

Air Pollution Control

A look into the historical and social context of the management of air pollution in the U.S.



AIR POLLUTION

LATEST AIR POLLUTION NEWS

GLOBAL NEWS September 11, 2018 3:02 pm

As U.S. braces for Hurricane Florence, report reveals devastating environmental impact of 2017's Harvey

While the storm itself is expected to be 'extremely dangerous' according to forecasters, another danger lurks after the storm has passed: pollution. Continue reading →



ENVIRONMENT August 22, 2018 8:53 pm

ENVIRONMENT May 22, 2018 8:13 pm

The Taj Mahal is turning yellow and green due to heavy air pollution

India's white-marble Taj Mahal is turning yellow and green as the 17th century mausoleum

Bangkok air pollution at dangerous levels, children asked to stay indoors

Residents in one of the one of the world's top tourist destinations were warned the city's air quality had hit dangerous levels just days after the country's pollution control agency

WEATHER Toronto, ON



Weather Broken Clouds

Traffic Travel times & Incidents

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Air Pollution News

October 29, 2018

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Dandelion Seeds: A New Form of Natural Flight



Air Pollution Linked to Dementia Risk



EU Cars: Diesel Emissions Greatly Exceed Tests

Latest Headlines

updated 2:55pm EDT

Coal Power Plant Regulations Neglect a Crucial Pollutant

Oct 29, 2018 — Researchers determine that particle-forming sulfur dioxide is the most damaging pollutant from Texas' coal-fired power plants that lack equipment to scrub ... [read more >](#)

- Coal Power Plant Regs Neglect a Crucial ...
- Air Pollution and Asthma Attacks
- Warming Cuts Nitrogen Availability to Plants
- Polluted City Neighborhoods Are Bad for Asthma
- A Clearer Path to Clean Air in China
- China: Substantial Changes in Air Pollution
- Health Effects of Air Pollution in India and ...
- Moss Rapidly Detects Air Pollutants
- Climate Change Predictions Could Be 'Inaccurate'
- Air Pollution and Health: Science Daily

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90% of allergy sufferers surveyed would recommend a Dyson Purifier*

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Air Pollution Linked to Decline in Cognitive Performance

A study compares verbal and math test scores to air quality measurements in China and finds a correlation.

What is Air Pollution?

- Air pollution occurs when harmful or excessive quantities of substances including gases, particulates and biological molecules are introduced into the Earth's atmosphere



Air pollution: Half a million early deaths in Europe despite progress

BBC.com

5 hours ago



More than 90% of world's children breathe toxic air, report says, as India prepares for mos...

CNN.com

5 hours ago



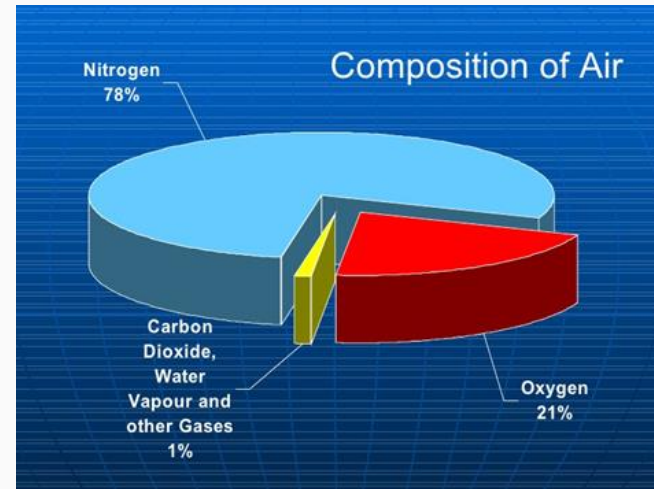
WHO: 600,000 children died from air pollution in 2016 | TheHill

The Hill

4 hours ago

What Causes Air Pollution?

- The natural composition of air is composed of:
 - ~78% Nitrogen
 - ~21% Oxygen
 - ~1% Argon and other trace components, such as carbon dioxide, helium and methane
- Air often carries water droplets, ice crystals and dust
- Dust and other particulate matter in the air can lead to air pollution under unstable atmospheric conditions

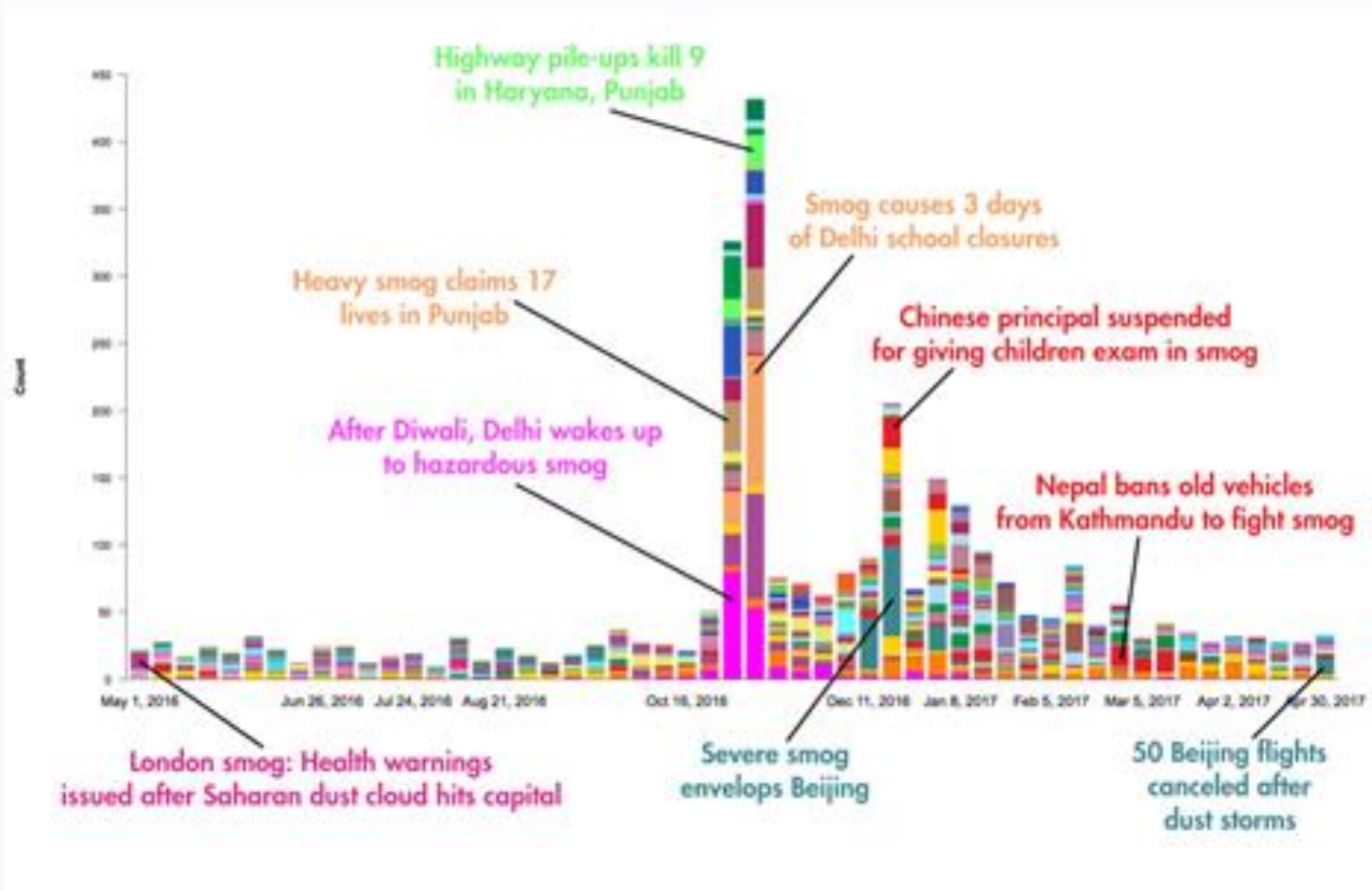


What Causes Air Pollution?

- Smog:
 - Fog or haze combined with smoke and other atmospheric pollutants
 - Composed of nitrogen oxides (NO_x), sulphur oxides (SO_x), ozone, smoke and particulates
- Human-Made Smog:
 - Derived from coal plants, vehicular and industrial emissions, forest and agricultural fires, as well as photochemical reactions of these emissions
- Primary sources of air pollution in the U.S. are power plants and automobiles



Landmark Air Pollution Episodes



New Articles from 2016-2017 Reporting Air Pollution Episodes

Great Smog of London of 1952

- 1952: London, England
- Period of cold weather
- Temperature inversion and windless conditions - Cold, stagnant air trapped under layer of warm air
- Airborne pollutants arising from the abundant use of coal



Great Smog of London of 1952

- Lasted for 3 days – Slowed transportation; increased crime
- Respiratory tract infections (bronchitis, pneumonia, heart failure, etc.)
- 4,000 dead (2,000 more dead in the coming months); 100,000 more fell ill
- Worst air pollution episode in the history of the U.K. – led to legislation to clean air



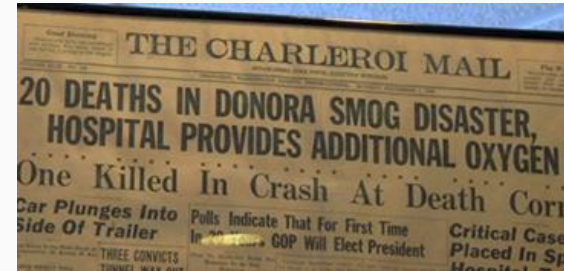
Donora Smog of 1948

- 1948: Donora, PA – 20 miles outside of Pittsburgh, PA
- U.S. Steel's Donora Zinc Works and its American Steel & Wire Plant
 - Hydrogen fluoride and sulfur dioxide emissions
- Temperature Inversion – Pollution trapped in cold air at surface
- Lasted for 5 days – Steel plants shut down; American Red Cross set up emergency treatment in Town Hall



Donora Smog of 1948

- 20 dead (50 more dead in the following months)
- Over 7,000 more fell ill
- All vegetation in 1/2-mile radius of plant killed
- Worst air pollution episode in U.S. history
- Contributed to U.S. Clean Air Movement starting in the 1950s



U.S. Environmental Protection Efforts

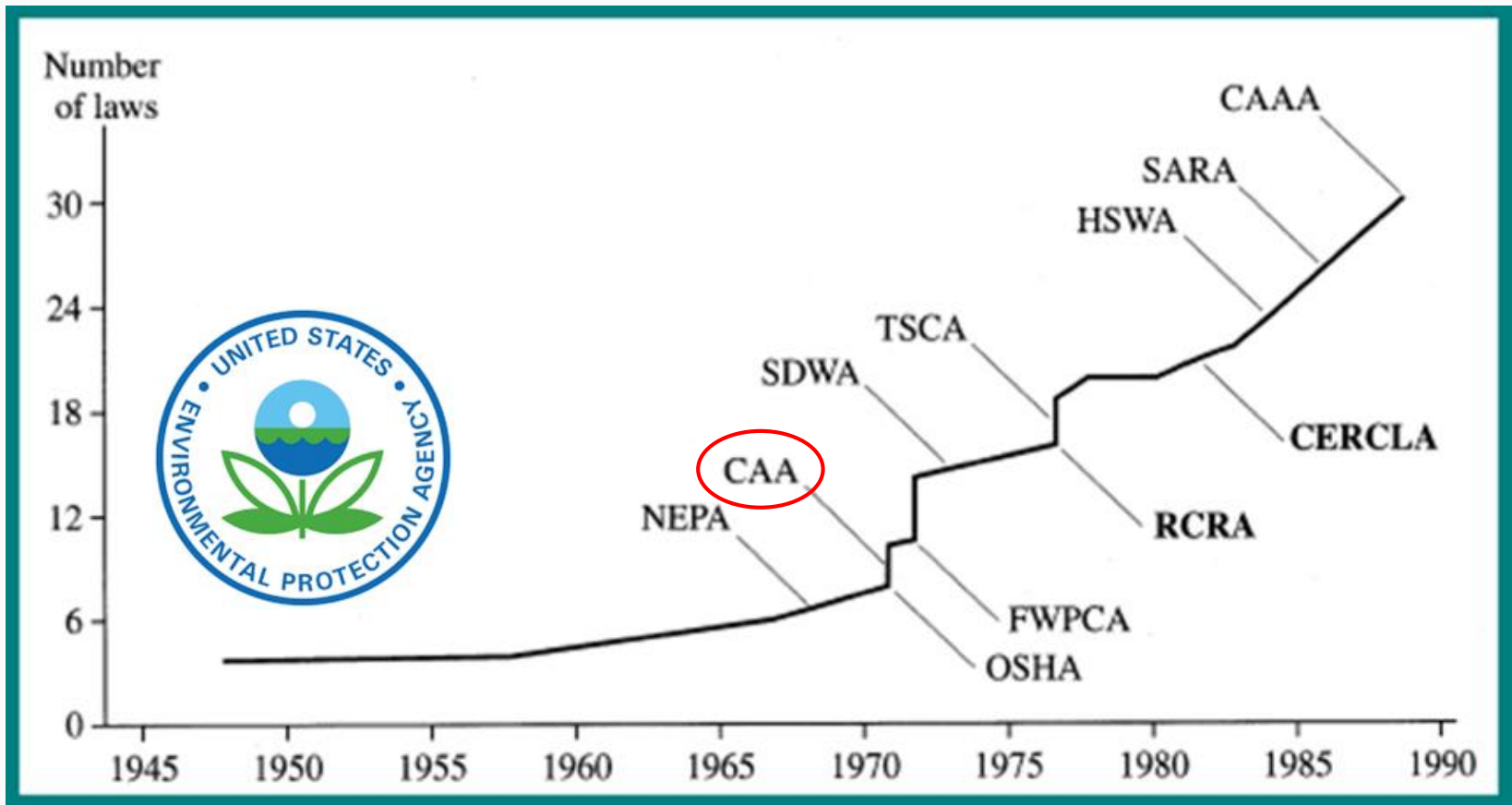
Environmental Protection Efforts

- Common Environmental Values:
 - No adverse effect on our personal health
 - Minimal or no affect on public health
 - Worthwhile to protect species and natural environments
 - Minimize the constraints placed on individual liberties
 - Consider both the costs and benefits of environmental protection efforts

Historical Stages of U.S. Environmental Protection Efforts

- pre-1945: Common Law/Conservation Era
- 1945-1962: Public Works Era
- 1962-1972: Environmental Movement
- 1972-1980: Federal Regulatory Era
- 1980-1990: Refining Regulatory Strategies
- 1990-? : Regulatory Recoil
- post-? : Unknown





Growth of Environmental Laws

Regulation of Air Pollution

- 1955: Air Pollution Control Act – First U.S. legislation pertaining to air pollution research – Granted funds to U.S. Public Health Service
- 1963: Clean Air Act – First U.S. legislation pertaining to air pollution monitoring and control
- 1965: Motor Vehicle Air Pollution Act – Amendment for federal government to set standards for controlling automobile emissions
- 1967: Air Quality Act – Amendment to expand studies of air pollutant emission inventories, ambient monitoring techniques and control technologies

Regulation of Air Pollution

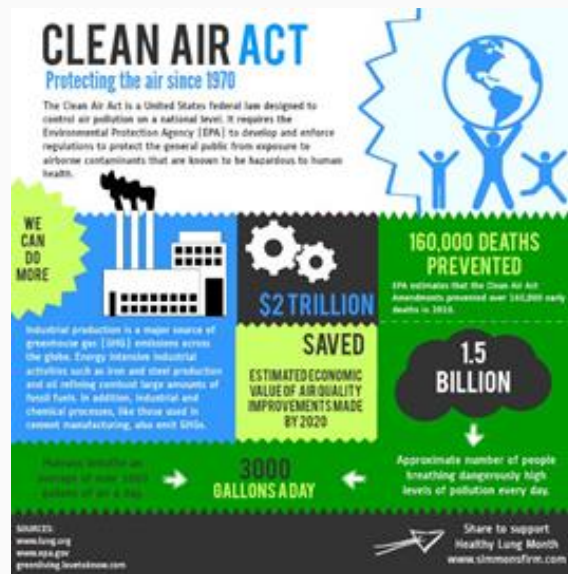
- CAA – Clean Air Act of 1970 (1970: Environmental Protection Agency [EPA] founded)
- Comprehensive federal and state regulations for both stationary (industrial) pollution sources and mobile sources
- Required U.S. EPA to develop and enforce regulations to protect the general public from exposure to hazardous airborne contaminants



President Nixon signing the
Clean Air Act of 1970

Clean Air Act of 1970

- One of most comprehensive air quality laws in the world
- First major environmental law in U.S. history to include provision for citizen suits
- National Ambient Air Quality Standards (NAAQS) set for six criteria air pollutants:
 1. Carbon monoxide
 2. Nitrogen dioxide
 3. Sulfur dioxide
 4. Particulate Matter (PM)
 5. Lead
 6. Ozone



Clean Air Act of 1970

- National Emissions Standards for Hazardous Air Pollutants (NESHAPs) set for air pollutants not covered by NAAQS
- Seven hazardous air pollutants (HAPs) regulated between 1970-1990:
 1. Asbestos
 2. Arsenic
 3. Benzene
 4. Beryllium
 5. Mercury
 6. Vinyl chloride
 7. Radionuclides
- Total of ~190 HAPs identified and regulated today



Amendments to the Clean Air Act

- CAA Amendments of 1977
 - Provision for the Prevention of Significant Deterioration (PSD) of air quality in areas attaining NAAQS
 - As well as non-attainment areas for NAAQS – Areas that do not meet one or more of the federal air quality standards
- CAA Amendments of 1990
 - Address problems of acid rain, ozone depletion and toxic air pollution
 - Established national permit program for stationary sources

Sources of Air Pollution

Activity	Air Pollutants Created	Detrimental Environmental Effects
Energy production from fossil fuels	Carbon dioxide, sulfur oxides, particulates	Increase in greenhouse gases; Acid precipitation
Automobiles and other transportation sources	Carbon dioxide, nitrogen and sulfur oxides, products of incomplete combustion	Increase in greenhouse gases; Acid precipitation
Refrigeration devices, including home, commercial and vehicles	Chlorofluorocarbons	Destruction of the stratospheric ozone layer
Industrial manufacturing	Various depending on industry and processes, including toxic materials	Destruction of the stratospheric ozone layer; Toxic emissions

Indoor Air Pollutants

Sources of Indoor Pollutants



- Detection and identification can be difficult
- In-home combustion: stoves, heaters, cigarettes, etc.
- Volatile and semi-volatile organic compounds sources
 - Cleaners, sprays, “deodorizers”, etc.
 - Building materials
 - Plastics, computers and other electronic devices

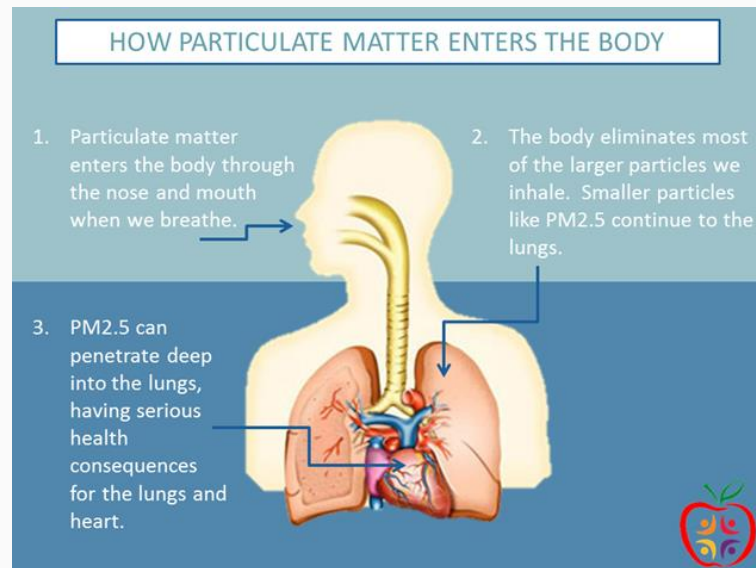
Human Health Effects of Air Pollution

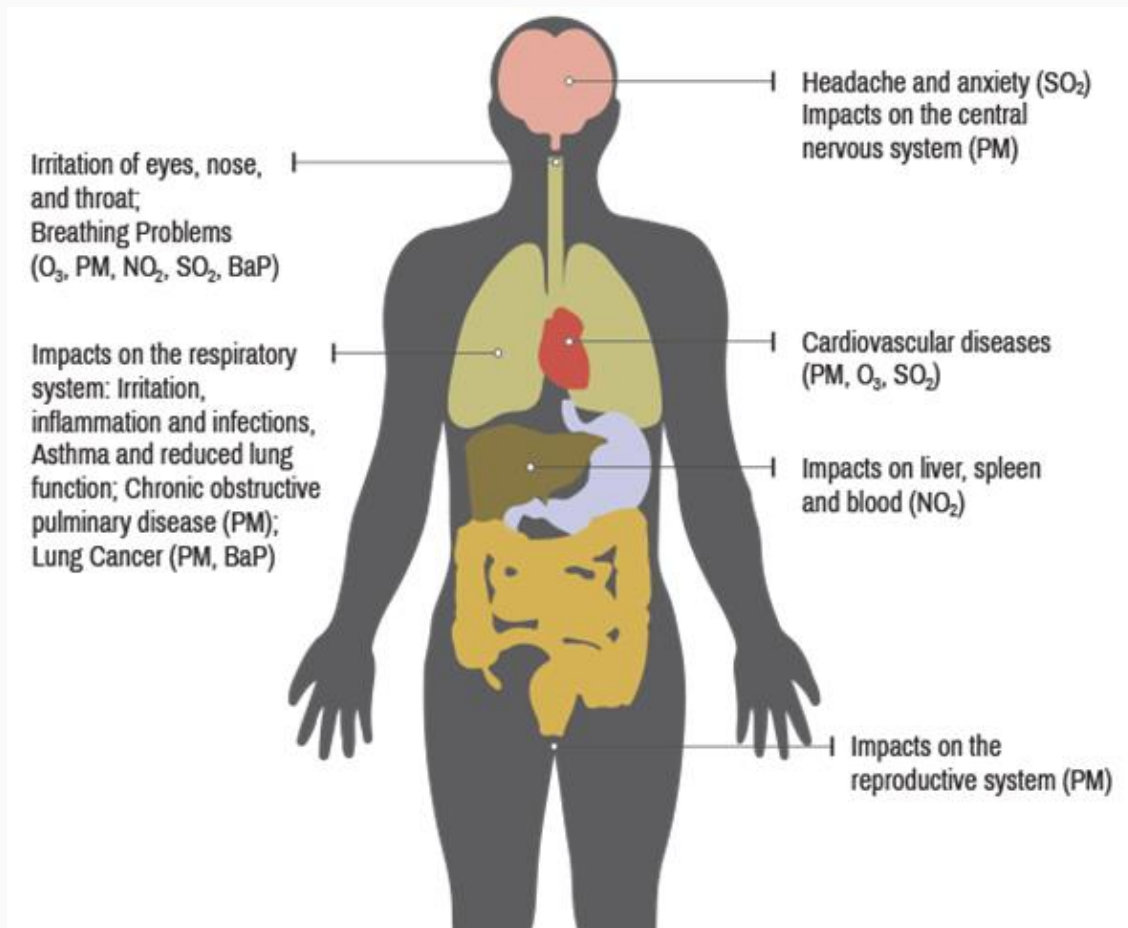
- Common health effects due to exposure to air pollution:

- Eye irritation
- Respiratory tract irritants
 - Results in inflammation
 - Chronic inflammation can lead to scarring

- Chronic Respiratory Health Effects:

- Bronchial asthma
- Chronic bronchitis
- Cancer of the bronchus or lung cancer





Human Health Effects of Air Pollution

Environmental Health Effects of Air Pollution

- Greenhouse Gas (GHG) Pollutants
 - Such as carbon dioxide, methane and nitrous oxide
 - Gases which impede the exit of reflected solar radiation from Earth's atmosphere
 - Leads to changes in global temperature, changing sea levels

