

## GHG- Key Findings H.P.

- The net Green House Gas (GHG) emissions from Himachal Pradesh that is emissions with LULUCF, for activity data base for year 2012 were 9.197 million tons of CO<sub>2</sub> equivalent (eq) in comparison of 10.083 million tons in 2008-09. During the year 2012;
  - CO<sub>2</sub> emissions were 8.73 million tons;
  - CH<sub>4</sub> emissions were 0.134 million tons; and
  - N<sub>2</sub>O emissions were 0.0070 million tons.
- GHG emissions from Energy, Industry, and Agriculture sectors constituted 47.299% (5146.9196 Gg), 51.195% (5570.8844 Gg), 1.506% (163.9438 Gg) of the net CO<sub>2</sub> eq emissions respectively. The contribution of Waste sector is quite marginal.
- Energy sector emitted 5.15 million tons of CO<sub>2</sub> eq, of which 2.756 million tons of CO<sub>2</sub> eq were emitted from electricity consumption in Industrial, Commercial and Institutional sectors and 1.405 million tons of CO<sub>2</sub> eq were emitted from energy consumption in Residential sector.
- Industry sector emitted 5.57 million tons of CO<sub>2</sub> eq.
- LULUCF sector was a net sink. It sequestered 1.68 million tons of CO<sub>2</sub> eq.
- Himachal Pradesh per capita CO<sub>2</sub>eq emissions including LULUCF showed a decreasing trend and were 1.341 tons/capita in 2012 that of 1.47 tons/capita levels in 2008-09.



## Let's Check our Steps:

- Not to Burn of fossil fuels and deforestation leading to higher carbon dioxide concentrations. Land use change (mainly deforestation in the tropics) account for up to one third of total anthropogenic CO<sub>2</sub> emissions.
- Control live stock enteric fermentation and manure management, paddy rice farming, land use and wetland changes, pipeline losses, and covered vented landfill emissions leading to higher methane atmospheric concentrations. Many of the newer style fully vented septic system that enhance and target the fermentation process also are sources of atmospheric methane.
- Let's reduce use of Air Conditioners & use of chlorofluorocarbons (CFCs) in refrigeration systems, and use of CFCs and halons in fire suppression systems and manufacturing process.
- Adopt organic products, agricultural activities, including the use of fertilizers that lead to higher Nitrous oxide (N<sub>2</sub>O) concentrations.

## Carbon Intensity

Emission intensity is an average emission rate of a given pollutant from a given source relative to the intensity of a specific activity; for example grams of carbon dioxide released per mega joule of energy produced, or the ratio of greenhouse gas emissions produced to GDP.

In State of Himachal Pradesh there is 100% electrification, energy conservation programmes are in place. Increasing solar energy usages, efficiency in the residential and commercial sectors, energy savings from space heating, air conditioning, refrigeration and lightening, capacity building of stakeholders in infrastructure development on energy saving options and technological innovations adopted. All these are evident from the fact that during the year 2011-12 energy consumption was 6633.045 Million units that of 6958.497 million units in 2009 and the energy intensity has declined by 4.68%. Total CO<sub>2</sub> emissions from energy use were about 2.97% below 2008 levels in year 2012. Over the period 2008-2012, CO<sub>2</sub> emissions from energy use have decreased on an average by 3% although the economic activity (GDP) at constant price based on 2004-05 year has shown an average growth of 7.05% during this period. The GDP has increased steadily by 0.57% per year on an average until 2010-11 and further decreased slowly again during the year 2012 by about 1.02%.

The total CO<sub>2</sub> emissions per capita have decreased from 1.47 tons in year 2008-09 to 1.34 tons in 2012, a decrease of about 8.84%. Almost 80-85 % of reduction in CO<sub>2</sub> intensity are due to the decrease in energy use or increase in use of low GHG emitting sources of energy per unit of GDP, the CO<sub>2</sub> intensity decreased more rapidly than that of the energy intensity.

Analysed Emission Source of	GHGs at National (2007, INCCA Report)	2009		2012	
		GHGs Himachal Pradesh estimates	Percentage of Nation (%)	GHGs Himachal Pradesh estimates	Percentage of Nation (%)
Electricity Generation (Other than Hydro)	719.30	0.359	0.1	0.244	0.034
Transportation	142.04	0.667	0.47	0.716	0.50
Residential (Industrial, Commercial, mics.) Other Energy	137.84	1.81	1.31	1.405	1.02
Cement	100.87	3.23	3.20	2.757	2.73
Iron & Steel	129.92	5.17	3.98	5.311	4.09
Other Industries	117.32	0.281	0.24	0.167	0.14
Agriculture	165.31	0.034	0.021	0.034	0.021
Waste	334.41	0.165	0.049	0.248	0.074
Total without LULUCF	57.73	0.00001	0.00002	0.000003	0.0000052
LULUCF	1904.73	11.716	0.615	10.882	0.57
Total with LULUCF	(-)177.03	(-)1.633	-	(-)1.685	-
	1727.71	10.083	0.584*	9.197	0.53

\* Estimates are without the Emissions/Removals from Hydro Power generation.

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# Carbon Intensity Himachal Pradesh

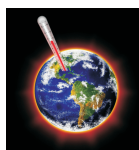
*Let us reduce our carbon footprint  
and  
Save Himalayas...!*



**HP Knowledge Cell on Climate Change**  
Department of Environment, Science & Technology  
Government of Himachal Pradesh

## What is global warming?

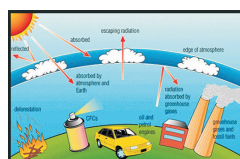
- Global warming refers to the increase in the earth's mean temperature due to the so-called enhanced greenhouse effect;
- Observational records give a collective picture of a warming world.



## What is greenhouse effect?

Greenhouse effect refers to the process by which the gases in the atmosphere near the surface of the earth trap the heat that is re-radiated by the earth's surface and re-emit it downwards.

If there were no greenhouse effect, the average temperature on the earth's surface would be approximately -15°C and life on earth would then be unbearable.



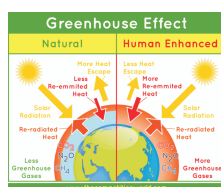
## What are greenhouse gases?

The gases in the atmosphere which trap the heat-radiated by the earth's surface and re-emit it downwards are called greenhouse gases. These include water vapor/clouds, aerosols, carbon dioxide, methane, nitrous, oxides and halo carbons.

## What is enhanced greenhouse effect?

It is the effect of the increasing concentrations of greenhouse gases in the atmosphere.

Atmosphere greenhouse gases warm the earth by trapping the sun's radiation near the earth's surface. Increased greenhouse gas concentrations (caused by human activity) have contributed to recent global warming)



## What are human activities that cause increases in the concentrations of greenhouse gases?

- Burning of fossil fuels like oil, coal, gas and others, in transportation, manufacturing processes and industry among other and land-use changes contribute to the increases of carbon dioxide emissions.
- The process of decomposition in flooded rice fields causes the emission of methane into the atmosphere. Like-wise, livestock

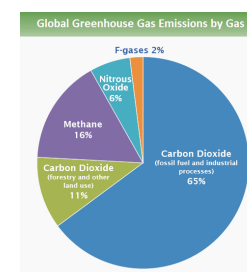
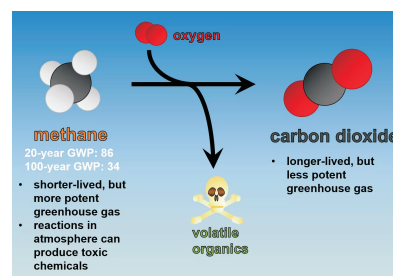
production and waste management system like landfills, also cause increases in the concentrations of methane.

- The use of chemical fertilizers and pesticides are example of activities that cause increases in the concentrations of nitrous oxides.
- The use of CFC's and its substitutes (HFCs) in refrigeration/ air conditioning causes the increase of halocarbon concentration in the atmosphere.

## Are the greenhouse gases really increasing?

During the pre-industrial revolution, levels of carbon dioxide concentration in the atmosphere was 280 parts per million (ppm) by volume. By the end of 2005, levels increased to 379 ppm.

Methane concentration in the atmosphere had also increased from pre-industrial value of 715 parts per billion by volume (ppb) to 1,770 ppb in 2005.



Nitrous oxide concentration in the atmosphere had increased from a pre-industrial value of 270 ppb to 319 ppb in 2005

## By how much did the global mean temperature increase?

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) has assessed that the increase in global mean temperature during the period from 1906 to 2005 had been 0.74°C.

Why does the 0.74°C increase in global mean temperature from 1906-2005 raise a serious concern?

The temperature increase from 1906 to 2005 is unprecedented. It has never happened during the last 1,000 years.

## What are the effects of global warming?

Global warming has led to what we call climate change through anthropogenic cause of human intervention. These are:

- increase in minimum (nighttime) temperatures, maximum (daytime) temperatures and increase in the global mean temperature;
- increase in sea surface temperature and;
- changes in evaporation and thus, changes in rainfall patterns among others.



## What was the assessed sea level rise due to the increase in the global mean temperature?

According to the IPCC, global sea level rise was pegged at an average of 1.8 mm per year from 1961 to 2003, or a total of 0.17 m for the 20th century.

## What causes global sea level rise?

Sea level rise will occur mostly as a result of the thermal expansion of warming ocean waters, the influx of freshwater from melting glaciers and ice and vertical movement of the land itself.

