Solid Waste Management

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Definition of Solid Wastes

- All wastes arising from human and animal activities that are normally solid and that are discarded as useless and unwanted.

Common Problems in Waste Management

- Inadequate
- Poorly controlled disposal sites, illegal roadside dumping
- Poor practices causes pollution with loss in aesthetic, health & other resources

Social problem (ethical problems) :

- Dumping not seen as a problem (ignorance)
- Cost of disposal more than consumer means

Generation of Solid Wastes in Malaysia

- In 2008, 23000 tonnes of waste generated each day in Malaysia (0.8~0.9 kg per capita)
- By 2020, waste generation rate increase to 30000 tonnes per day (2.23 kg per capita)
- Less than 5% of waste is recycle
- 19% of solid waste ends up in drains and rivers

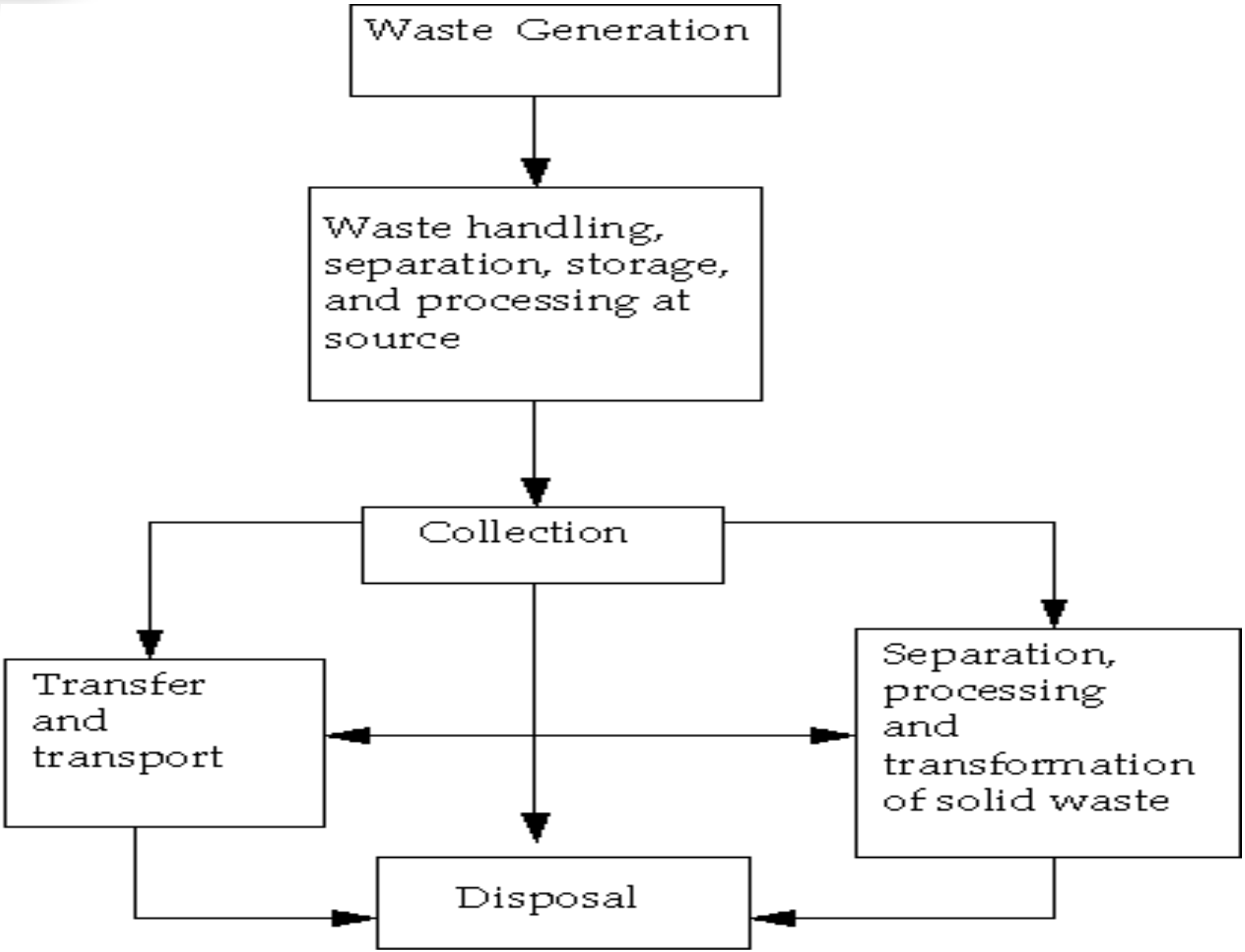
Factors Affecting Waste Generation

- Location
- Season
- Eating habit / lifestyle
- Collection frequency
- Characteristics of populace
- Extent of salvaging and recycling
- Public attitudes
- Legislation

Waste Flow / Waste Stream

- Definition : Aggregate flow of waste material from generation to treatment to final disposition.

- A waste stream is the complete flow of waste from domestic or industrial areas through to final disposal. The intervention of recycling may act to lessen the content of a waste stream as it moves down the line.


Waste Generation
Waste handling, separation, storage, and processing at source
Collection
Transfer and transport
Separation, processing and transformation of solid waste
Disposal

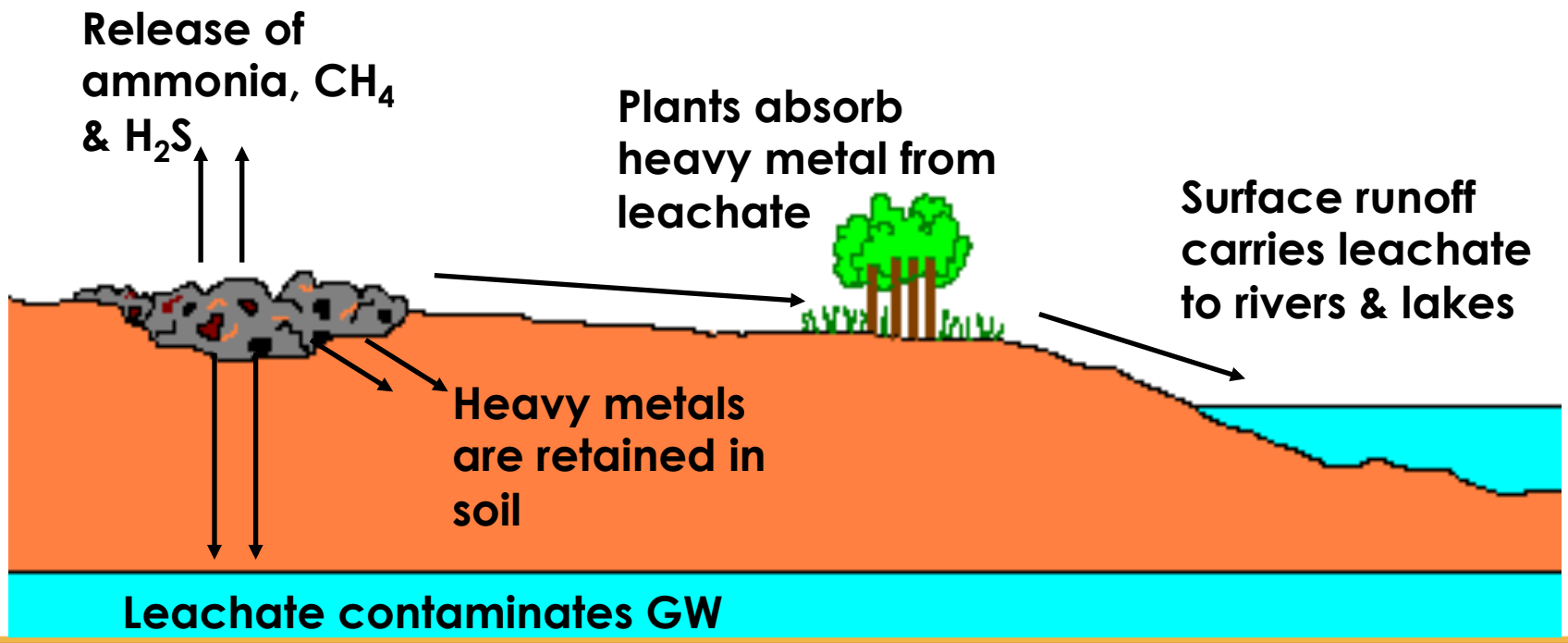
Solid Waste Disposal

- Open dumping
- Landfill
- Incineration

Disposal (1): Open Dumping

1. Oldest & most common method of disposing solid waste

2. Requires large amount of space, aesthetic nuisance, pest breeding, health hazard – air, water & soil pollution

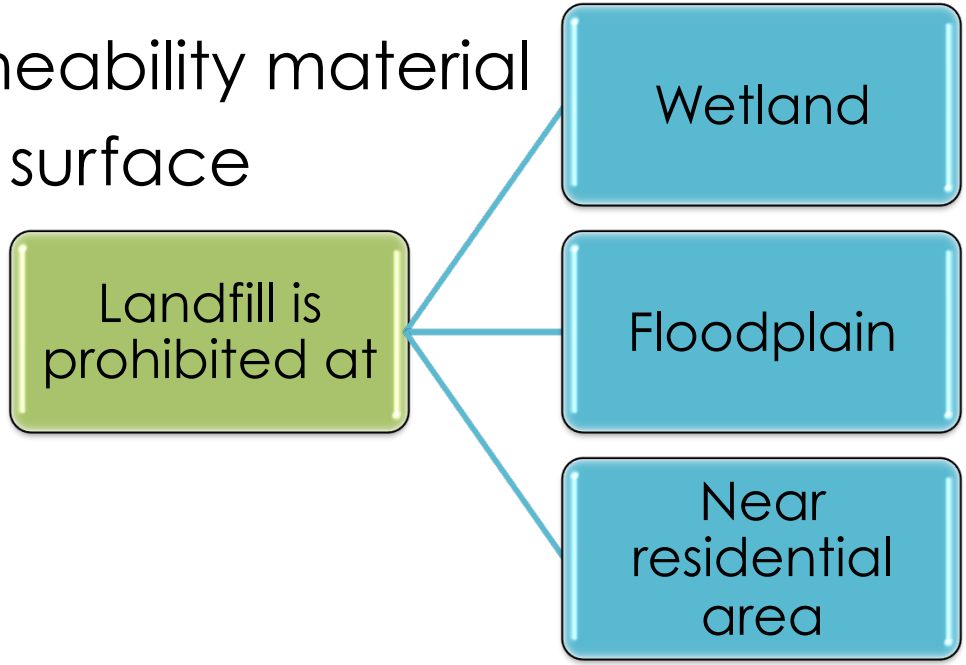


Disposal (2): Landfill

- Confining waste to smallest practical area, reducing it to smallest practical volume and covering it with a layer of compacted soil at the end of each day of operation

Criteria of Landfill Sitting

- Dry area
- Flat area or low topographic
- Far from surface water bodies
- Underlain by low permeability material
- Water table far below surface

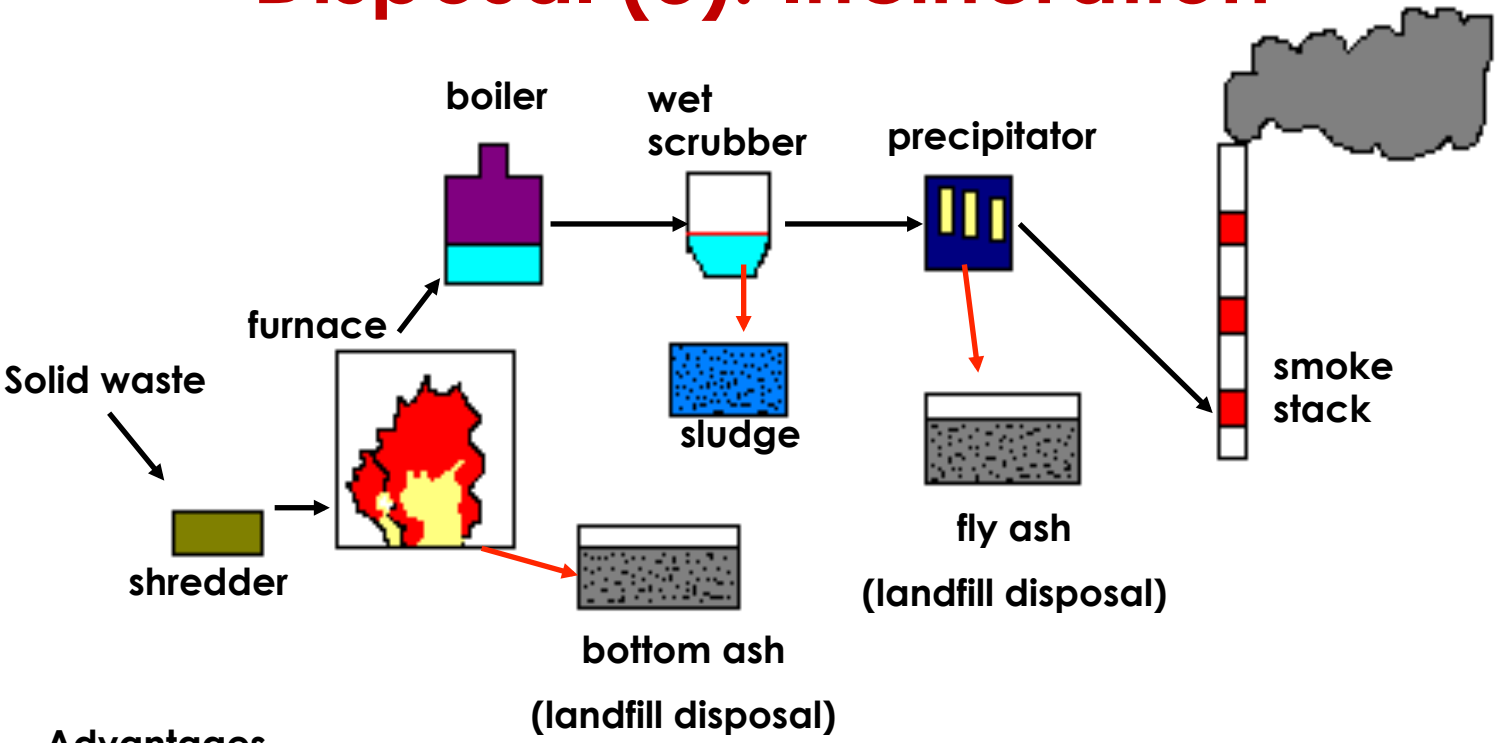


Leachate From Landfill

- Landfill leachate is comprised of the soluble components of waste and products of waste degradation which enter water as it percolates through the waste body.

- The amount of leachate generated is dependent on :
  - water availability
  - landfill surface conditions
  - solid waste conditions

Disposal (3): Incineration



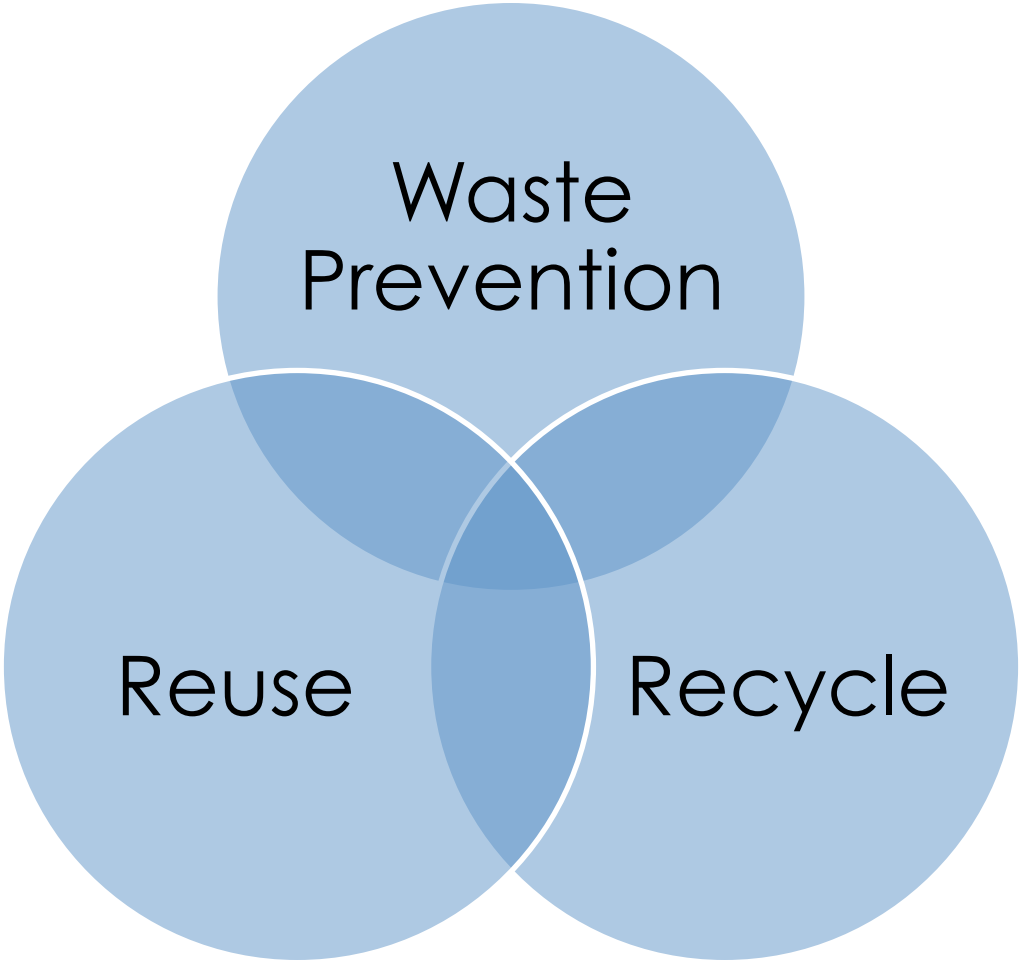
Advantages

1. Effectively converts large volume of waste to smaller volume of ash
2. Able to generate electricity / energy

Disdvantages

1. Possible production of toxic air pollutants
2. Production of large quantities of ash that must be dispose properly (fly ash usually contains more toxic materials such as dioxins & heavy metals).

How To Reduce Waste Generation?



Additional on How To Reduce Waste Generation….

- Reduce (Waste Prevention)
- Reuse
- Recycle
- Composting
- Rethink

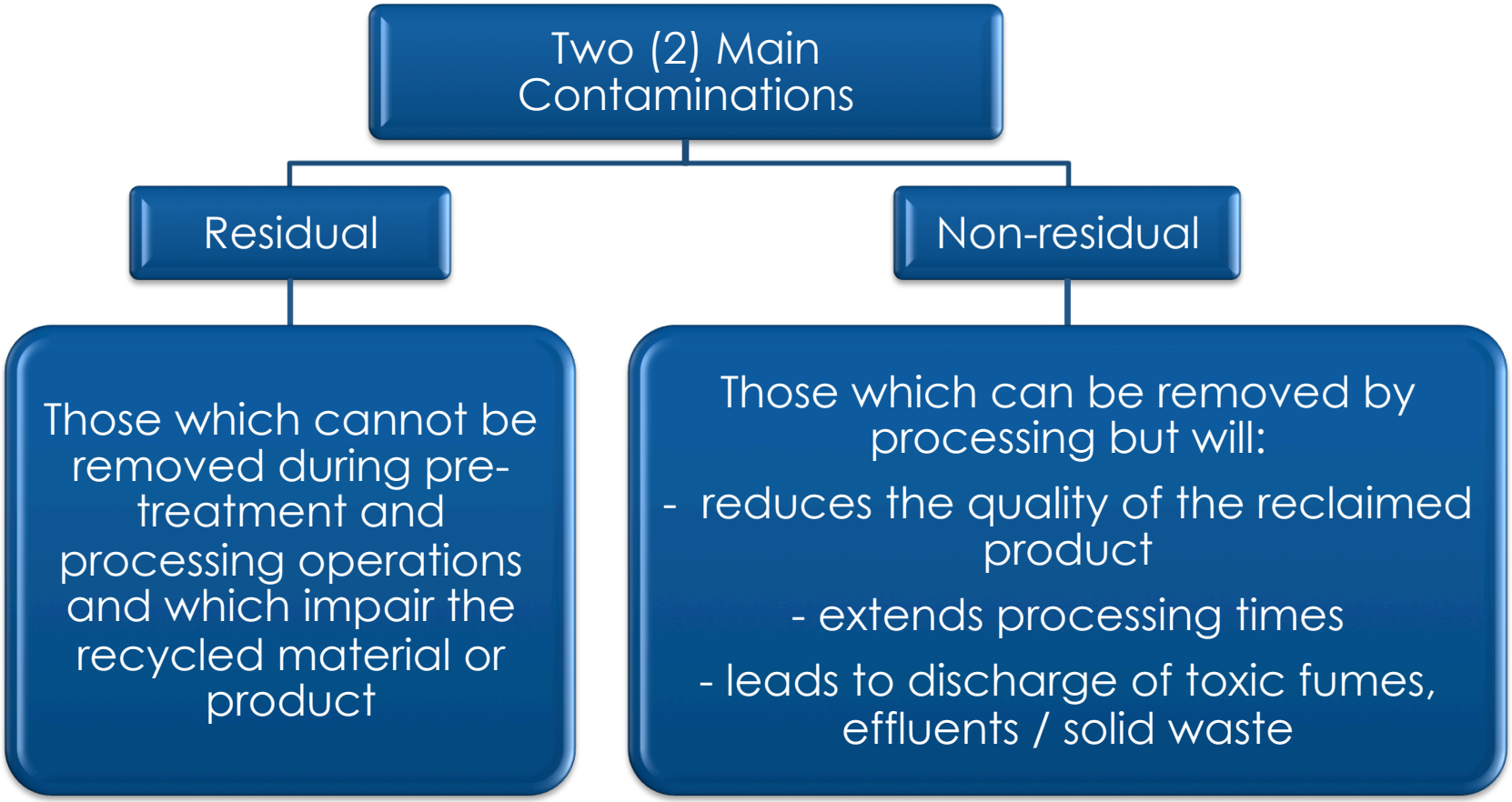
Requirements For Recycling

- Reliable supply of waste material
- System to collect the material and transport them to a place to be re-processed
- System and facilities to reprocess the materials into a suitable raw materials and products
- Available markets for raw materials and products produced by the recycling process

General Issues Affecting Recycling

- Contamination
- Collection
- Standard

(1) Contamination



(2) Collection

Major options for recovering recyclable materials are:

- Bring systems eg. bottle banks, paper skips
- Collect systems eg. door-to-door, kerb side systems
- Centralized system

(3) Standards

- Raw materials must conform to specifications

- Recycler certification schemes are regionally in place but yet no formal international standards for certification

Technical Issues Affecting Recycling

Glass

- Amount of waste glass manufacturers can use depends on desired colour of their products and colour of the waste glass available
- Removal of contaminants

Paper

- Few technical barriers if paper well separated into grades specified by paper and board industry.
- Shrinkage
- Heavy metals

Metals

- Ferrous scrap is a cheap iron
- But other elements present are contaminants (metallic and non-metallic)
- Cost of dealing with emissions eg. ZnO from galvanised steel

Technical Issues Affecting Recycling (Cont')

Plastics

- Low packing density
- Plastic needs to be sorted by polymer type
- Most recycling methods is hazard - some plastics additives can be toxic when heated
- Not so 'environmental friendly'

Bioplastics

- Bioplastics are sometimes indistinguishable from ordinary plastics
- Bioplastics will damage the recycling activities

Textiles

- Very labour intensive
- High processing costs
- Contamination

Technical Issues Affecting Recycling (Cont')

Waste Oils

- Recycled as as fuel after removal of water, sludges and emulsions
- Require oil laundering and refining

Compostables

- Lack of technical information regarding composting process
- Poor perception of composting as a modern treatment option
- Presence of contaminants
- Bad odour
- Requires high temperature while decomposing

Composting

- A process of breaking up organic waste such as food waste, manure, leaves, grass trimmings, paper, worms and coffee grounds, into a humus-like substance by various microorganisms in the presence of oxygen.
- The end product of composting is a rich organic material that can be added to condition and fertilize the soil.

Benefits of Composting

- Composting keeps waste out of landfills. Kitchen waste, in particular, in landfills, emits more greenhouse gases, particularly methane. Home composting does not emit methane and produces far less greenhouse gas.

- Composting provides rich matter to fertilize and condition the soil, reducing the need for added fertilizers, especially those made by the industries

Benefits of Composting (Cont')

- Composting can also soften plant material, making the nutrients in the plant more accessible, and can convert the ammonia in the plant into proteins.
- Composting reduces an individual's carbon footprint, because no energy is required to transport matter to another area.

- Rich soil leads to healthy plants, healthy plants deter pests, and so the need for pesticide use is reduced.

Recycling TIPS!!!

- Purchase foods with little packaging. Bring along own shopping bags and containers to the market.
- Take time to understand what items should be recycled in what container.
- Reduce and reuse. Part of vegetables that is not used might make a great broth or a good compost for garden.
- Do not discard contaminated items (greasy packaging). Throw it in the dishwasher and de-contaminate it.

Integrated Waste Management (IWM)

1. Minimize all component waste fractions.
2. Recycle what is possible of paper, cardboard, glass, non-ferrous metals & textiles.
3. Reuse plastics, ferrous metals and glass.
4. Biogas or compost food waste.
5. Incinerate only the remaining plastics & food waste.
6. Landfill only the remaining waste.

THE END