Green House Effects

Greenhouse Gases Warm the Earth

About half of the sun's incoming energy reaches the Earth's surface. The rest is reflected back into space or is absorbed by the atmosphere. The Earth absorbs most of the energy that reaches its surface and re-emits it as heat.

The atmosphere contains gases such as water vapor and carbon dioxide which absorb, or trap, some of the rising heat and return it back to Earth. This warming of the planet's surface is called the greenhouse effect. Without it, the rising heat would escape directly into space and Earth would be much colder.

Life Depends on The Greenhouse Effect

The greenhouse effect keeps the Earth's average surface temperature at about 60°F (15°C). If there were no greenhouse gases in the atmosphere, the planet's temperature would be 0°F (-18°C), too cold for most life. Most of the heat radiated from the Earth's surface would be lost directly to outer space.

Mars has a very thin atmosphere with a weak greenhouse effect. Its surface is much colder than Earth's. In fact, it is frozen.Venus has an intense greenhouse effect. Its atmosphere is thick with carbon dioxide and other gases that trap heat. The surface of Venus is much hotter than Earth's , hot enough to melt lead.

However too much greenhouse effect on Earth can be harmful to human life and poses a threat to existence of all life forms. In the following pages, we will go on the illustrate how destructive human activities have contributed to the intensifying of the greenhouse effect.

Intensified greenhouse effect being the cause , will result in the worsening of global warming.

How We Are Altering The Earth's Atmosphere

Human activities are intensifying the natural greenhouse effect. Every year we release billions of tons of heat-trapping gases to the atmosphere. In doing so, we are setting the stage for a warmer Earth. Carbon dioxide: industry, transportation, and deforestation. Transportation is a source of carbon dioxide emissions. Industry is a major source of heat-trapping gases.
Methane: rice farming, cattle, landfills, fossil fuel production.
Nitrous oxide: fertilizers, sewage treatment plants
Fluorocarbons: refrigerants, other industrial product

Global Warming Is a Problem

Expecting The Unexpected : "We're altering the environment far faster than we can possibly predict the consequences. This is bound to lead to some surprises."
--Dr. Stephen Schneider, National Center for Atmospheric Research

Nasty Surprises: Some of the ways that Earth may respond to global warming could be gradual; others could be rapid. By continuing to add greenhouse gases to the air, we may be surprised by some nasty changes.

Escaping Methane: As the Arctic warms, huge amounts of methane now frozen under the ocean and land could escape into the air. Because methane is a greenhouse gas that traps heat in the atmosphere, these added emissions could cause the Earth to warm even faster than now expected.

Rapid Sea Level Rise: Part of the West Antarctic ice sheet rests precariously on the sea floor. As the sea warms, the ice might become destabilized, break up and melt. As a result, over the next 300 years sea level would rise faster than currently predicted.

Change of Course: Warmer water temperatures might lead to changes in the course of major ocean currents. Their paths determine the distribution of ocean temperatures and nutrients that sustain marine life. If the currents were to change direction, entire marine ecosystems could be disrupted.

The Ozone Hole Not to Be Confused With the Greenhouse Effect

Chlorofluorocarbons (CFCs) and related industrial gases have thinned the ozone layer in many places. The ozone hole is the area over Antarctica where damage has been the greatest. The icy clouds there speed up chemical changes initiated by CFCs that resul t in destroying ozone. Ultraviolet light passing through damaged areas can harm many forms of life on Earth. In humans, ultraviolet light can cause skin cancer and cataracts.

The ozone layer, a blanket of gas in the upper atmosphere, shields the Earth from the sun's harmful ultraviolet rays. The ozone hole, a gap in this layer, does not intensify the greenhouse effect and should not be confused with it.
The "good" protective ozone layer in the upper atmosphere should be distinguished from "bad" ozone in the lower atmosphere, a major component of smog.

Carbon Dioxide CO_2

Carbon Dioxide Increased Drastically By More Than 30% Since 1750
Carbon dioxide, a colourless and odorless gas, is consistently cycled through the Earth's water, air, animal and plant life. Humans exhale carbon dioxide as they breathe. Plants absorb it from the air during photosynthesis. It is also absorbed in the oceans and, combined with other chemicals, stored in sediments on the ocean floor.

Factors Causing The Rise of Carbon Dioxide

Each year we add more than 30 billion tons of carbon dioxide to the air mainly by burning fossil fuels, and cutting down and burning trees.

Fossil Fuels

Fossil fuels contain carbon, thus burning them creates carbon dioxide. We use coal, oil and natural gas to generate electricity, heat our homes, power our factories and run our cars. All this burning releases billions of tons of carbon dioxide every year.

Fossil fuels such as coal, oil and natural gas were created chiefly by the decay of plants that flourished millions of years ago. Burning these fuels unlocks the carbon stored by these plants and releases it to the air as carbon dioxide.

Fewer Trees Mean More Carbon Dioxide

As they grow, trees take carbon dioxide from the air through photosynthesis. Destroying forests releases carbon dioxide, increasing its level in the atmosphere. Deforestation accounts for about 20 percent of the carbon dioxide increase from human activities.

Until 50 years ago most of the carbon dioxide from deforestation was released from temperate zones. Now tropical deforestation is the largest source. A forested area about the size of Central Park in New York City (860 acres) is destroyed every 15 minutes in the tropics.

Tropical forests are being burned and cut for farming, mining and raising cattle. This increases the amount of carbon dioxide in the atmosphere. It also contributes to the loss of thousands of animal and plant species every year.

Cars Puffing Carbon Dioxide

Burning one gallon of gasoline generates 22 pounds of carbon dioxide.
When gasoline is burned, the carbon in it combines with oxygen in the air to form carbon dioxide. Because the oxygen adds weight, the newly formed carbon dioxide weighs more than the original unburned fuel.

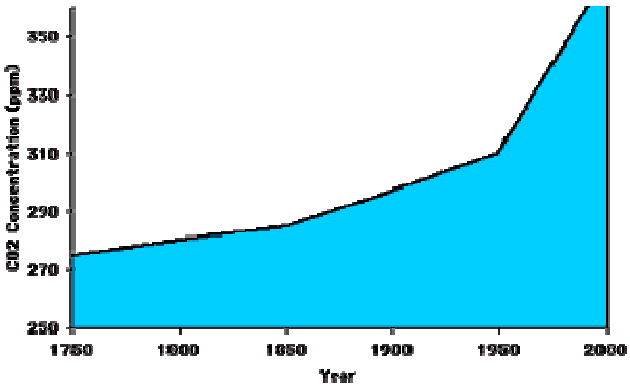
There are over 600 million motor vehicles in the world today. If present trends continue, the number of cars on Earth will double in the next 30 years. As global population booms, car ownerships and burning of gasoline will take on a dramatic rise. Thus the emission of carbon dioxide is expected to escalate in years to come.

It takes a pound of coal to generate the electricity to light a 100-watt bulb for 10 hours. For every pound of coal we burn, nearly three pounds of carbon dioxide go into the atmosphere.

Sulfur Dioxide

Burning coal and other fossil fuels also releases sulfur dioxide, polluting the air and forming a haze that blocks sunlight. This haze cools the climate, partly masking the greenhouse effect.

Carbon Dioxide on the Rise



Since 1750, carbon dioxide in the air has risen by more than 30%, due to human activities. It could double by the year 2065.

Trapping Duration

The carbon dioxide we release today could still be trapping heat hundreds of years from now.

How To Reduce the Amount of Carbon Dioxide Going into the Air

1) Use public transportation, walk or bike to school or work. If you must drive, join a carpool and use a car that gets high mileage.

2) Use energy-efficient appliances and weatherize your home.

3) Use renewable energy sources like solar heat or wind power, which don't emit carbon dioxide.

4) Switch from coal and oil to natural gas in power plants and factories. Natural gas releases the least amount of carbon dioxide**Methane CH_4**

Methane More Than Doubled Since 1750

Methane, also called swamp gas, is colorless and odorless. It is generated naturally by bacteria that break down organic matter in wetlands and in the guts of termites and some other animals. It also escapes from natural gas deposits.

Source Of Methane From Garbage

Methane gas escapes from garbage landfills and open dumps. It also leaks out during mining, extraction and transportation of coal, oil and natural gas. Instead of allowing it to escape, we could collect this methane and use it as fuel.

Factors Causing The Rise of Methane

Each year we add 350 to 500 million tons of methane to the air mainly by:

- Raising livestock
- Coal mining and drilling for oil and natural gas
- Rice cultivation
- Disposing of garbage in landfills
- Burning forests and fields

Increasing Rice Cultivation Raises Methane
Farmland for rice has doubled in 45 years.
Rice, the most important grain crop, feeds one-third of the world's people. Most types of rice grow in flooded fields. Bacteria in the waterlogged soil release methane.

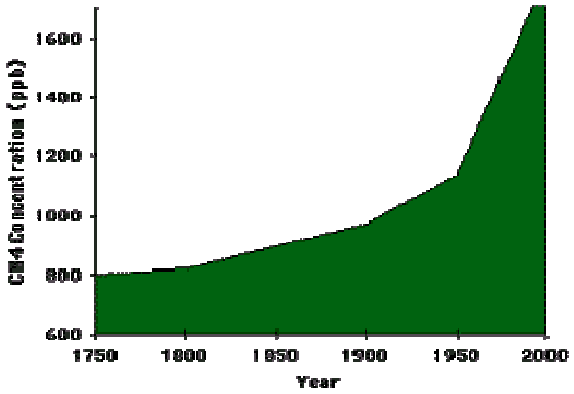
More Livestock Means More Methane
Every time cattle burp, Methane is released.
Bacteria in the gut of cattle break down the food these animals eat, converting some of it to methane gas. A cow can belch up to a half-pound of methane a day.

Sheep, goats, buffalo and camels also belch methane.

Because of rapidly growing world population and greater demand for meat and dairy products, the number of cattle has doubled in the past 40 years.

There are now 1.3 billion cattle, each burping methane several times a minute.

Methane on the Rise



Since 1750, methane in the air has more than doubled due to human activity. It could double again by 2050.

Trapping Duration
The methane we release today could still trap heat more than a decade from now. It stays in the atmosphere that long. Each molecule of methane traps heat 20 times more effectively than a carbon dioxide molecule.

How To Reduce the Amount of Methane Going into the Air
1) Reduce, recycle and compost waste.
2) Recover methane at landfills and from coal mining and use it as fuel.
3) Reduce burning of forests and fields.

Fluorocarbons

Fluorocarbons Come Almost Entirely From Human Activities
Fluorocarbons are greenhouse gases that rarely occur naturally. They are manufactured for refrigeration and other uses. Some fluorocarbons, including chlorofluorocarbons (CFCs), are being phased out because they damage the Earth's protective ozone layer. Newer fluorocarbons, including hydrofluorocarbons (HFCs), do not harm the ozone layer but still trap heat in the atmosphere, adding to the greenhouse effect.

Fluorocarbons : A Class of Chemicals

Many different chemicals are classified as fluorocarbons. Three main kinds of fluorocarbons make the largest contributions to the greenhouse effect:

- CFCs (chlorofluorocarbons) destroy ozone. Their use is being phased out.
- HCFCs (hydrochlorofluorocarbons) destroy ozone, although less than CFCs. They are also being phased out.

HFCs (hydrofluorocarbons) do not destroy ozone, but still trap heat in the atmosphere. Thus HFCs still play a role in contributing to the greenhouse effect and global warming. It should be noted that the ozone layer is not equivalent to the greenhouse effect.

Factors Causing The Rise Of Fluorocarbons

Air Conditioners : America's Chief Fluorocarbon Source

Air conditioners in cars and buildings use fluorocarbons as coolants. Fluorocarbons escape into the air from leaks in the units and also when cars or home air conditioners are improperly repaired or discarded. With a fluorocarbon recycling and recovery machine, the coolant in a car air conditioner can be pumped out and purified for reuse.

Refrigerators

Fluorocarbons used as coolants for refrigerators and freezers may escape into the air during manufacture, installation and repair of these appliances. They are also may be released when we discard the appliances. Before we junk refrigerators, the fluorocarbons should be recovered for recycling.

The Good News and Bad News About Fluorocarbons

The Good News

The production of some kinds of fluorocarbons, including CFCs, has been banned in the United States and other industrialized countries because of concern about destruction of the ozone layer.

The Bad News

Some substitutes for CFCs, including HFCs, do not destroy ozone but are powerful greenhouse gases, contributing to global warming.

How To Reduce the Amount of Fluorocarbons Going into the Air

1) When home or auto air conditioners are serviced, make sure the coolant is recycled.
2) Ask technicians to repair leaks in refrigerators or air conditioners as a first step in servicing them.
3) Make sure the coolant in home refrigerators is recovered before junking them.

Nitrous Oxide N_2O

Nitrous Oxide Up More Than 15% Since 1750

Nitrous oxide, a colorless gas with a slightly sweet odor, is released naturally from oceans and by bacteria in soils. Each year we add 7 to 13 million tons of nitrous oxide to the atmosphere mainly by:

- Using nitrogen-based fertilizers
- Disposing of human and animal wastes
- Automobile exhausts

We have not yet identified all the sources of this gas.

Factors Causing The Rise in Nitrous Oxide

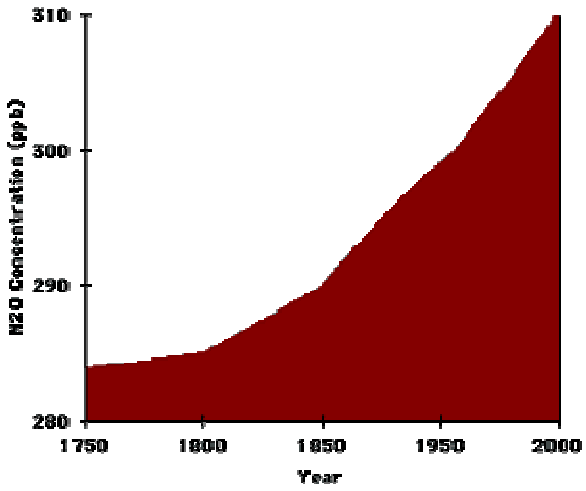
Chemical Fertilizers: The Main Source

Nitrogen-based fertilizer use has doubled in the past 15 years. Nitrogen fertilizers provide nutrients for crops. But when these fertilizers break down in the soil, nitrous oxide is released into the air.

Sewage Emits Nitrous Oxide

Human and animal wastes release nitrous oxide. Sewage treatment plants may be a major source of this gas. The increase in global population will definitely increase sewage , which in turn releases more nitrous oxide in the atmosphere.

Nitrous Oxide on the Rise



Since 1750, nitrous oxide in the atmosphere has risen by more than 15%.

Trapping Duration

The nitrous oxide we release today could still trap heat more than a century from now. It stays in the atmosphere about that long.
A nitrous oxide molecule traps heat about 200 times more effectively than a carbon dioxide molecule.

How To Reduce the Amount of Nitrous Oxide Going into the Air

1) Revise farming practices to reduce use of nitrogen-based fertilizers.
2) Other sources of this gas are not well known and will have to be clearly identified before emissions can be reduced.