

summit, where international governments came together to agree to principles and global laws related with climate issues. This treaty was aimed at reducing emission of GHGs in order to combat global warming.

This was followed by subsequent meetings of parties at Berlin in 1995, Geneva in 1996, Kyoto in Dec 1997 where most industrialized nations agreed to legally binding reductions in GHG emission of 6-8% below 1990 levels. Further meetings held at Bonn in Nov '98, at Hague in Nov. 2000, at Marrakech, Morocco in Nov 2001, New Delhi in Nov 2002. The Delhi declaration on climate change and sustainable development was adopted by countries with a focus on adaptation, technology transfer and capacity building.

Further meeting of intergovernmental parties was held at Montreal in Nov 2005. The issues related with credit for carbon 'Sinks', emission trading and clean development mechanism (CDM) were also discussed which allow industrialized nations to fund emission reduction activities in developing countries as an alternative to domestic emission reduction.

What Government Can do?

The Govt. can adopt a range of options, including the following ones, for reducing GHG emissions in order to control the scenario of global warming:

- Set new standards for energy conservation.
- Set standards of emission on per capita basis.
- Promote use of renewable energy like solar power, wind power, geothermal power etc.
- Reduce or eliminate subsidy on coal, oil, fossil fuel etc.
- Conservation and restoration of forests which serve as important storehouse of carbon.
- Negotiate with developed nations for transfer of advanced energy efficient technologies.
- Development and restoration of carbon capture and storage technology.
- Framing standards for atmospheric concentration for individual GHGs.
- Alternative power generation sources like nuclear and hydel power plants.
- Promote research on mileage improvement and cleaner vehicles.
- Policy to put a check on population explosion.

What an Individual can do?

An individual can play a key supporting role in minimizing the problem of global warming. There are many steps that an individual can take to go a long way towards reducing the use of

energy and hence emission of GHGs which resultantly reduces global warming. Few simple actions that can make a big difference are as follows:-

- Use of energy efficient appliances.
- Prefer solar energy at home and at work place.
- Use of recyclable and reusable products
- Plant more trees and conserve the existing ones to help absorb the greenhouse gases.
- Use mass transit and pool vehicles.
- Use of fuel efficient and catalytic converter based automobiles.
- Create awareness among community and other target groups.
- Optimum application of fertilizers and crop rotation to reduce the N_2O emission.

FIELD OFFICES LOCATED IN THE STATE

Office	Phone (O)	Phone (R)	Fax
Bhopal	2466392	2423674	0755-5278342
Dhar	4061255	2574494	0731-4061255
Guna	274098	273165	07544-273254
Gwalior	2233288	2347503	0751-5012224
Indore	2555436	2559403	0731-5235618
Jabalpur	4042780	2407267	0761-2640801
Rewa	230605	230399	07662-230605
Satna	237273	250334	07672-237273
Sagar	224270	230120	07582-235958
Ujjain	2510984	2510185	0734-2510984

CONTACT PERSONS AT BHOPAL

Prof. S.P. Gautam Chairman	2463143	2731463	chairmanmppcb@mp.nic.in
Dr. M.L. Gupta Member Secretary	2466735	2726648	msmppcb@mp.nic.in
Dr. P.C. Seth Chief Scientific Officer	2464428	2461312	ercmppcb@mp.nic.in
Dr. Rajendra Chaturvedi Scientist	2469180	2696716	ercbpl@sancharnet.in
B.K. Varma Jr. Scientist	2466191	--	ercmppcb@mp.nic.in

ISSUED ON WORLD ENVIRONMENT DAY, 2007

Global Warming



Emergency Response Centre M.P. Pollution Control Board,

E-5, Arera Colony, Bhopal - 16 (India)

Phone : +91-755-2469 180

Fax : +91-755-2463 742, 2469 180

PBX : +91-755-2464 428, 2466 191

Web : www.ercmp.nic.in

E-mail : ercmppcb@mp.nic.in

Preamble

The world is undoubtedly warming because of excess emission of carbon dioxide and other greenhouse gases. The phenomenon of Global Warming refers to an average increase in the Earth's temperature which in turn causes change in climate like change in rainfall pattern, rise in sea level, wide range impacts on plants, wildlife, ecology and human beings etc. The Earth's surface temperature has risen in the past century with accelerated warming during the past two decades. Facts reveal that most of the warming over the last 50 years has been attributed to human activities. These activities have altered chemical composition of the atmosphere through buildup of Greenhouse Gases (GHGs) which have heat trapping properties that result into temperature elevation on earth's surface. The current projection trends show a global increase of 2.5° to 10.4°F by 2100. This increase in temperature threatens dangerous consequences like drought, floods, lost ecosystem, rise in sea level, altered weather pattern that can bring unusually intense precipitation or dry spells and more severe storms. At risk are our coastal property and resources, the productivity of our farms, forests and fisheries and the livability of our cities in summer.

These effects have already begun and this may lead to catastrophic situation unless we put a strict check on the possible causes. The solutions are well in sight but there is need of strong will to fight the problem squarely.

Green-house Gases

The Earth's atmosphere consists mainly of oxygen and nitrogen but, since both of these are transparent to terrestrial radiations, they do not contribute to global warming. The global warming is basically a function of the other trace gases in the atmosphere that absorb the terrestrial radiations leaving the Earth surface. These trace gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), water vapour (H₂O), ozone (O₃), halocarbons, sulfur hexafluoride (SF₆), perfluoro carbons (PFCs), nitrogen oxides (NO_x), carbon monoxide (CO), aerosols and nonmethane volatile organic compounds (NMVOCs). Some of these trace gases influence the global warming directly whereas some have indirect effects.

Sources of Green-house Gases

There are many activities and sources that lead to generation of GHGs. Carbon dioxide is released to the atmosphere on burning of solid wastes, wood and wood products, fossil fuels etc. The atmospheric concentration of CO₂ has increased from 270 ppmv during pre-industrial

time to 370 ppmv at present. The anthropogenic generation of CO₂ is only 3.22% and the rest is of natural origin.

Methane is primarily produced through anaerobic decomposition of organic matter in biological systems. Agricultural processes such as wetland rice cultivation, enteric fermentation in animals and decomposition of animal wastes also emit methane. It is also generated during the production and transport of coal, natural gas and oil. Global warming potential of methane is about 24 times higher than that of CO₂. The atmospheric level of methane is reported to have gone up from 0.8 to 1.75 ppmv. The manmade methane contributes 18.338% and the rest is of natural origin.

Nitrous oxide is emitted during agricultural and industrial activities as well as during combustion of solid waste and fossil fuels. Global warming potential of N₂O is about 170 to 190 times higher than that of CO₂. The present concentration of N₂O is 314 ppmv as compared to 270 ppmv of pre-industrial time. Only 4.933% of the total N₂O is manmade and the rest is of natural origin.

Per fluorocarbons result as a by product of aluminum smelting and also during uranium enrichment processes. Global warming potential of Per fluorocarbons is about 6000 to 10000 times higher than that of CO₂.

Sulfur hexafluoride is a man-made gas and has a warming potential 25000 times that of CO₂. It is mainly used for insulating material for high voltage equipment like circuit breakers and utilities. It is also used in water leak detection for cable cooling system.

Water vapour is the most significant GHG which comes from natural sources and is responsible for nearly 95% greenhouse effect. About 99.99% water vapour is of natural origin.

Importance of GHGs

The Greenhouse Gases are blamed for the increase in global warming but these gases are of great importance as they play a crucial role in the existence of life on the Earth. The energy from the sun drives the Earth's weather and climate and heats the Earth's surface. The earth, in turn, radiates the energy back into the space. The GHGs present in the atmosphere trap some of the outgoing energy and this retained heat helps in maintaining the Earth's temperature to around 15°C, needed for the survival of life. Had there been no GHG in the atmosphere

the temperature of Earth would have been less than zero and the life, as known today, would not be possible. Thus GHGs are very useful up to a certain level but are dangerous if exceeds desired level.

Effects of Global Warming

The consequences of Global Warming are far reaching. There is an urgent need to act now else the future generation will inherit a hotter world, dirtier air and water, more severe floods and droughts and more wildfires and other form of calamities. The principal adverse effects, resulting due to global warming, may be seen in the following form:

- Alarming rise in sea water level due to speed up of melting of glaciers and ice caps.
- Intense heat waves generation causing severe health effects.
- Adverse effect on ecosystem and loss of species diversity due to rise in temperature and due to non adaptation.
- Increase in incidences of drought, cyclone, hurricanes etc.
- Breaking out and spread of new diseases.
- Loss of water due to excessive evaporation.
- Increased risk of wild fires.
- More intense rainfall due to increase in the energy of climatic system
- Loss of coastal wet lands and islands and risk to coastal communities due to sea water level increase.

Need to Act

Though we can not avoid all the consequences of global warming, but committing ourselves to actions today can help ensure our future generation inherit a healthy world full of opportunity. Not only Government bodies but every individual need to do more to address the global warming issue. Following are the few points in this regard:

International efforts

Owing to the possible damaging consequences of global warming, the world countries have initiated action on international platform. An Intergovernmental Panel on Climate Change (IPCC) was established in the year 1988 which is an advisory body of scientists and officials for comprehensive assessment of climate related issues, including global warming, due to human activities. It was followed by first UN Framework Convention on Climate Change in June 1992 at Rio de Janeiro, known as Earth