Important consideration for dealing with air pollution

Air pollution dispersion

Ways that uses to control on the air pollution of atmosphere by using different instruments due to the type of pollutants.

1-Pollution control

- Pollution control is a term used in **environmental management.**

It means the control of **emissions and effluents into air, water or soil.** Without pollution control, the waste products from consumption(usees), heating, agriculture, mining, manufacturing, transportation and other human activities, whether they accumulate or disperse, will **degrade**(destroy) the environment.

- In the hierarchy(order) of controls, pollution prevention and waste minimization are **more desirable than pollution control**. In the field of land development, low impact development is a similar technique for the prevention of urban runoff.

2-Practices

- recycling
- reusing
- Waste minimisation
- mitigating(reduce the impact of disasters)
- preventing
- compost

3-Pollution control devices(plans)

- **a-Dust collection systems**
  - 1-Baghouses
  - 2-Cyclones
  - 3-Electrostatic precipitators
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- **b-Scrubbers(gas washing instrument)**
  - 1-Baffle spray scrubber
  - 2-Cyclonic spray scrubber
  - 3-Ejector venturi scrubber
  - 4-Mechanically aided scrubber
  - 5-Spray tower
  - 6-Wet scrubber

A dust collector in Pristina, Kosovo

Pollutant dilution by chimney

Although media attention has shifted towards other environmental issues such as global warming, acid deposition continues to be a problem at the beginning of the 21st century. In fact, acid rain is not a new problem at all. It dates from the middle of the 19th century when a **Scottish chemist**, **Robert Angus Smith**, began to study the effect of air pollution in Manchester, UK, and used the term ‘acid rain’ to describe his findings. What is very new is the scale of the problem.

A **chimney** :is a structure that provides ventilation for hot flue gases or smoke from a boiler, stove, furnace or fireplace to the outside atmosphere. Chimneys are typically vertical, or as near as possible to vertical, to ensure that the gases flow smoothly, drawing air into the combustion in what is known as the stack, or chimney effect. **The space inside a chimney is called a *flue*.** Chimneys may be found in buildings, steam locomotives and ships. In the United States, the term ***smokestack*** (colloquially, ***stack***) is also used when referring to locomotive chimneys or ship chimneys, and the term ***funnel*** can also be used.[1]

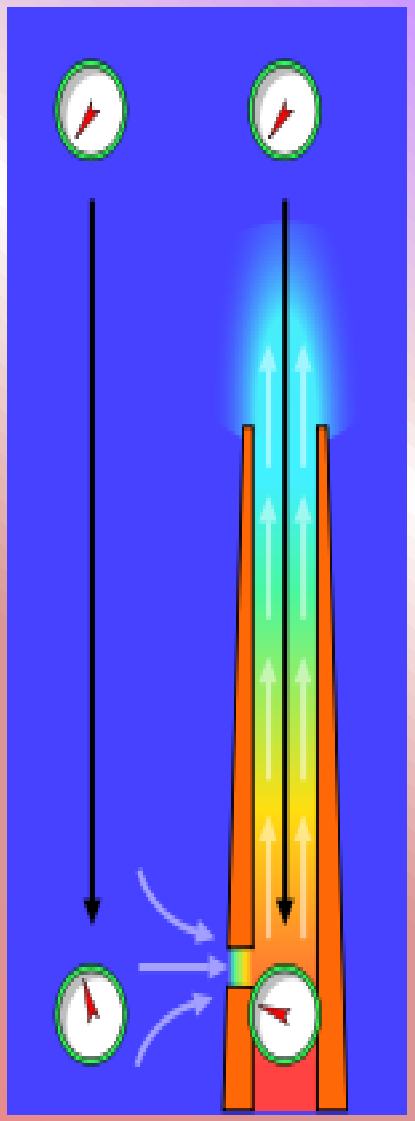
- The height of a chimney influences its ability to transfer flue gases to the external environment via stack effect. Additionally, the dispersion of pollutants at higher altitudes can reduce their impact on the immediate surroundings. In the case of chemically aggressive output, a sufficiently tall chimney can allow for partial or complete self-neutralization of airborne chemicals before they reach ground level. The dispersion of pollutants over a greater area can reduce their concentrations and facilitate compliance with regulatory limits.

Chimney draught or draft

When coal, oil, natural gas, wood, or any other fuel is combusted in a stove, oven, fireplace, hot water boiler, or industrial furnace, the hot combustion product gases that are formed are called: **flue gases**. Those gases are generally exhausted to the ambient outside air through chimneys or industrial flue gas stacks (sometimes referred to as smokestacks).

The combustion flue gases inside the chimneys or stacks are much hotter than the ambient outside air and therefore less dense than the ambient air.

That causes the bottom of the vertical column of hot flue gas to have a lower pressure than the pressure at the bottom of a corresponding column of outside air. That higher pressure outside the chimney is the driving force that moves the required combustion air into the combustion zone and also moves the flue gas up and out of the chimney.



The stack effect in chimneys: the gauges represent absolute air pressure and the airflow is indicated with light grey arrows. The gauge dials move clockwise with increasing pressure

That movement or flow of combustion air and flue gas is called "**natural draught/draft**", "**natural ventilation**", "**chimney effect**", or "stack effect". The taller the stack, the more draught or draft is created.

There can be cases of diminishing(concentrating) returns: if a stack is overly tall in relation to the heat being sent out of the stack, the flue gases may cool before reaching the top of the chimney. This condition can result in poor drafting, and in the case of wood burning appliances, the cooling of the gases before emission can cause creosote to condense near the top of the chimney.

Designing chimneys and stacks to provide the correct amount of natural draught or draft involves a number of design factors, many of which require iterative trial-and-error methods. As a "first guess" approximation, the following equation can be used to estimate(guess) the natural draught/draft flow rate by assuming(supposing) that the molecular mass (i.e., molecular weight) of the flue gas and the external air are equal and that the frictional pressure and heat losses are negligible:

$$Q = CA\sqrt{2gH\,\frac{T_i - T_e}{T_e}}$$

where:

Q = chimney draught/draft flow rate, m^3/s

A = cross-sectional area of chimney, m^2 (assuming it has a constant cross-section)

C = discharge coefficient (usually taken to be from 0.65 to 0.70)

g = gravitational acceleration, 9.807 m/s^2

H = height of chimney, m

T_i = average temperature inside the chimney, K

T_e = external air temperature, K.

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