

AIM: **What efforts have been made to reduce air pollution?**

The Clean Air Act – 1963

Many Revisions: 1965-1990

1. NAAQS (National Ambient Air Quality Standards)
– limits placed on all primary pollutants and O₃
2. set emission standards for automobiles (1965)
3. prevention of air degradation of cleaner areas by new industry (1977)
4. reduction of SO₂ and NO_x emissions to address acid rain (1990)
5. regulation of ODCs (ozone-depleting chemicals) (1990)

Basically all primary and secondary pollutants have been addressed (and re-addressed with revisions and amendments).

6. SO₂ Allowance Trading Program (1990)

– if a regulated facility kept emissions below limitations, the owner could sell extra allowances to another facility or bank the allowance for future use



Emissions Trading or “Cap and Trade”

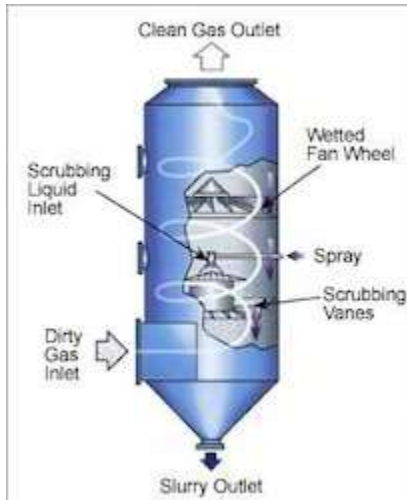
Emissions trading is a government-mandated, market-based approach to controlling pollution by providing economic incentives for achieving reductions in the emissions of pollutants. Various countries, states and groups of companies have adopted such trading systems, notably for mitigating climate change. A central authority (usually a government agency) allocates or sells a limited number of permits to discharge specific quantities of a specific pollutant per time period. Polluters are required to hold permits in amount equal to their emissions. Polluters that want to increase their emissions must buy permits from others willing to sell them.

use a "lime slurry" to absorb sulfur which reduces SO₂ emissions

Technologies that Remove Exhaust / Effluent Gases)

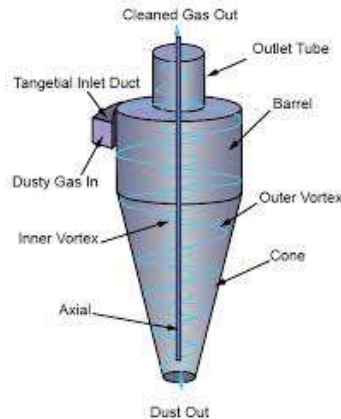
Wet Scrubbers –

a fluid is sprayed over emissions to neutralize acidic particles



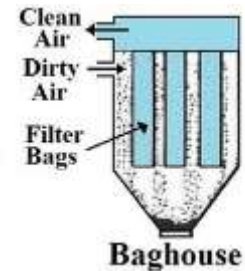
Cyclone Separators –

are separation devices that use the principle of inertia to remove **particulate matter** from flue gases.



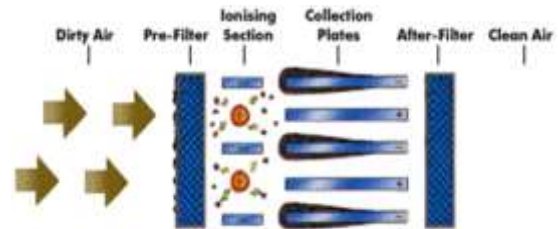
Baghouse Filters -

an air pollution control device that removes **particulates** out of air or gas released from commercial processes or combustion for electricity generation.



Electrostatic Precipitators –

charged particles attract **PMS** to prevent atmospheric release



Afterburners (Thermal Oxidizers) -

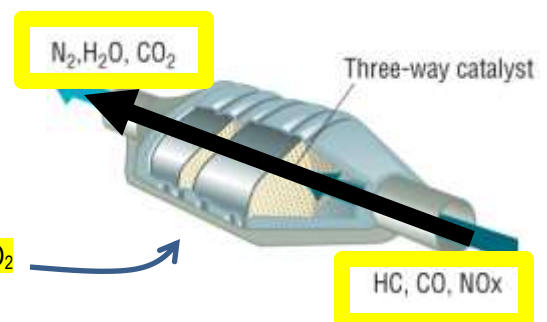
a secondary system used to completely combust (destroy) industrial pollutants such as Hazardous Air Pollutants (HAPs), **Volatile Organic Compounds (VOCs)**, and industrial odors and fumes. During the thermal combustion process, the pollutants are chemically changed into harmless combustion by-products, water and carbon dioxide, both of which can be discharged through the exhaust.

Mandatory Catalytic Converters in Automobiles

(manufactured after 1975) -

an emissions control device that converts toxic gases and pollutants in exhaust gas to less toxic pollutants by catalyzing a redox reaction. Catalytic converters are used with internal combustion engines fueled by gasoline or diesel engines as well as kerosene heaters and stoves.

Converts more dangerous hydrocarbons, CO, and NO_x to N₂, H₂O, and CO₂



2. Clean Water Act of 1972

- regulated the discharge of pollutants into the nation's surface waters (lakes, rivers, wetlands, and coastal areas).
- eliminated the discharge of untreated waste water from municipal and industrial sources and thus make American waterways safe for swimming and fishing

3. Safe Drinking Water Act of 1974

- established minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards
- protects public drinking water supplies (on surface and below ground)

4. Resource Conservation & Recovery Act (RCRA) – 1976

- “Cradle to the Grave” tracking of hazardous wastes
- includes generation of, transportation, treatment, storage, and disposal of toxic waste
- 8 common RCRA metals:

lead	arsenic	cadmium	selenium
mercury	chromium	barium	silver

5. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - 1980

Love Canal: Niagara Falls NY – “Mother of the Superfund” (1942-2004...)

Hooker Chemical Co. dumped 22,000 tons of chemical waste into an abandoned canal and later sold the land to the City of Niagara Falls. From 1954-1978, the community grew and after record rainfall, the chemicals that were buried started leaching from the soil and reaching the surface. High rates of cancer (leukemia), liver & kidney damage, miscarriages, and birth defects were all attributed to human exposure to the chemicals.

- provided the EPA the authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment
- provided for liability of persons responsible for releases of hazardous waste at these sites; and
- established a trust fund to provide for cleanup when no responsible party could be identified.
 - At first, a tax on the chemical and petroleum industries was used to finance the **Superfund**. (Over 5 years, \$1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned hazardous waste sites)
 - In the mid-1990s, ended the tax on industry and shifted the burden to taxpayers
- short-term removals: actions taken to address releases or threatened releases requiring immediate response.
- long-term remedial response: actions that permanently and significantly reduce the dangers associated with releases (or threats of releases) of hazardous substances that are serious but not immediately life threatening. These actions can be conducted only at sites listed on EPA's National Priorities List.