

SCIENCE OF GLOBAL WARMING AND PRACTICAL SOLUTIONS

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Composition of Atmosphere-The atmosphere is a mixture of many gases, in addition, it contains huge numbers of solid and liquid particles, collectively called aerosols, some of the gases may be regarded as permanent atmospheric components that remain in fixed proportions to the total gas volume. Other constituents vary in quantity from place to place and from time to time. If the suspended particles, water vapour, and other variable gases were excluded from the atmosphere, we would find that the dry air is very stable all over the earth up to an altitude of about 80 kilometers. Out of above mentioned gases, Argon, Neon, Helium, Krypton and Xenon are so inert chemically that they are never found in any chemical compounds. Besides these gases large quantity of water vapour and dust particles are also present in the atmosphere, these solid and liquid particles are of great climatic significance.

Nitrogen is another important gas of which about 78 percent of the atmosphere's volume is made up. Nitrogen does not easily enter into chemical union with other substances, but it is an important constituent of many organic compounds. Nitrogen serves mainly as a diluent. The third important gas is carbon dioxide, which is a product of combustion and constitutes only about 0.03 percent of the dry air. Green plants, in the process of photosynthesis extract carbon dioxide from the atmosphere and utilize it. It is exhaled by animals. Being an efficient absorber of heat from the upper atmosphere as well as the earth, carbon dioxide is considered to be of great climatic significance. This gas emits about half of the absorbed heat to the earth. Thus it influences flow of energy through the atmosphere. Carbon dioxide is considered to be a very important factor in the heat energy budget.

Another important gas in the atmosphere is ozone (O₃). It is found only in very small quantity in the upper atmosphere. The greatest concentration of ozone layer found between about 20 and 25 km. It is the most efficient absorber of burning ultraviolet radiation from the sun and protect human habitation as well as all living organisms on the earth.

Water vapour is one of the most variable gases in the atmosphere. The water vapour content of air

may vary from 0.02 percent by volume in a cold dry climate to nearly 4 percent in the humid tropics. The variation in this percentage over time and place are very important considerations climatically. Innumerable dust particles are held in suspension in the lower layers of the atmosphere. The heat received from other celestial bodies as well as the interior of the earth is rather too insignificant. The earth atmosphere system receives on an average 0.30 calorie of heat per square centimeter per minute. However, the most interesting thing is that there exists a balance between the amount of incoming solar radiation and the amount of terrestrial radiation returned to space. In the absence of such a balance, the earth would be progressively colder or progressively warmer. This balance between the amount of insolation received from the sun and the outgoing terrestrial radiation is known as the 'Earth's Heat Budget'. Temperature that the earth experiences is because of certain gases in the atmosphere (Carbon dioxide, Nitrous oxide, Water vapour and Methane etc.) trap energy from the sun. Without these gases heat would escape back into space and earth's average temperature (15°C) would not be maintained, these gases are referred to as 'Green House Gases.' The effect is known as 'Green House Effect.' The Green House Effect is important. Without the green house effect, the earth would not be warm enough for human to live. But if the green house effect becomes stronger, it could make the earth warmer than usual. Even a little extra warming may cause problems for humans, plants and animals.

What is Global Warming?- Once, all climate changes occurred naturally. However, since the Industrial revolution, we began altering our climate and environment through agricultural and industrial practices. The industrial revolution was a time when people began using machines to make life easier. It started more than 200 years ago and changed the way human live. Before the industrial revolution, human activities released very few gases into the atmosphere, but now through industrial growth, population growth, fossil fuel burning and deforestation, we are affecting the mixture of gases in the atmosphere. Since the Industrial Revolution, the

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need for energy to run machines has steadily increased. Global Warming is caused by emissions of carbon dioxide and other heat trapping gases that are emitted primarily by the burning of fossil fuels and the clearing of forests. These gases remain in our atmosphere for decades or even centuries. 1) Rapid Industrialization in developing and developed countries. 2) Rapid urbanization. 3) Rapid increase in transport vehicles. 4) Rapid population growth. 5) Rapid deforestation. 6) Modern agricultural practices. 7) Depletion of Ozone layer.

These are the some of major causes of Global Warming, hardly need any explanation. As a result of an enormous scientific efforts over the past 10-15 years to better understand the climate system and its relationship to human activities, there now is a growing consensus among mainstream scientists about the reality of global warming. The intergovernmental panel on climate change (IPCC) was established in 1988 by the world Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) in recognition of the problem of global warming. Through the IPCC, climate experts from around the world synthesize the most recent science findings every five to seven years and present their report to world's political leaders. In 1992, countries from around the world, including the United States, signed the United Nations Framework Convention on Climate Change (UNFCCC)- an international treaty addressing the issue of global warming. To date, 192 nations ratified the treaty. In 1997, at a meeting in Kyoto (Japan), the UNFCCC was strengthened by an amendment that set legally binding targets and timelines for reducing global warming pollution from developed nations. The "Kyoto Protocol" entered into force in 2005 and has been ratified by all industrialized countries except the United States. The Kyoto Protocol expires in 2012. Therefore, a new framework of deeper emission reduction needs to be developed and approved. Countries hope to leave Indonesia with a "Bali

Roadmap" that will lay out this new framework and, for the first time, include guidelines for developing as well as developed countries. Following are the fingerprints and harbingers of the Global Warming, marked by PCC in 2001.

FINGERPRINTS: Direct manifestations of a widespread and long-term trend toward warmer global temperatures. 1) Heat waves and periods of unusually warm weather. 2) Ocean warming, sea-level rise and coastal flooding. 3) Glaciers melting.

HARBINGERS: Events that foreshadow the types of impacts likely to become more frequent and widespread with continued warming. 1) Spreading disease 2) Earlier spring arrival. 3) Plant and animal shifts and population changes. 4) Coral reef bleaching. 5) Downpours, heavy snowfalls, and flooding.

PRACTICAL SOLUTIONS :- We Must Act Now The scientific consensus is in our planet is warming, and we are helping make it happen by adding more heat - trapping gases. Procrastination is not option. Scientists agree that if we wait 10, 20 or 50 years, the problem will be much more difficult to address and the consequences for us will be that much more serious. We realized what a horrible mistake that was. Following are some most important practical solutions at national and global level- 1) Use of fuel efficient vehicles. 2) Use of Renewable energy (Wind energy, Bio Gas, etc.) 3) Protecting threatened forests. 4) Reduce driving 5) Afforestation 6) Reforestation 7) Conservation of solar energy, Hydro Electricity,

Practical Solutions at Personal Level- 1) Make sure you re-cycle newspapers, glass bottles, tin cans, and magazines. 2) Reuse your shopping bag plastic instead of getting new ones each time you go to the market. 3) Place a brick or something heavy into a plastic bag and place it into your toilet drum. This will cause it to fill faster and use less water each time you flush. 4) Donate your unwanted clothes. 5) Turn off the faucet when you are brushing your teeth. 6) Turn off electrical devices (lights, fans, TV, computers etc.) when they are not in use. 7) Use "Energy Efficient" appliances. They will save you about a one third on their bill with similar savings of greenhouse gas emissions, without sacrificing features, style or comfort. 8) Check for leaks (toilets, faucets, pipes, irrigation systems etc.)

Principal Gases Comprise at Sea Level in the Dry Air

Constituent	Percent by volume	Constituent	Percent by Volume
Nitrogen (N ₂)	78.08	Ozone (O ₃)	0.00006
Oxygen (O ₂)	20.94	Hydrogen (H ₂)	0.00005
Argon (Ar)	0.93	Krypton (Kr)	Trace
Carbon dioxide	0.03	Xenon (Xe)	Trace
Neon (Ne)	0.0018	Methane (Me)	Trace
Helium (He)	0.00005		

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