

WASTE MANAGEMENT

According to EPA regulations, **SOLID WASTE** is

- ▮ **Any garbage or refuse (Municipal Solid Waste)**
- ▮ **Sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility**
- ▮ **Other discarded material**
- ▮ **Solid, liquid, semi-solid, or contained gaseous material from industrial, commercial, mining, and agricultural operations, and from community activities**

Classification of Wastes according to their Properties

- ▮ **Bio-degradable**

- ▮ **Non-biodegradable**

Classification of Wastes according to their Effects on Human Health and the Environment

- **Hazardous wastes**
- **Non-hazardous**

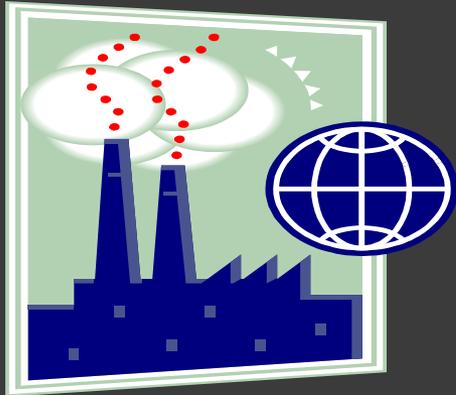
Classification of wastes according to their origin and type

- ▣ **Municipal Solid wastes**
- ▣ **Medical wastes**
- ▣ **Industrial wastes**
- ▣ **Agricultural wastes**
- ▣ **Radioactive wastes**
- ▣ **Electronic wastes**

Sources of Wastes



Households



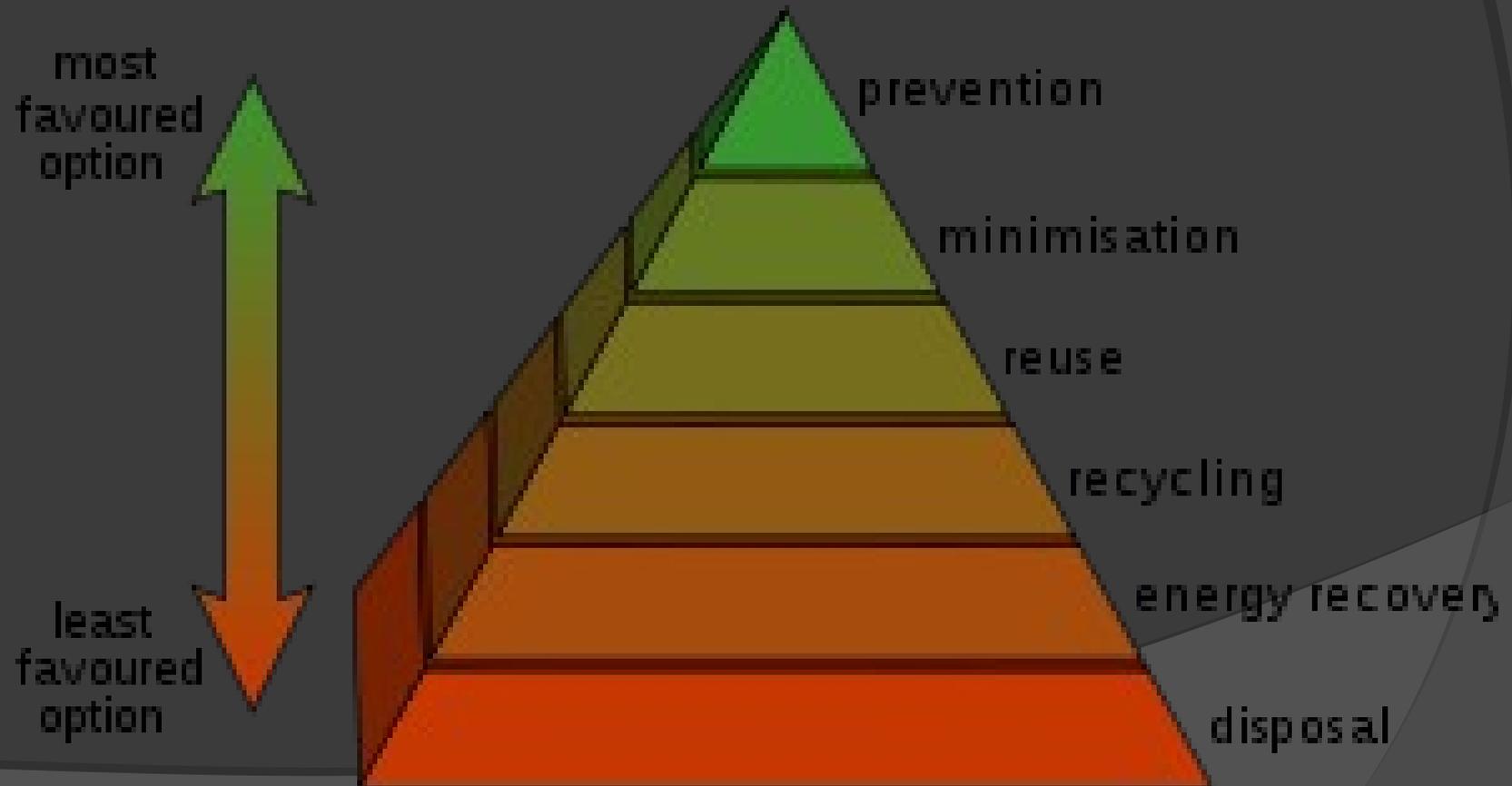
Commerce and Industry

IMPACTS OF WASTE IF NOT MANAGED

- Affects our health
- Affects our coastal and marine environment
- Affects our climate

Waste hierarchy

Waste hierarchy refers to 3 Rs
Reduce, Reuse, Recycle



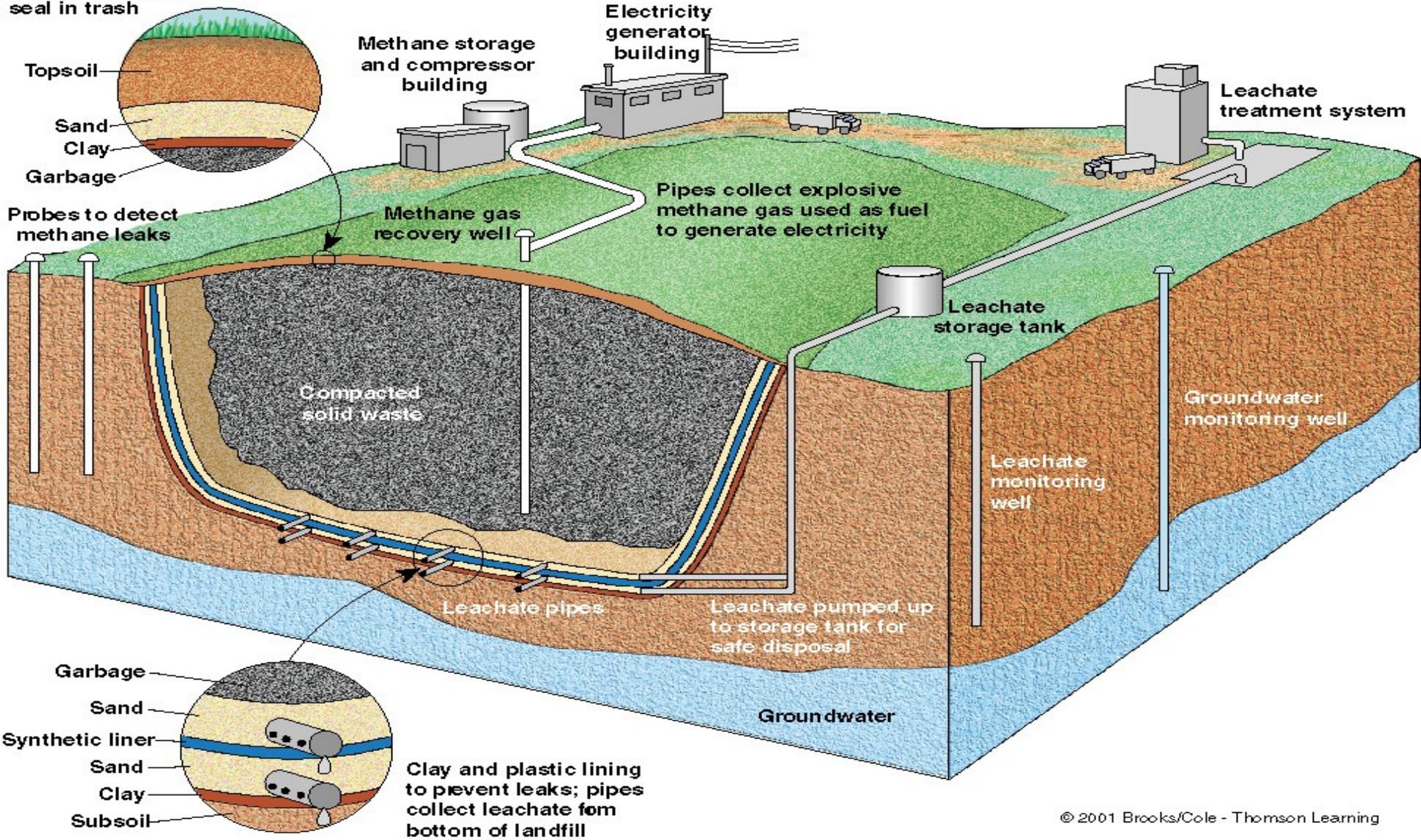
SOLID-WASTE DISPOSAL

- Landfilling
- Incineration
- Pyrolysis
- Gasification
- Plasma gasification

Landfilling

- ▮ Oldest method, waste disposed in landfill.
- ▮ Waste digested anaerobically and produce biogas used as source of heating.

When landfill is full, layers of soil and clay seal in trash



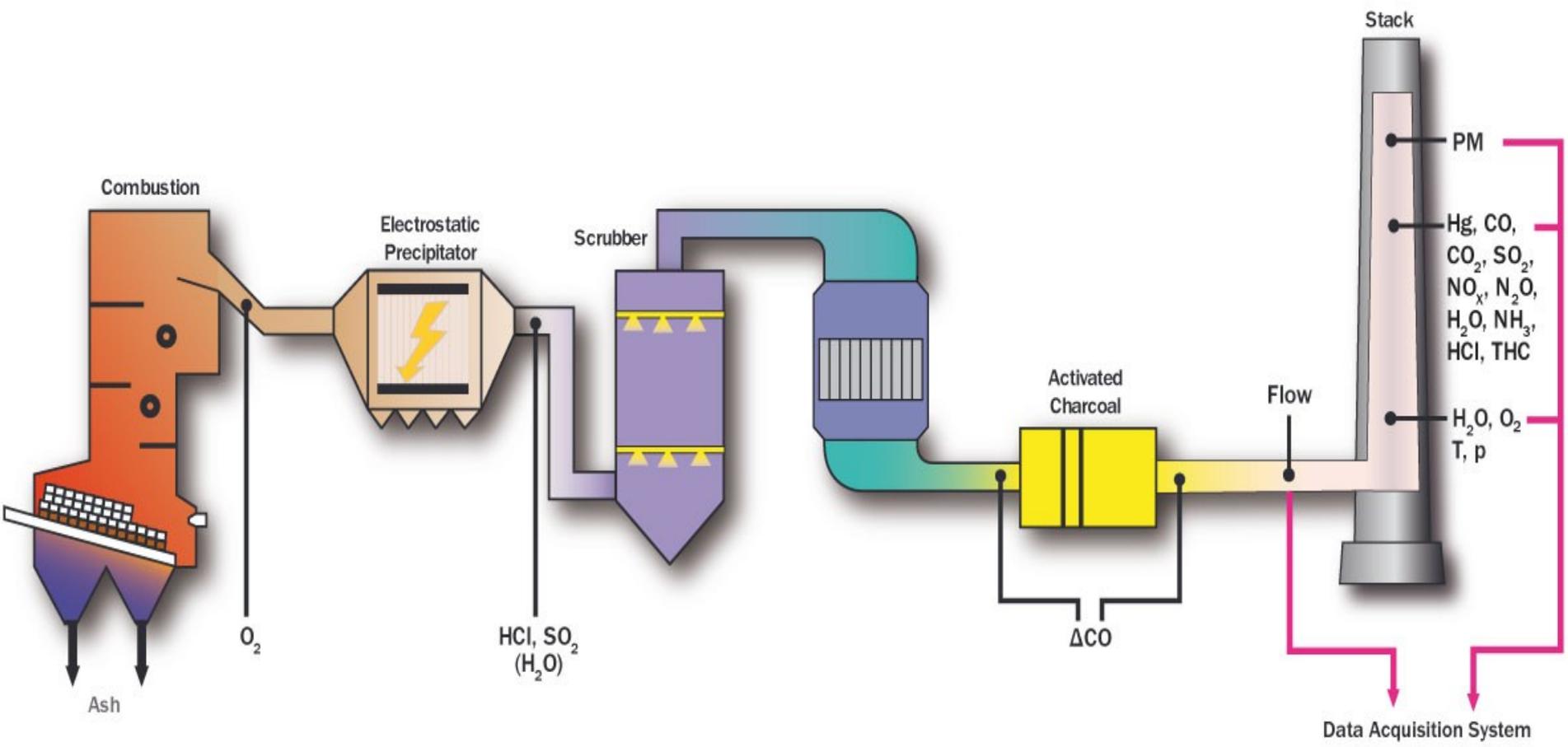
Incineration

- ▮ Mass burn technology in the presence of oxygen.
- ▮ Waste burn in incinerator and converted in to ash and harmful green house gasses.

Waste Incineration

Process Control

Emission Monitoring

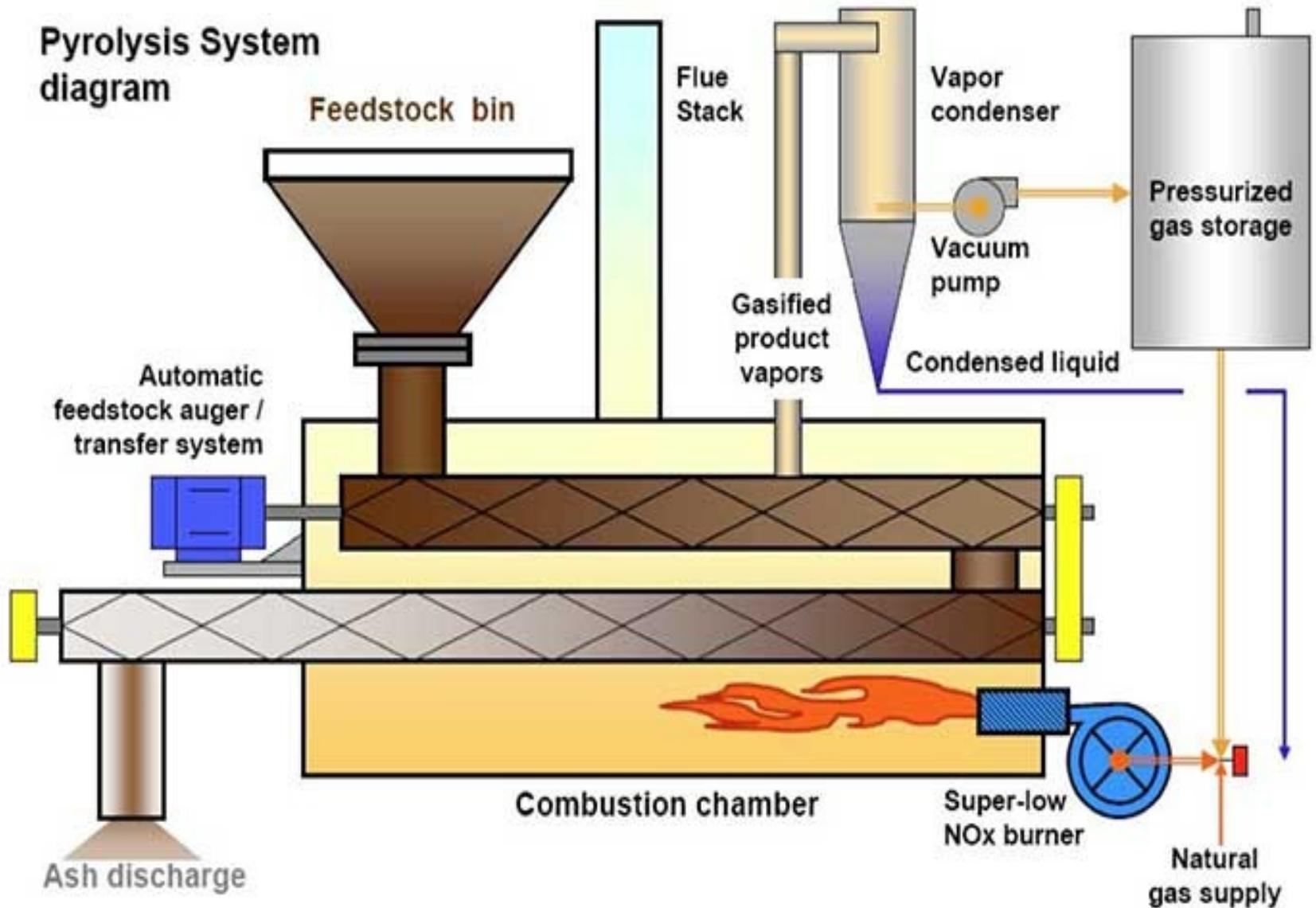


Pyrolysis

- ▮ Thermal treatment in the absence of oxygen at low temperature.
- ▮ Syngas, pyrolysis is liquid and coke obtained as products.

Pyrolysis Process

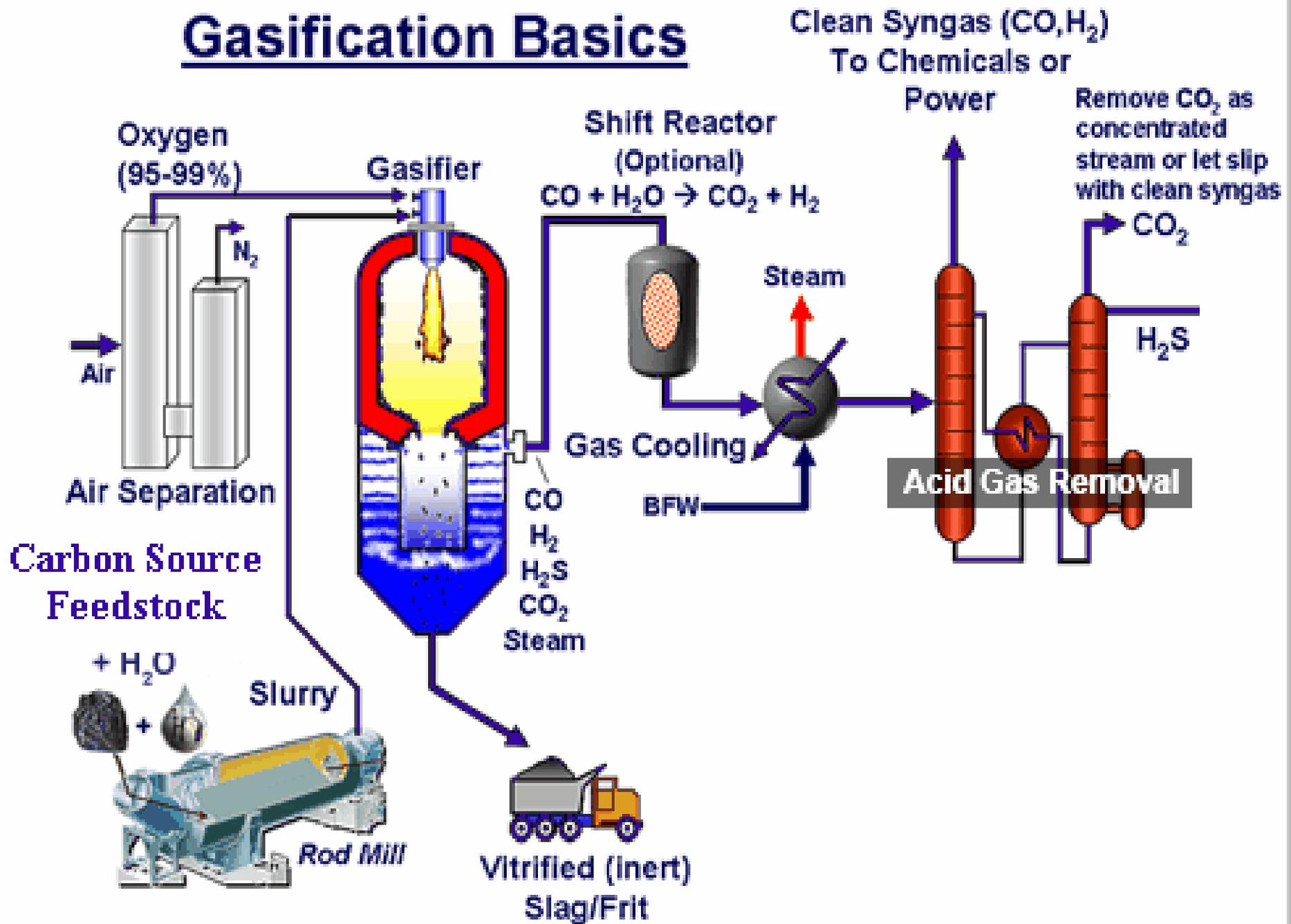
Pyrolysis System diagram



Gasification

- ▮ Partial oxidation of waste at high temperature.
- ▮ Products are low quality synthesis gas (a mixture of carbon mono-oxide and hydrogen used espacially in chemical synthesis), slag (unwanted material of a metal) and metals.

Gasification Basics



Plasma gasification

- ▮ Waste is converted into syngas and vitrified slag at high temperature.
- ▮ No emission of green house gasses.



The End