Environmental friendly technologies
KEE/ENT

ESF II project of the University of West Bohemia in Pilsen

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Lecture 13

Waste management, package management

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IMPACTS OF WASTE

- Affects our health
- Affects our socio-economic conditions
- Affects our coastal and marine environment
- Affects our climate

- GHGs are accumulating in Earth's atmosphere as a result of human activities, causing global mean surface air temperature and subsurface ocean temperature to rise.

- Rising global temperatures are expected to raise sea levels and change precipitation and other local climate conditions.

- Changing regional climates could alter forests, crop yields, and water supplies.

- This could also affect human health, animals, and many types of ecosystems.

- Deserts might expand into existing rangelands, and features of some of our national parks might be permanently altered.

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IMPACTS OF WASTE…

- Some countries are expected to become warmer, although sulfates might limit warming in some areas.

- Scientists are unable to determine which parts of those countries will become wetter or drier, but there is likely to be an overall trend toward increased precipitation and evaporation, more intense rainstorms, and drier soils.

- Whether rainfall increases or decreases cannot be reliably projected for specific areas.

Impacts of waste….

Activities that have altered the chemical composition of the atmosphere:

-Buildup of GHGs primarily carbon dioxide (CO2) methane (CH4), and nitrous oxide (N20).

-C02 is released to the atmosphere by the burning of fossil fuels, wood and wood products, and solid waste.

-CH4 is emitted from the decomposition of organic wastes in landfills, the raising of livestock, and the production and transport of coal, natural gas, and oil.

-N02 is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. In 1977, the US emitted about one-fifth of total global GHGs.

SOURCES OF HUMAN EXPOSURES

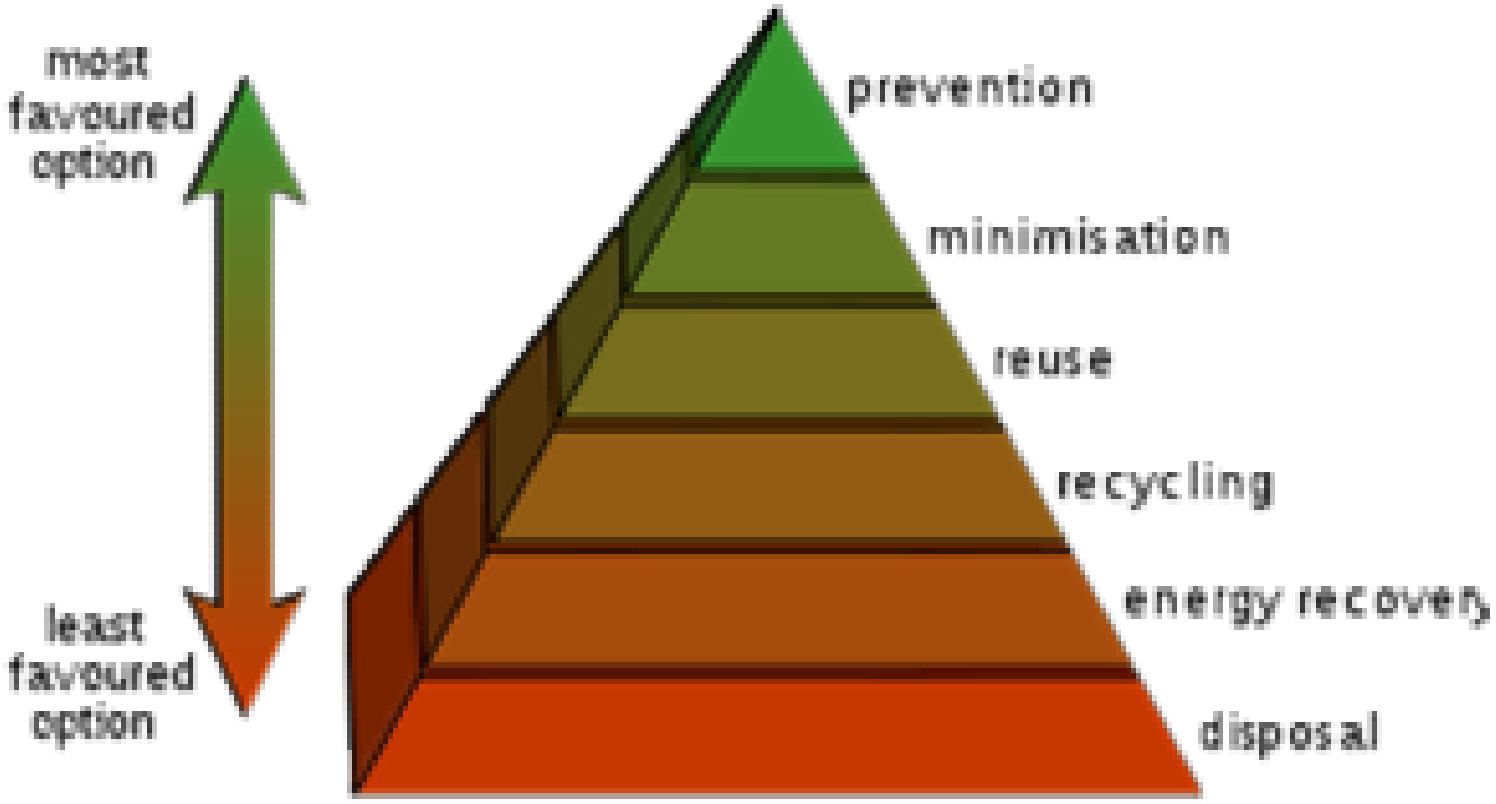
Exposures occurs through
Ingestion of contaminated water or food
Contact with disease vectors
Inhalation
Dermal

Points of contact

Soil adsorption, storage and biodegrading
Plant uptake
Ventilation
Runoff
Leaching
Insects, birds, rats, flies and animals
Direct dumping of untreated waste in seas, rivers and lakes results in the plants and animals that feed on it

Waste hierarchy

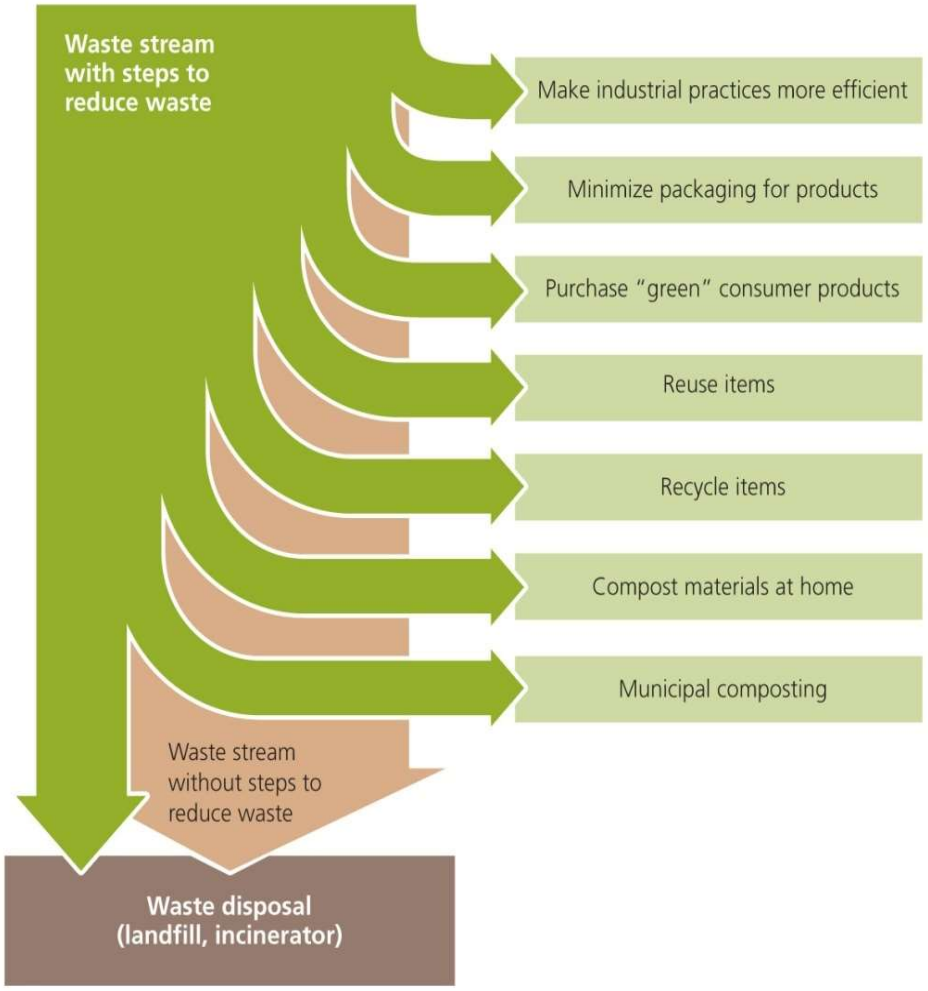
Waste hierarchy refers to 3 Rs
Reduce, Reuse, Recycle



Waste

Minimizing solid waste

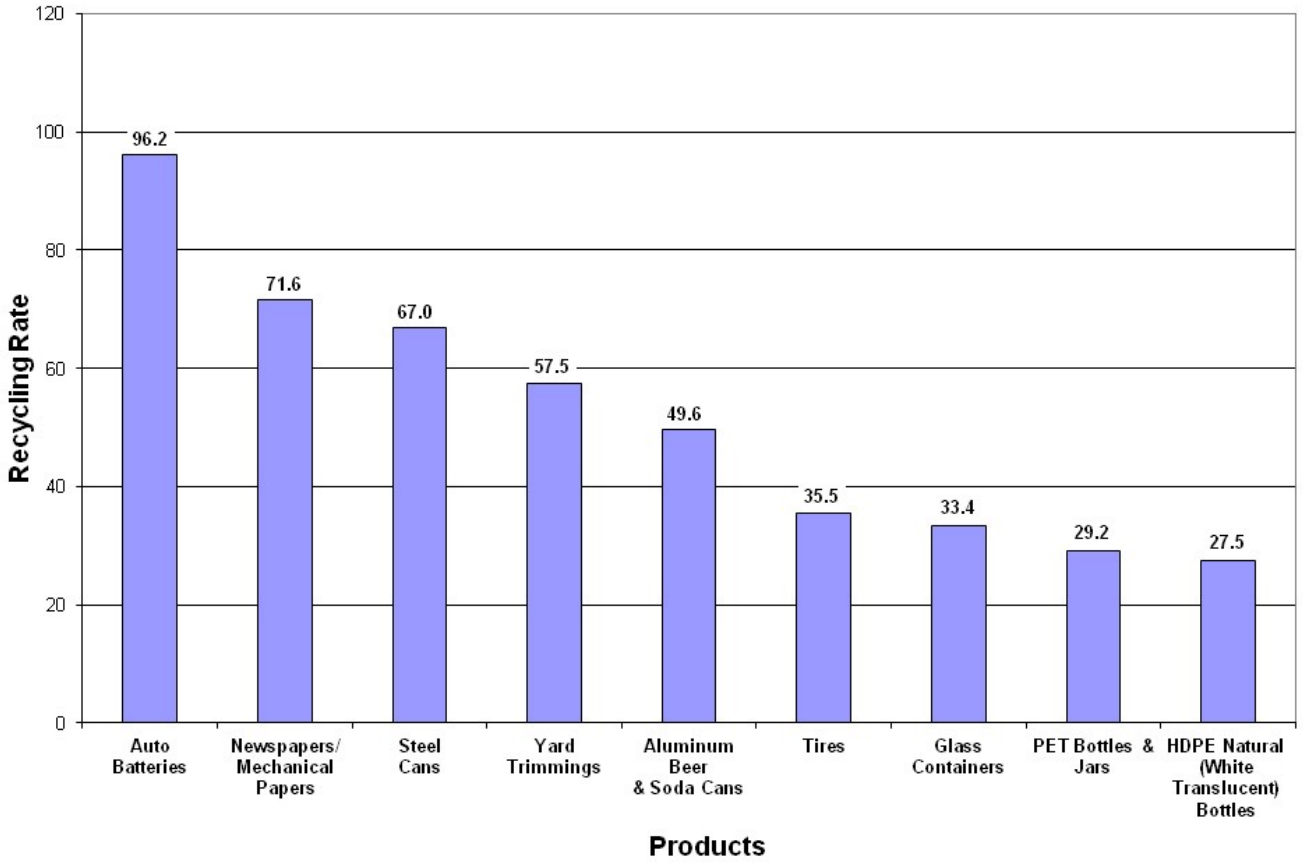
- Minimizing packaging
- Recycleable
  - Paper, plastics, metals, glass, wood
- Reusable ?
  - Textiles, leather, rubber, metals, wood
- Compostable
  - Yard trimmings, food scraps (vegetable)



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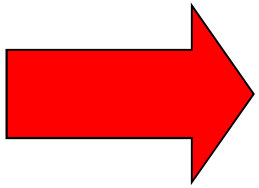
“By recycling almost 8 million tons of metals (which includes aluminum, steel, and mixed metals), we eliminated greenhouse gas (GHG) emissions totaling more than 26 million metric tons of carbon dioxide equivalent (MMTCO2E). This is equivalent to removing more than 5 million cars from the road for one year.”

Figure 3. Recycling Rates of Selected Products, 2010*



CATEGORIES OF WASTE DISPOSAL

1. DILUTE AND DISPERSE (ATTENUATION)

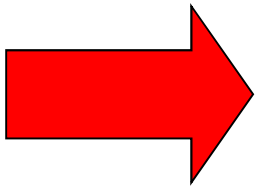


Throw it in the river / lake / sea
Burn it

Basically this involves spreading trash thinly over a large area to minimize its impact

Works for sewage, some waste chemicals, when land-disposal is not available

2. CONCENTRATE AND CONTAIN (ISOLATION)



Waste dumps, landfills

Historically, that's how most of the solid waste gets treated

Useful options

Resource recovery

Composting

Vermicomposting

Energy recovery

Incineration

Pyrolysis

Gasification

Bio-methanation or anaerobic digestion

Impacts of waste on health

Chemical poisoning through chemical inhalation
Uncollected waste can obstruct the storm water runoff resulting in flood
Low birth weight
Cancer
Congenital malformations
Neurological disease

Effects of waste on animals and aquatics life

Increase in mercury level in fish due to disposal of mercury in the rivers.
Plastic found in oceans ingested by birds.
Resulted in high algal population in rivers and sea.
Degrades water and soil quality.

Impacts of waste on Environment

Waste breaks down in landfills to form methane, a potent greenhouse gas

Change in climate and destruction of ozone layer due to waste biodegradable

Littering, due to waste pollutions, illegal dumping, Leaching: is a process by which solid waste enter soil and ground water and contaminating them.

U.S. Environment Protection Agency (2009)

Waste reduction

- Reduce office paper waste by implementing a formal policy to duplex all draft reports and by making training manuals and personnel information available electronically.

- Improve product design to use less materials.

- Redesign packaging to eliminate excess material while maintaining strength.

- Work with customers to design and implement a packaging return program.

- Switch to reusable transport containers.

- Purchase products in bulk.

Reuse

- Reuse corrugated moving boxes internally.

- Reuse office furniture and supplies, such as interoffice envelopes, file folders, and paper.

- Use durable towels, tablecloths, napkins, dishes, cups, and glasses.

- Use incoming packaging materials for outgoing shipments.

- Encourage employees to reuse office materials rather than purchase new ones.

Donate/Exchange

- old books
- old clothes
- old computers
- excess building materials
- old equipment to local organizations

Employee Education

- Develop an “office recycling procedures” packet.

- Send out recycling reminders to all employees including environmental articles.

- Train employees on recycling practices prior to implementing recycling programs.

- Conduct an ongoing training process as new technologies are introduced and new employees join the institution.

Conduct outreach program adopting an ecologically sound waste management system which includes:

- waste reduction
- segregation at source
- composting
- recycling and re-use
- more efficient collection
- more environmentally sound disposal

Thank you for your attention...

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