,00.html) at the OECD



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