

# Solid Waste Management

I. **Solid Waste** – any unwanted material that is not a liquid or a gas. The U. S. produces 33% of the world' solid waste and represents 4.7% of its population. We live in a high waste society.

a. 11 billion tons of solid waste produced by the US annually. This is 2 to 3 times the amount of other developed nations.

75% Mining, oil and gas production

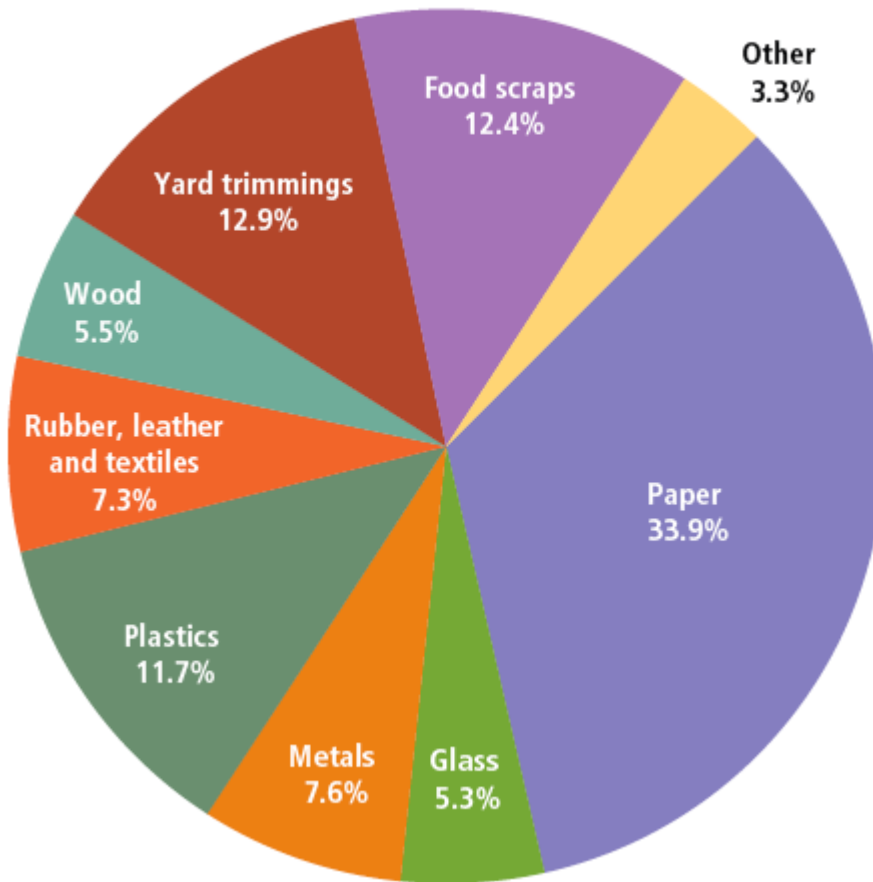
13% Agriculture

9.5% Industry

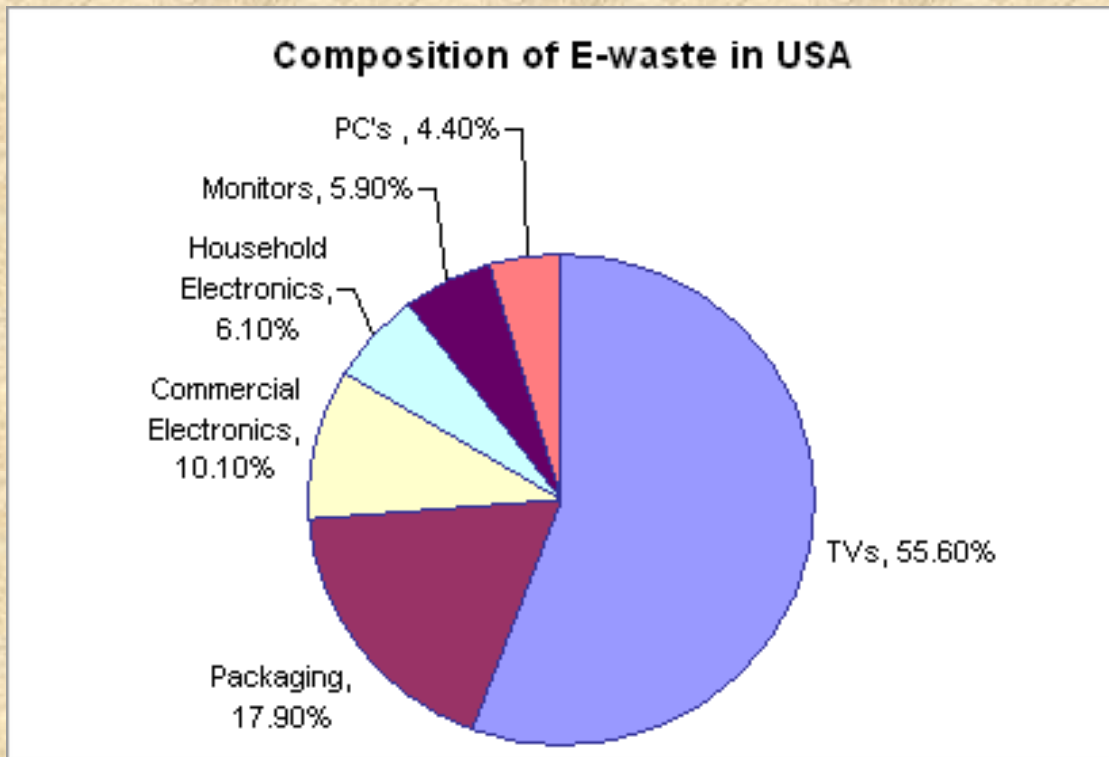
1.5% municipal (Household) ~ 1,500 lbs /person

1% Sewage Sludge

**Figure 5. Total MSW Generation (by Material), 2006  
251 Million Tons (Before Recycling)**



**Electronic Waste (e-waste)**



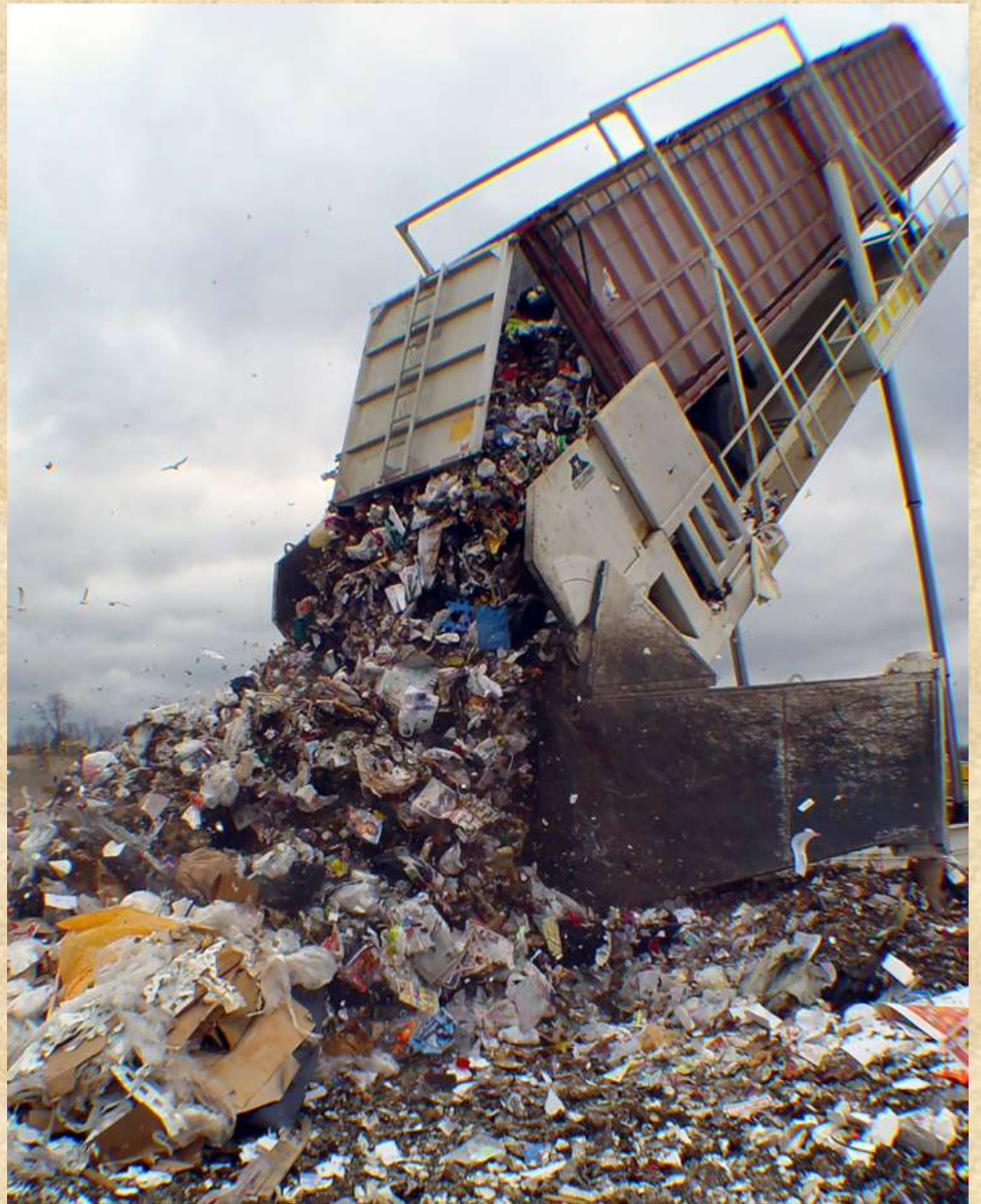
### Where does it go?

- ~22% recycled
- ~62% landfills
- ~16% burned

### Landfills:

- "a big hole in the ground filled with garbage"
- Very little decomposition
- Sanitary Landfills - lined with an impermeable barrier, leachate collection system, capped.
- Waste of resources

- **Possible source of methane production for about 20 years.**













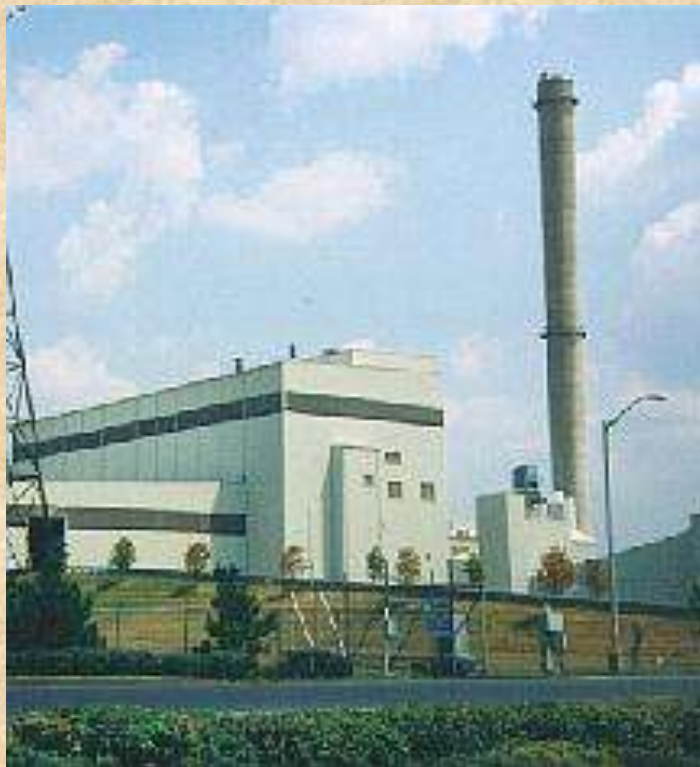
### **Incinerators:**

**Do not eliminate waste, but change the form of waste into hazardous air emissions and toxic ash.**

**Convert ~30% of the waste burned into toxic ash, which EPA allows to be used as daily landfill cover. (3 tons waste = 1 ton ash)**

**Spread hazardous contamination worldwide; contaminating air, soil, and water.**

**Are a major source of 210 different dioxin compounds, plus mercury, cadmium, nitrous oxide, hydrogen chloride, sulfuric acid, fluorides, and particulate matter small enough to lodge permanently in the lungs.**



## Waste to Energy – burning solid waste to produce electricity.

## II. Hazardous Waste – solid or liquid material that is harmful to human health, flammable, reactive, or corrosive.

Disposed by incineration, injection wells, buried storage containers, and landfills.

### Injection Well Data

Table 1. OHIO CLASS I INJECTION WELLS						
FACILITY NAME	COUNTY	# OF WELLS	INJECTED VOLUME (gal) (12/31/05)	WASTE CHARACTERIZATION	DEPTH (ft) to top of injection interval	INJECTED WASTES
<b>Innovene USA, LLC</b>	<b>Allen</b>	<b>4 (active)</b>	<b>7,259,272,459</b>	<b>Hazardous</b>	<b>2800'</b>	<b>Organic Chemicals</b>
Aristech Chemical Corporation	Scioto	2 (closed)	1,178,232,805 (haz) 276,656,714 (non-haz)	Non-hazardous at closure	5514'	Organic Chemicals
<b>Vickery Environmental Inc.</b>	<b>Sandusky</b>	<b>4 (active)</b>	<b>1,422,653,764</b>	<b>Hazardous</b>	<b>2800'</b>	<b>Brines, Acids</b>
Arysta Corporation	Lake	2 (closed)	786,219,157	Non-hazardous	5476'	Brines, Organics
<b>AK Steel Corporation</b>	<b>Butler</b>	<b>2 (active)</b>	<b>548,701,902</b>	<b>Hazardous</b>	<b>2954'</b>	<b>Hydrochloric acid</b>
Reserve Environmental Services	Ashtabula	1 (closed)	89,344,171	Non-hazardous	5496'	Neutralized Acid
Cargill Salt, Inc.	Cuyahoga	1 (closed)	43,268,128	Non-hazardous	1335'	Oriskany Brine

Empire Reeves Steel	Richland	1 (closed)	10,314,933	Hazardous	4982'	Hydrochloric acid
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**Brownfield – property that has been exposed to toxic waste.**

**Superfund – designated land that has been exposed to toxic waste, and identified for clean-up**

**III. Zero/Low Waste – Completely reducing waste from our society. Waste as a resource point of view.**

**RRR – Reduce – Reuse – Recycle**

**Old Way = 3 tons of trash = 1 ton of toxic ash**

**Low Waste Strategy = 3 tons trash = 1 ton compost, 1 ton recyclables, 1 ton refuse**

**Three bin system – Recyclables, Organics, Refuse**

**How to reduce refuse - Producer responsibility, end life of product, reuse.**

