

# Environmental Technology in Mining

## CHAPTER 3.1.2 WASTE MANAGEMENT



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## Content:

Section 1 - Mine atmosphere

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**Section 3 – Environmental impact and restoration in mining activities**

**Chapter 3.1 - Environmental technology**

**3.1.1 - Water management**

**3.1.2 - Waste management**

**Chapter 3.2 - Soil pollution**

**Chapter 3.3 - Mining and the environment**

## Chapter 4. Solid waste management

4.1. Introduction to solid waste management

4.2. Municipal solid waste management

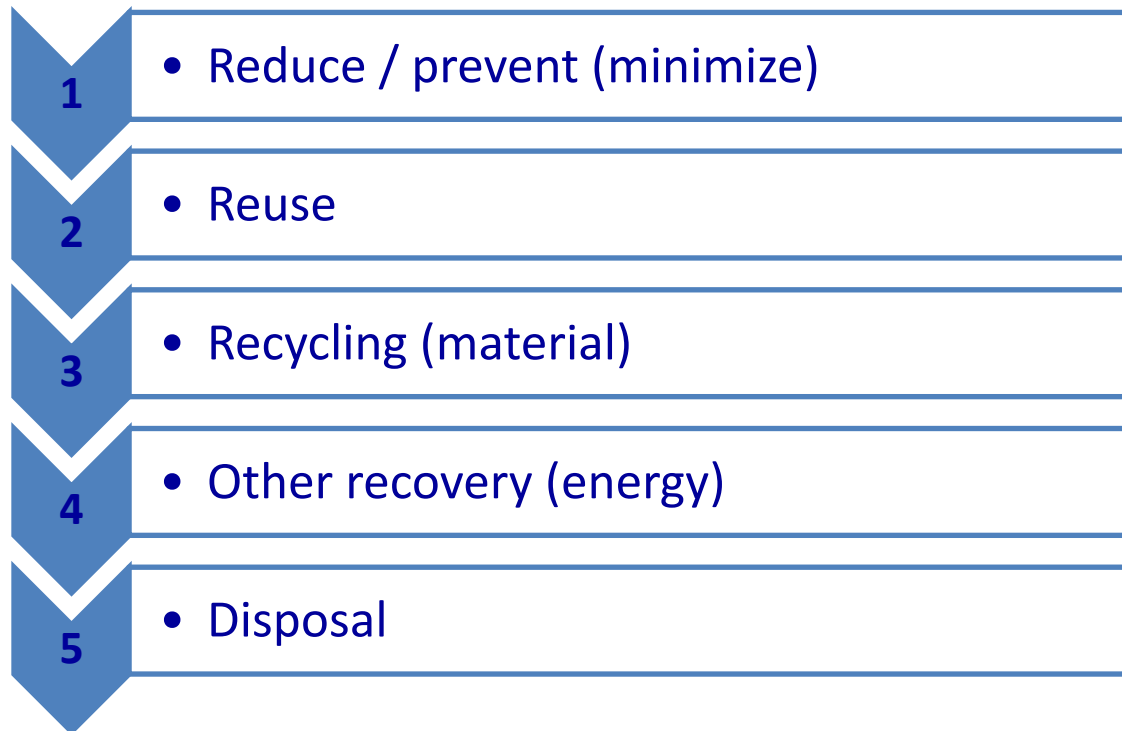
✓ **Solid waste** definition:

Any (solid) discarded item, not useful anymore for the activity in which was generated

(includes garbage, rubbish, etc., and also industrial waste, agricultural waste, radioactive waste,...)

## Solid waste management hierarchy:

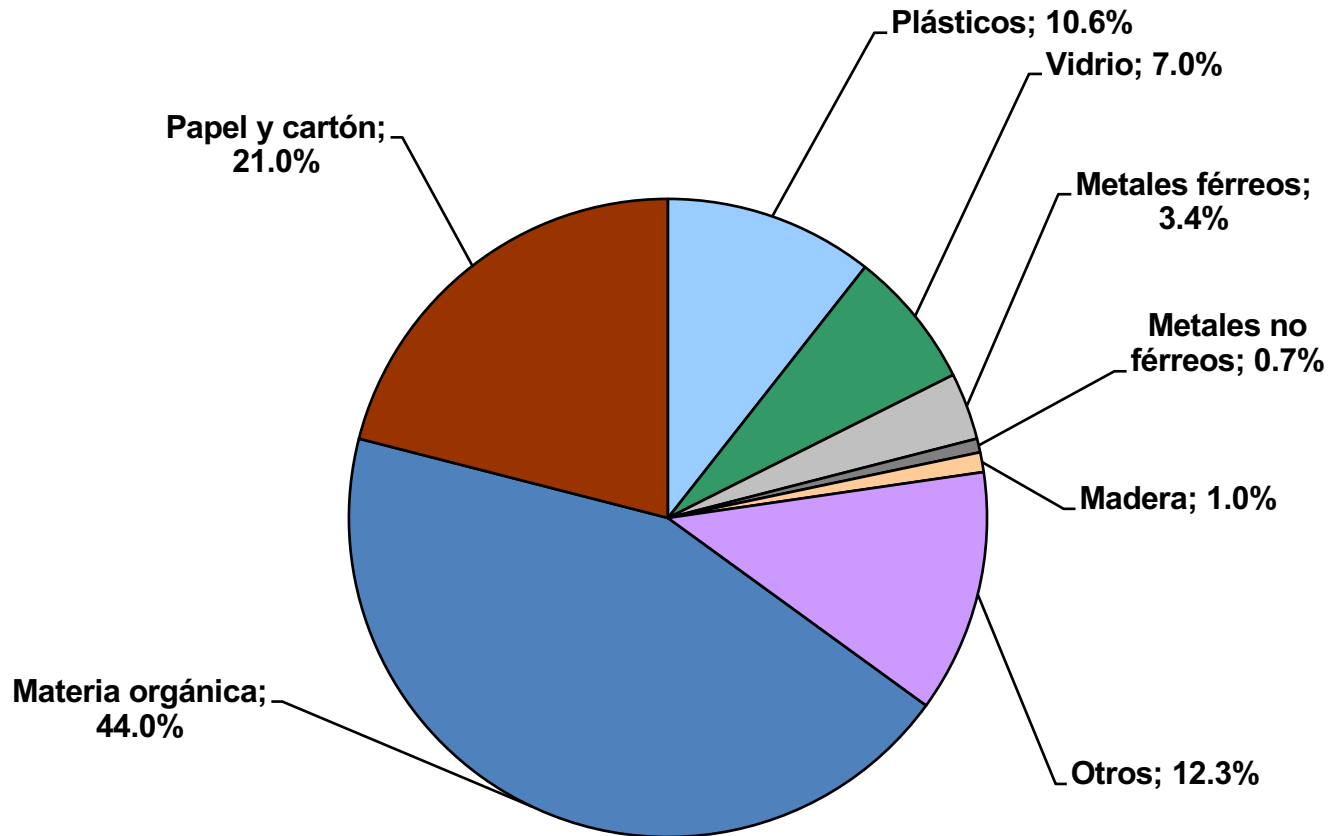
According to Directive 2008/98/EC, the following waste hierarchy shall apply as a priority order in waste management:



USA regulation: *Resource Conservation & Recovery (RC&R)*

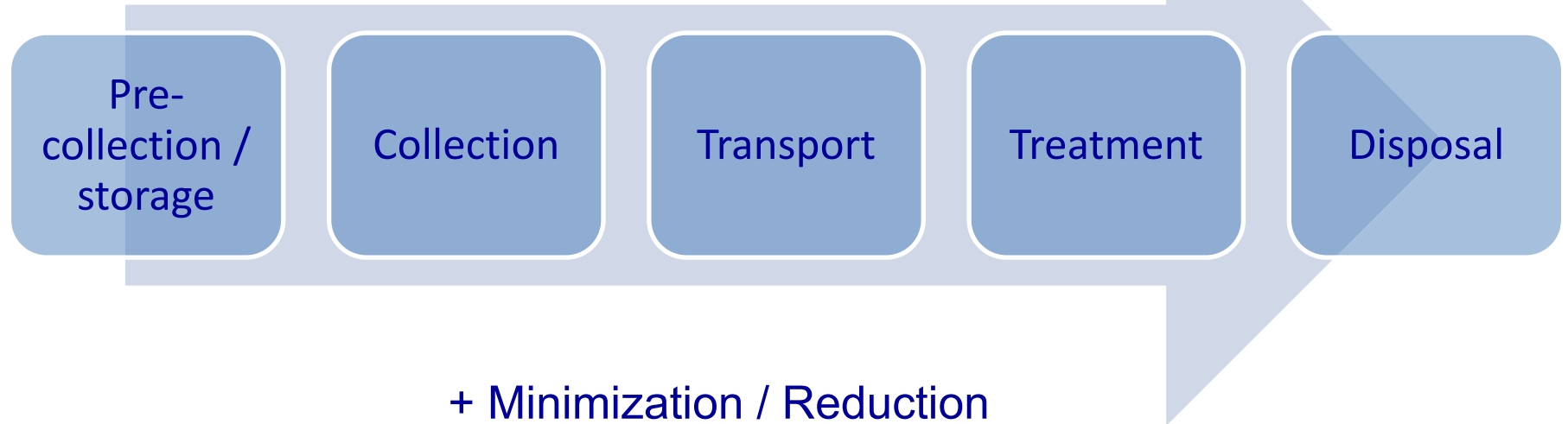
→ Reduce, Reuse, Recycle, Recovery (4R)

Composition of MSW:



*Average Composition of MSW in Spain  
(Plan Nacional Integrado de Residuos 2008-2015)*

## Solid waste management: stages



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**Pre-collection/storage:** first step of solid waste management, carried out by users at home

✓ **Type of building:**

flat, individual household, urban/rural area, etc.

✓ **Pre-collection/storage methods:**

waste separation at home, disposal on containers or bags, etc.





## Solid waste management: stages



**Collection:** pickup of solid waste from the pre-collection/storage point

✓ **Collection methods:**

curbside pickup, pneumatic collection, etc.

✓ **Frequency of collection:**

climate, storage conditions, time for putrefaction, length of fly-breeding cycle

✓ **Type and size of equipment:**

containers + trucks



## Solid waste management: stages

Pre-collection / storage

Collection

Transport

Treatment

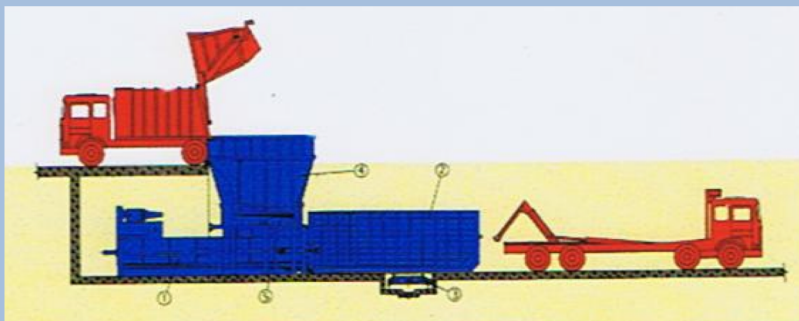
Disposal



**Transport:** hauling of solid waste from the collection point to the disposal site

✓ **Defining the routes:**  
detailed path for the truck, street segments clustered in the same area, etc.

✓ **Inter-route transfer:**  
transferring SW load from collection trucks to larger vehicles in a transfer station, investment costs vs. savings



## Solid waste management: stages



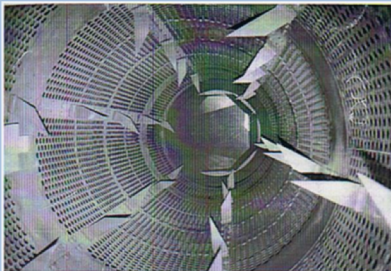
**Treatment:** processing of SW aimed at recovery of materials and energy, prior to disposal

✓ **Recycling:** mixed waste collection and separation (manual, screening, magnets, etc.)

✓ **Composting:** recycling organic matter

✓ **Anaerobic digestion:** energy recovery from organic matter

✓ **Waste-to-energy (incineration):** combustible portion of MSW, after separation of inert materials



## Solid waste management: stages



### ✓ **Sanitary landfill:**

site where the SW are disposed of on land in a manner that minimizes environmental hazards (fires, odors, air and water pollution, etc.)

### ✓ **Site selection:**

proximity to major roadways, haul distances, hydrology, availability of cover material, public opposition, etc.

### ✓ **Landfill operation:**

disposal of, compaction and cover of SW, biogas and leachate management, completed MSW landfill (after closure)

## Chapter review:

- **Definition** of solid waste
- Solid waste management **hierarchy**: reduction, reuse, recycle, recover and disposal
- **Stages** of MSW waste management