



CHAPTER 19: WASTE

The Generation of Waste

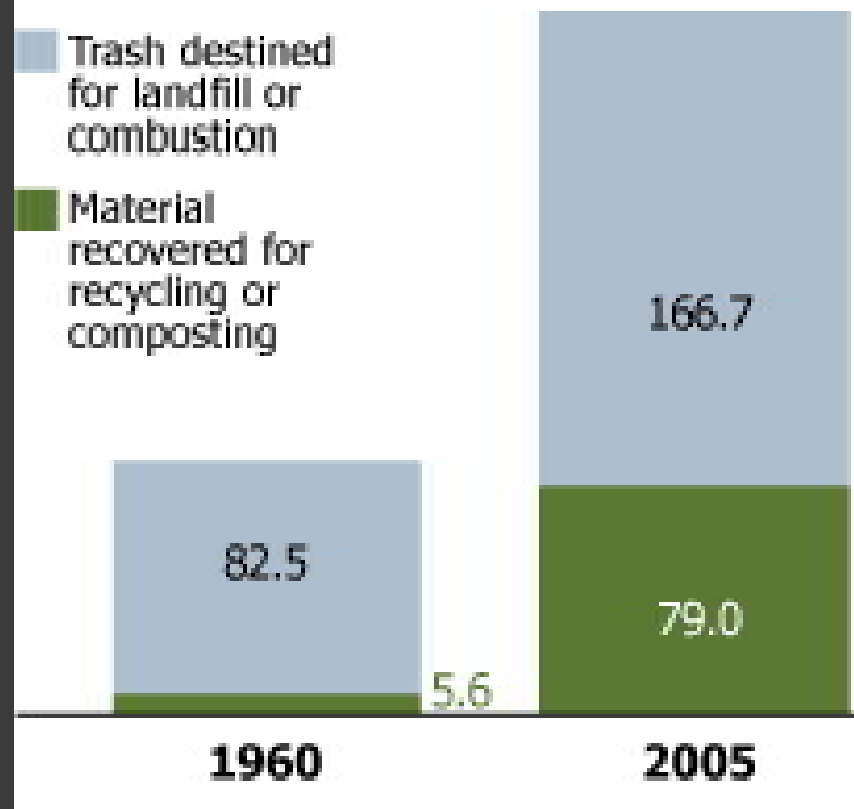
- ◎ **Solid waste** is any discarded solid material, such as garbage, refuse, or sludges
- ◎ Every year, the United States generates more than 10 billion metric tons of solid waste



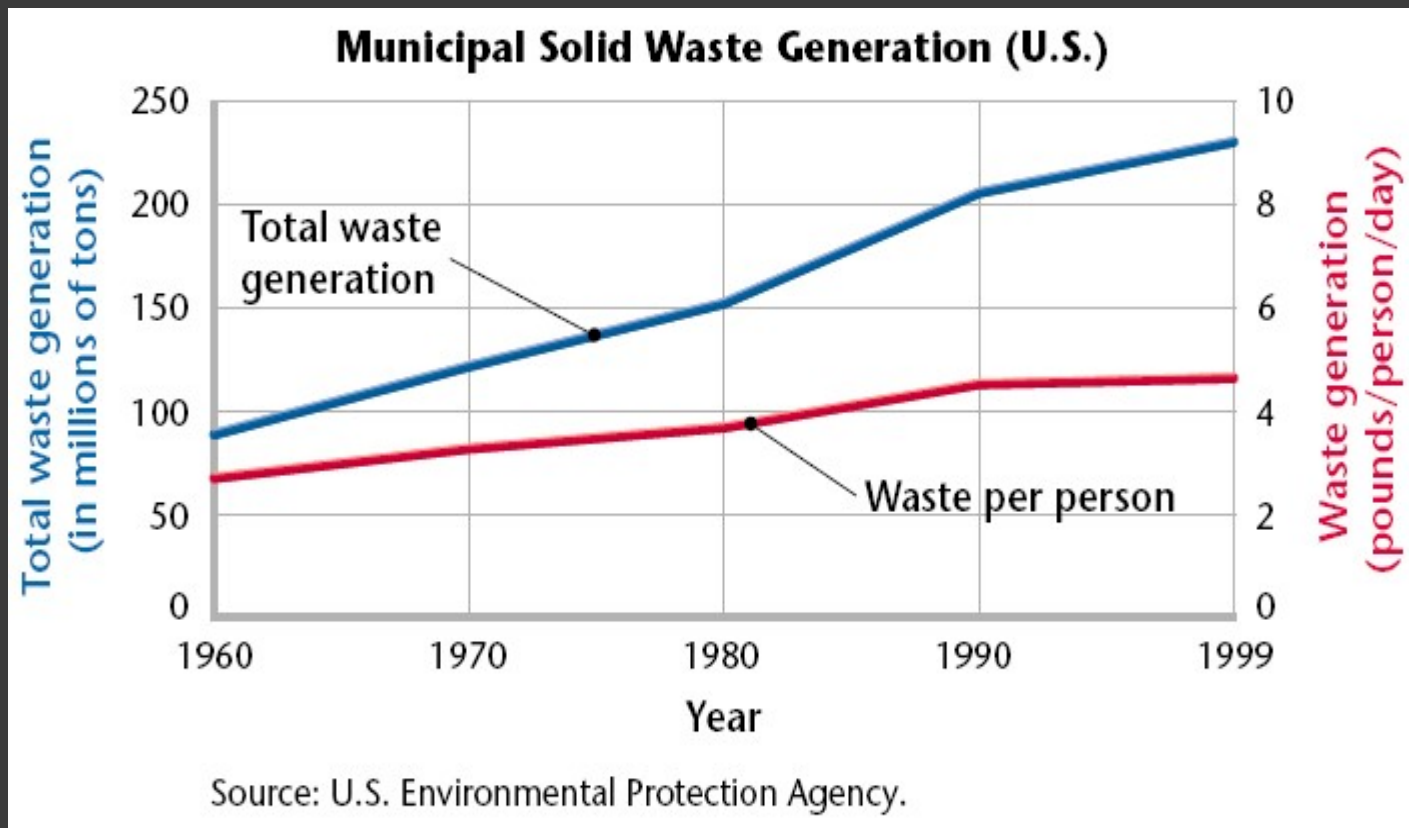
The Generation of Waste

- ◎ Many products we buy today are used once and then thrown away
- ◎ As a result, the amount of solid waste each American produces each year has more than doubled since the 1960s
- ◎ Where does trash go?
- ◎ Where is “away?”
- ◎ **Today, the average person living in the United States produces 4.4 pounds of solid waste per day**

Millions of tons of trash



Population and Waste



Not All Wastes Are Equal

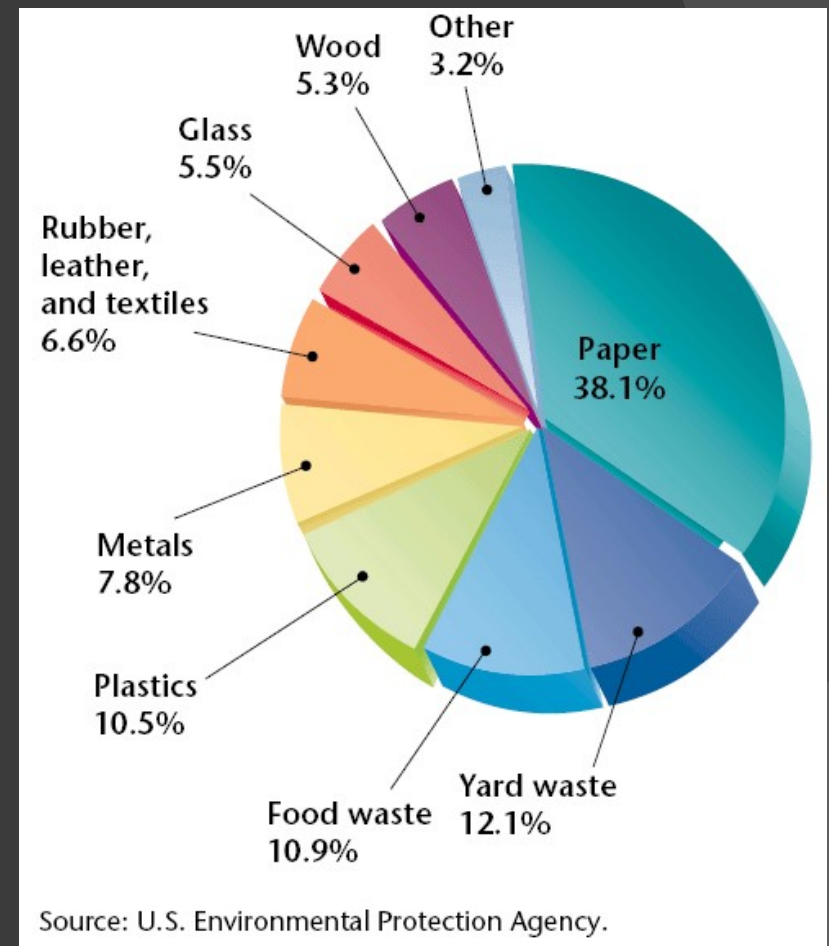
- ◎ Wastes are made from two basic materials:
 - biodegradable materials
 - nonbiodegradable materials.
- ◎ A **biodegradable material** is a material that can be broken down by biological processes
- ◎ **Nonbiodegradable** material cannot be broken down by biological processes

TIME TO BIODEGRADE



Municipal Solid Waste

- ◎ Municipal solid waste creates more than 210 million metric tons each year of solid waste
- ◎ Only 2 %of the total solid waste in the United States
- ◎ Comes from homes and businesses



Solid Waste from Manufacturing, Mining, and Agriculture

- ◎ Agricultural waste makes up 9% of the total solid waste but is biodegradable
- ◎ The increased use of fertilizers and pesticides may cause agricultural waste to become more difficult to dispose of because the waste may be harmful if returned to the soil

Landfills

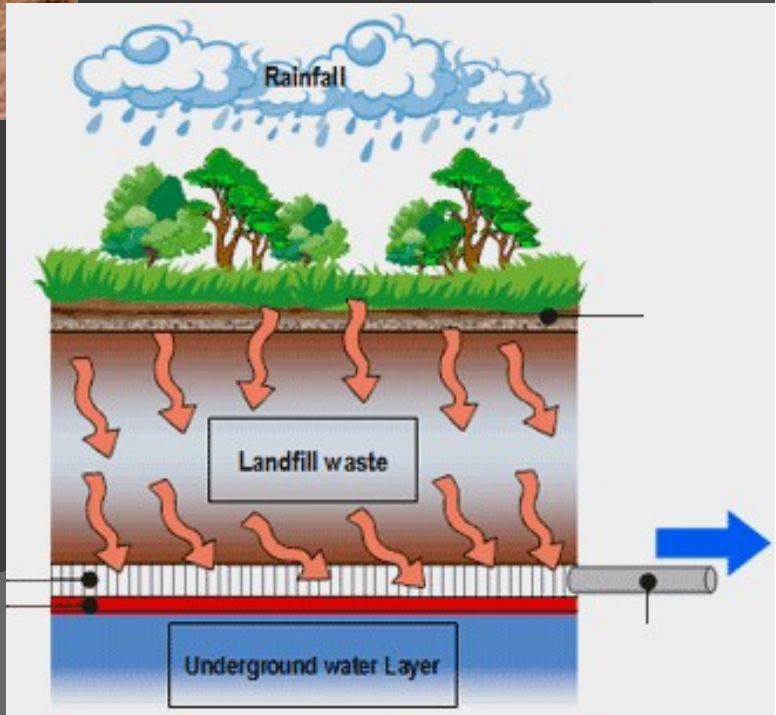
- ◎ A **landfill** is an area of land or an excavation where wastes are placed for permanent disposal
- ◎ More than 50% of the municipal and manufacturing solid waste in the United States ends up in landfills

Waste-disposal method	Percentage of waste by weight
Stored in landfills	57
Recycled	28
Incinerated	15

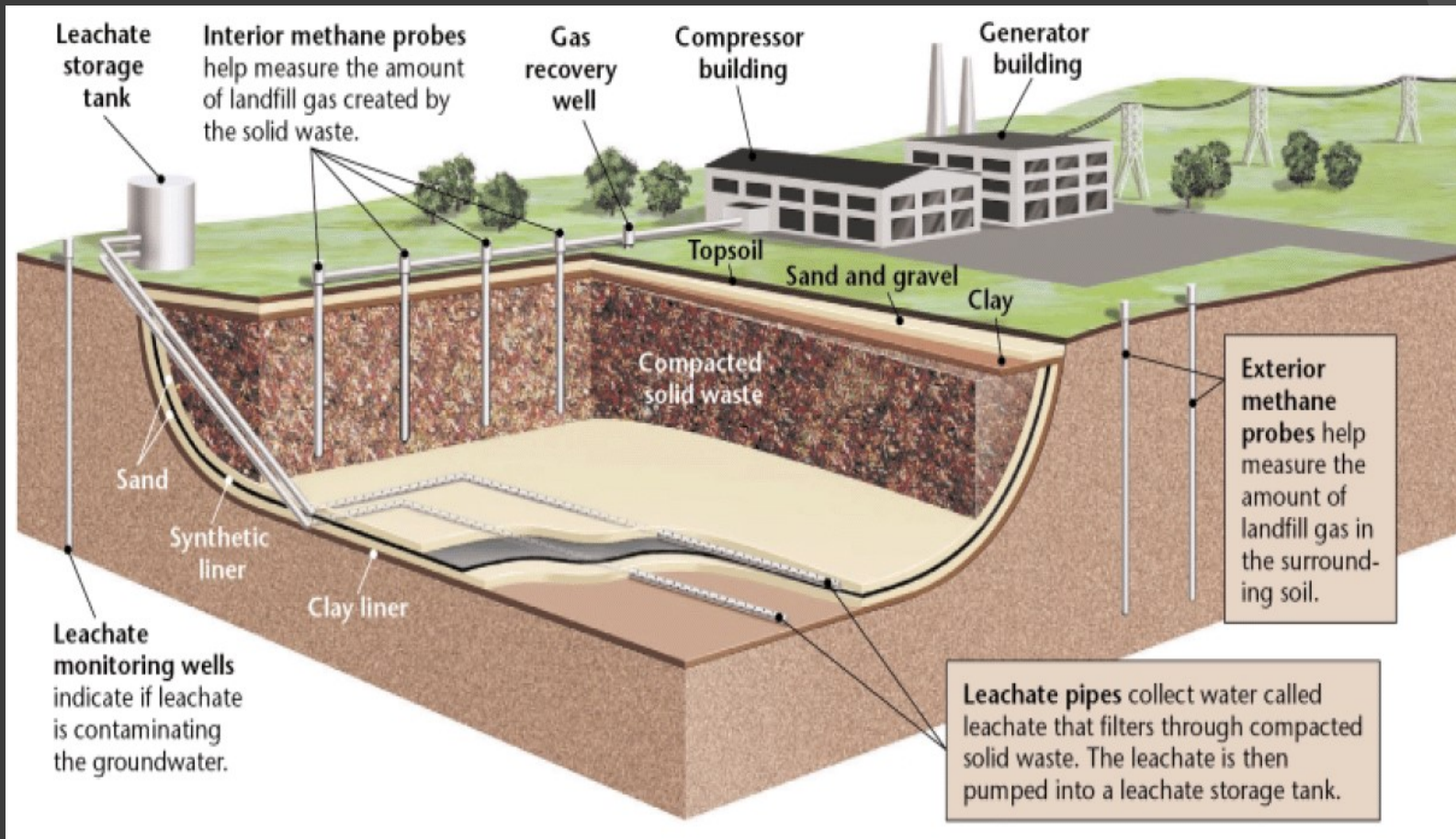


Problems with Landfills

- ◎ **Leachate** is a liquid that has passed through solid waste and has extracted dissolved or suspended materials from waste, such as pesticides in the soil



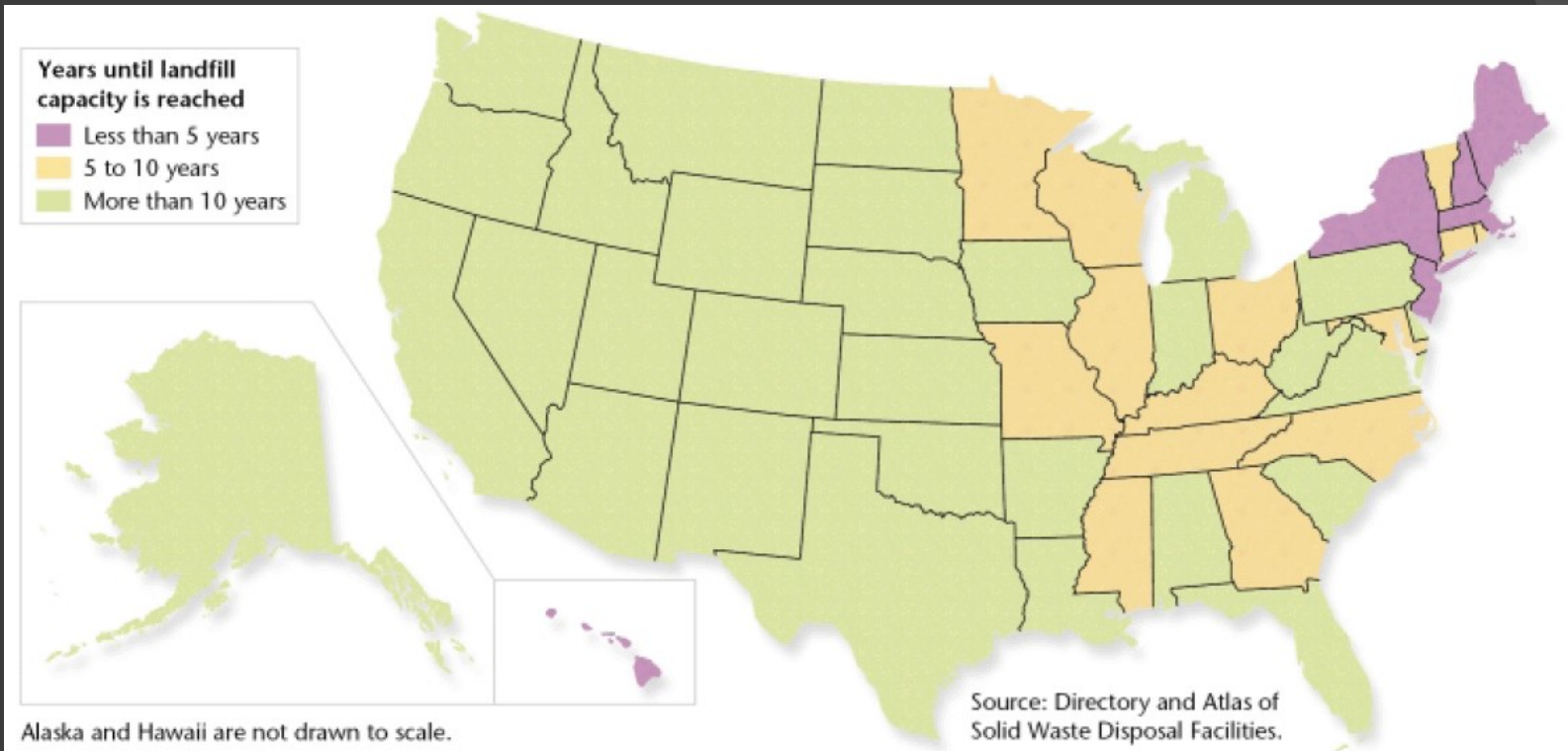
Parts of a Modern Landfill



Safeguarding Landfills

- ◎ **The Resource Conservation and Recovery Act, passed in 1976** and updated in 1984, requires that new landfills be built with safeguards to reduce pollution problems
- ◎ New landfills must be lined with clay and a plastic liner and must have systems for collecting and treating leachate, as well as vents to carry methane out of the landfill
- ◎ More expensive to build

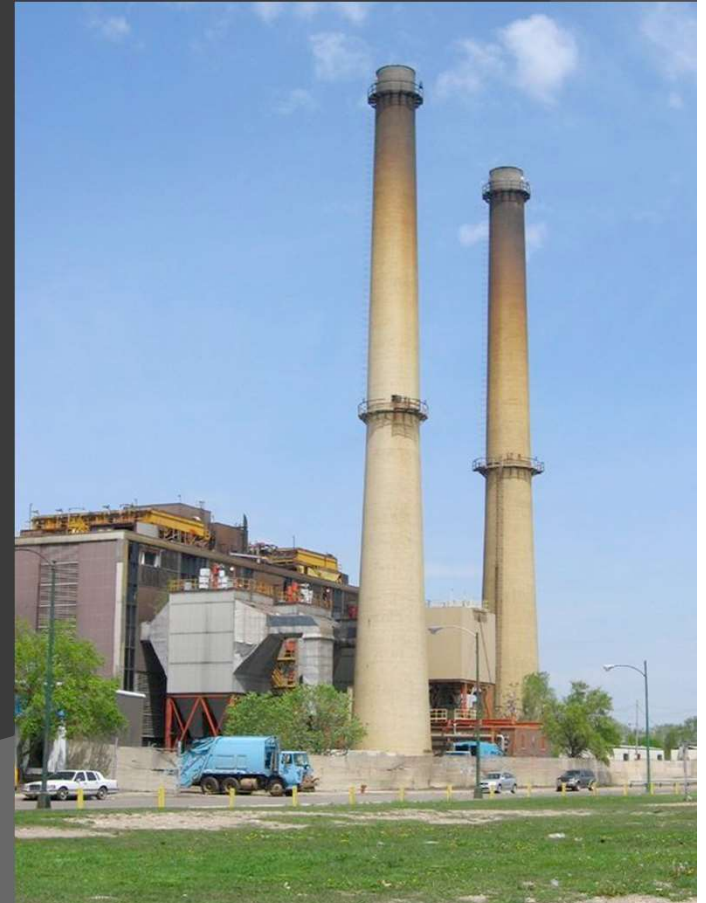
Building More Landfills



The EPA estimates that active landfills in 20 states will be filled to capacity within 20 years.

Incinerators

- ◎ Incinerated materials can be more toxic than before they were incinerated



Reducing Solid Waste

- ◎ **Source reduction** is any change in the design, manufacture, purchase, or use of materials or products to reduce their amount of toxicity before they become municipal solid waste
- ◎ Increases reuse of materials
- ◎ Reduces waste



**Decrease
Air Pollution**

*85% Lower
GHG Emissions**

100% Recycled & Recyclable



**Reduces
Plastic Trash**

No Trees Harmed



**Saves
Trees**



*Water is not used
in production*



**Saves
Water**

made in USA

Recycling

- ◎ **Recycling** is the process of recovering valuable or useful materials from waste or scrap. Recycling also refers to the process of reusing some items
- ◎ 95% less energy is needed to produce aluminum from recycled aluminum than from ore
- ◎ About 70% less energy is needed to make paper from recycled paper than from trees



PLASTIC

includes #1-7 and thin-film plastics
please bundle plastic bags together when possible



ALUMINUM & TIN



GLASS

PAPER

books, white/colored paper,
newspaper, magazines (Tape/staples OK)



RECYCLE

Questions? contact recycling@scu.edu

Composting

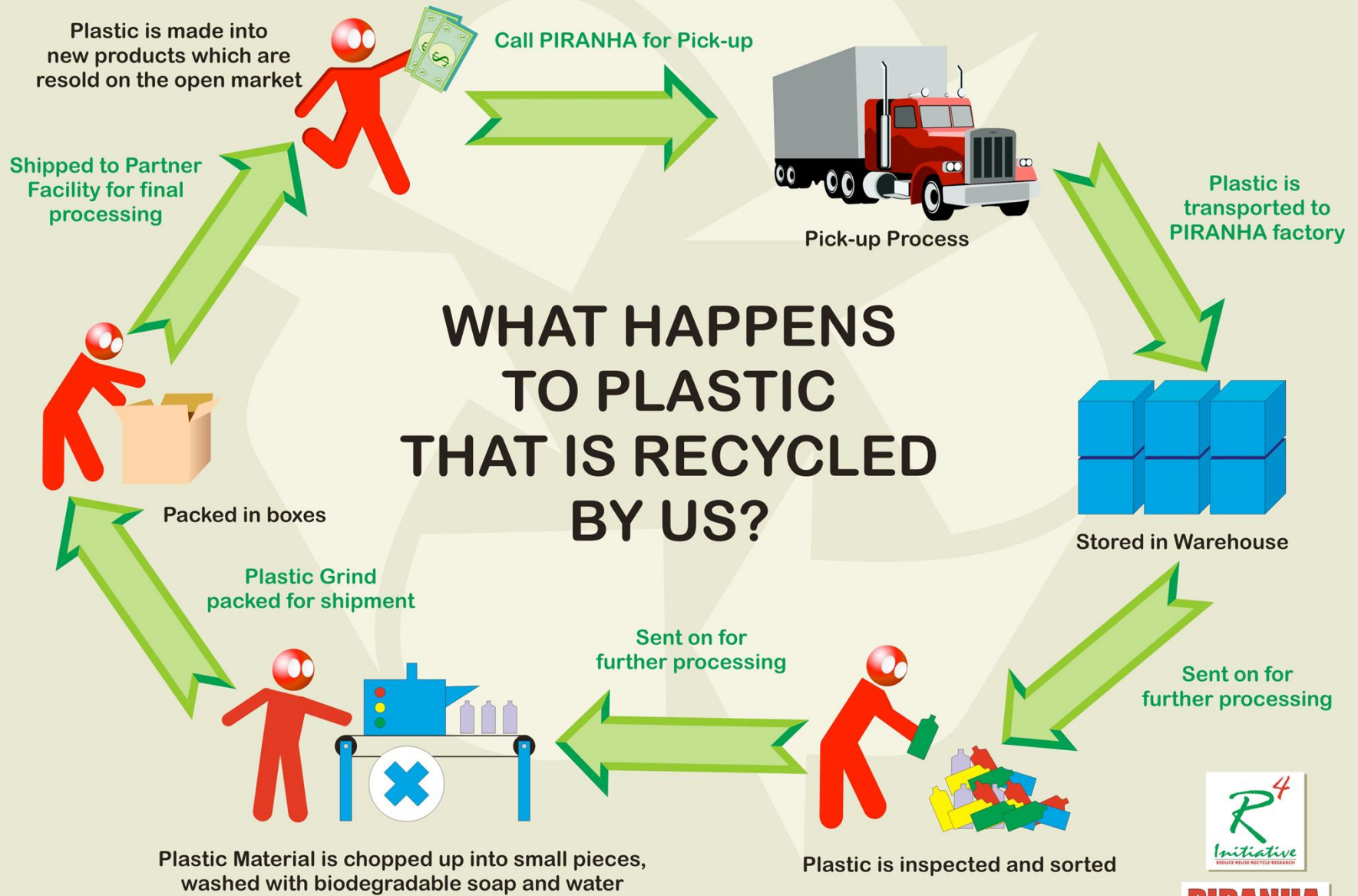
- ◎ **Compost** is a mixture of decomposing organic matter, such as manure and rotting plants, that is used as fertilizer and soil conditioner
- ◎ Compost provides several benefits

Benefits of Composting

- keeps organic wastes out of landfills
- provides nutrients to the soil
- increases beneficial soil organisms, such as worms and centipedes
- suppresses some plant diseases
- reduces the need for fertilizers and pesticides
- protects soil from erosion



PLASTICS RECYCLING OVERVIEW



Degradable Plastics

- ◎ **Photodegradable plastic**, unlike nonbiodegradable plastics, is made to become weak and brittle when left in the sun for many weeks. Eventually, it breaks into pieces
- ◎ **Green plastic**, is made by blending the sugars in plants with a special chemical agent to make plastics



Save ne...
Protec™ me..

100%
DEGRADABLE

The bag that drinks water™

Types of Hazardous Waste

- ◎ **Hazardous wastes** are wastes that are a risk to the health of humans or other living organisms
- ◎ They may be solids, liquids, or gases. They often contain toxic, corrosive, or explosive materials
- ◎ **Some examples are**
 - dyes,
 - cleansers,
 - solvents,
 - plastics,
 - and pesticides.

Types of Hazardous Waste

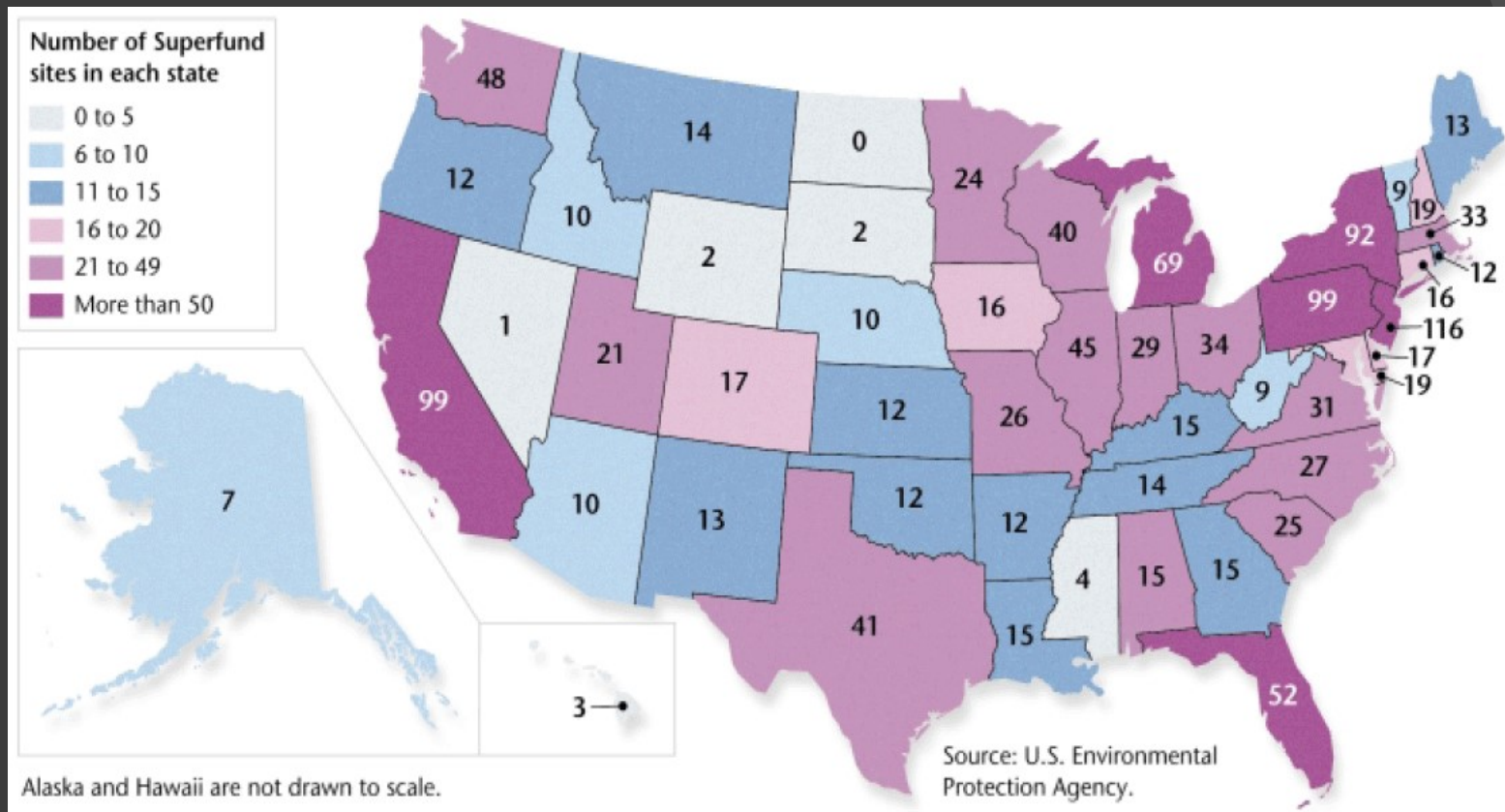
Types of Hazardous Waste

- dyes, cleansers, and solvents
- PCBs (polychlorinated biphenyls) from older electrical equipment, such as heating systems and television sets
- plastics, solvents, lubricants, and sealants
- toxic heavy metals, such as lead, mercury, cadmium, and zinc
- pesticides
- radioactive wastes from spent fuel that was used to generate electricity

Resource Conservation and Recovery Act

- ◎ **The Resource Conservation and Recovery Act (RCRA)** requires producers of hazardous waste to keep records of how their wastes are handled
- ◎ **Superfund Act**
 - This act gives the EPA the right to sue the owners of hazardous waste sites who had illegally dumped waste

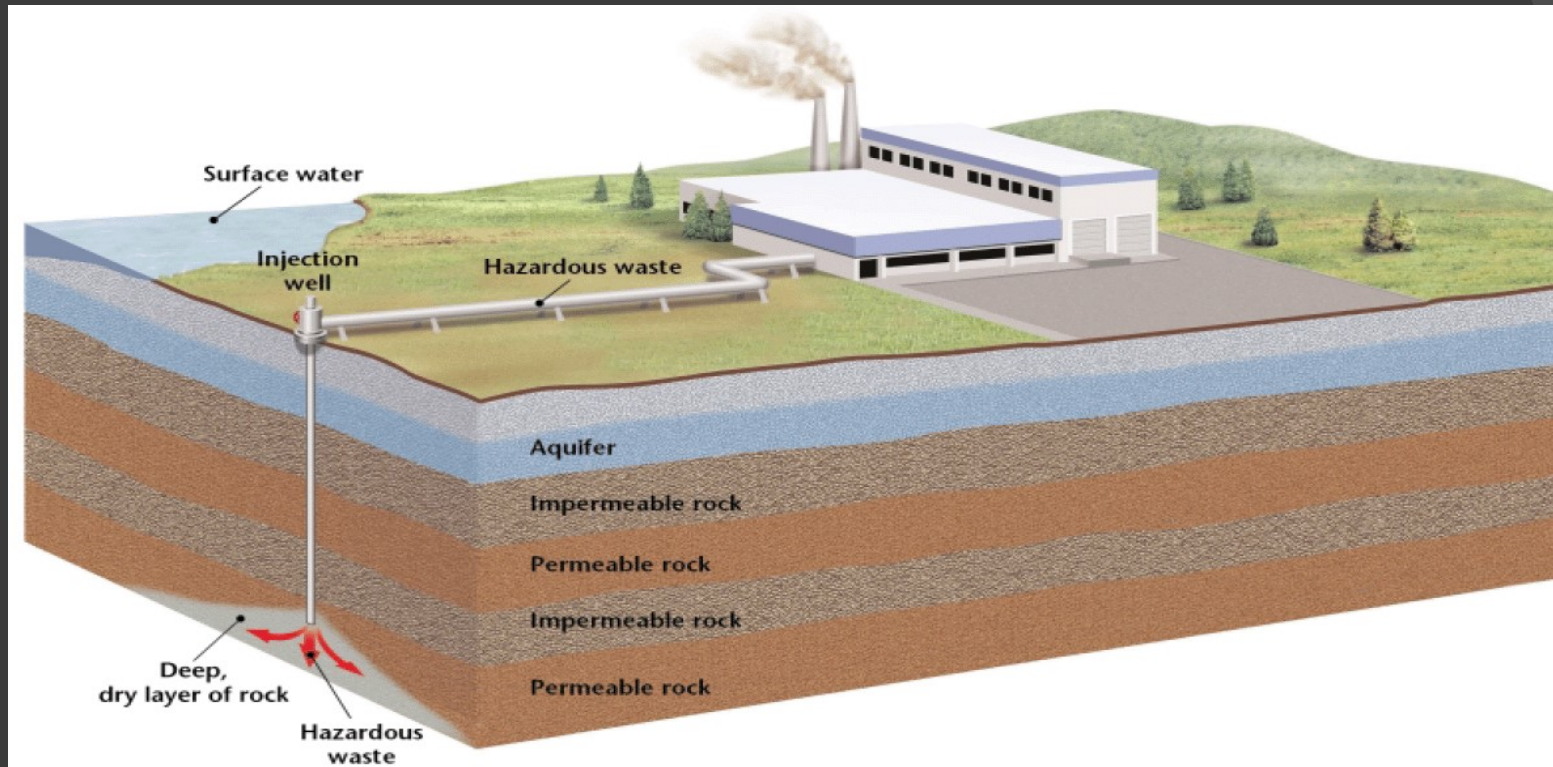
The Superfund Act



Preventing Hazardous Waste

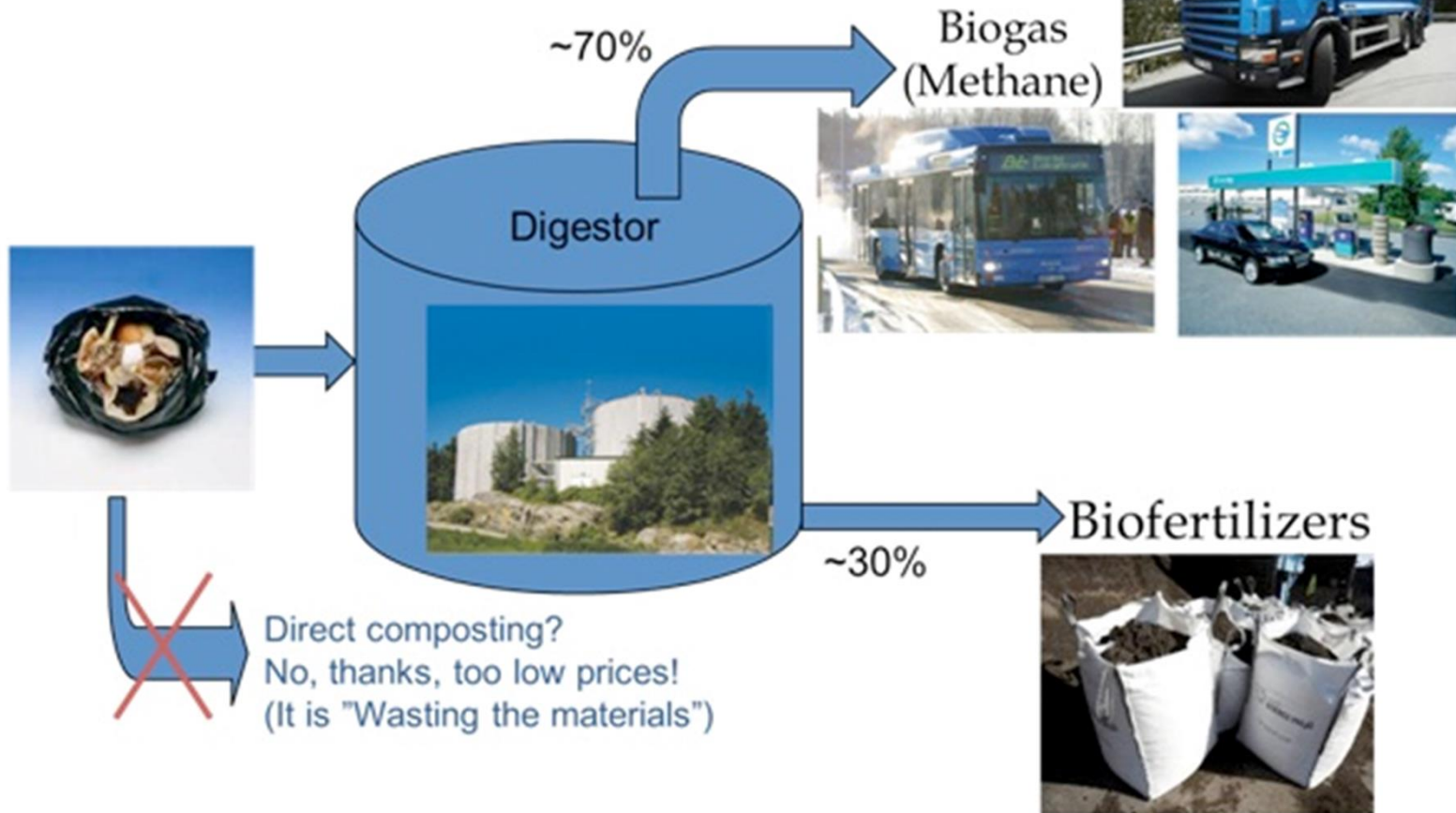
- ◎ **Prevention = Reduce and Reuse!**
- ◎ For example, a company that would usually throw away a cleaning solvent after one use can instead sell it to another company that produces a product that is not harmed by small amounts of contamination in the solvent

Land Disposal





Biological wastes treatment



Hazardous Wastes at Home

- ◎ Household products can also create hazardous waste
- ◎ Some household products should be disposed of in specially designed hazardous waste landfills, and not down the drain or put in the trash for a solid-waste landfill

Common Hazardous Household Products

- motor oil
- pesticides
- paints
- fertilizers
- batteries
- cleaners
- computers
- antifreeze
- mobile phones

Motor Oil

- ⦿ It is illegal to pour motor oil on the ground or throw it in the trash