



Report on Heat-trapping Gases in the Atmosphere: WMO

Why in News

According to the [World Meteorological Organization \(WMO\) Greenhouse Gas Bulletin](#), the **abundance of heat-trapping greenhouse gases in the atmosphere once again reached a new record last year (2020)**, with the annual rate of increase above the 2011-2020 average.

- This is **despite the approximately 5.6% drop in fossil fuel CO₂ emissions in 2020** due to restrictions related to the **pandemic**.
- Earlier, the **WMO** released a report named [United in Science 2021](#). WMO is a **specialized agency of the United Nations** for meteorology (weather and climate), operational hydrology and related geophysical sciences.
- The **WMO Global Atmosphere Watch Programme** coordinates systematic observations and analysis of greenhouse gases and other atmospheric constituents.

Unclean air

Key greenhouse gas emissions rose faster in 2020 than the average for the previous decade. A comparison of the key trends to pre-industrial levels:



Parameter	CO ₂	CH ₄	N ₂ O
2020 global mean abundance	413.2 ± 0.2 ppm	1889 ± 2 ppb	333.2 ± 0.1 ppb
Pre-industrial levels	278 ppm	722 ppb	270 ppb
2020 abundance relative to 1750	149%	262%	123%
2019-2020 absolute increase	2.5 ppm	11 ppb	1.2 ppb
Mean annual absolute increase over past 10 years	2.4 ppm	8 ppb	0.99 ppb

// ppm: parts per million | ppb: parts per billion

Key Points

- **Data Analysis:**
 - **Concentration of Carbon Dioxide (CO₂)**, the most important greenhouse gas, reached 413.2 parts per million in 2020 and is **149% of the pre-industrial level**.

- Many countries are now setting **carbon neutral targets** and it is hoped that **COP26** (Climate Conference) will see a dramatic increase in commitments.
- **Methane (CH₄) is 262%** and **Nitrous Oxide (N₂O) is 123% of the levels in 1750** when human activities started disrupting Earth's natural equilibrium.
- The **economic slowdown from Covid-19 did not have any distinguishable impact** on the atmospheric levels of greenhouse gases and their growth rates, although there was a temporary decline in new emissions.
- **From 1990 to 2020, radiative forcing** - the warming effect on our climate - by long-lived greenhouse gases **increased by 47%**, with CO₂ accounting for about 80% of this increase.
- The **ability of land ecosystems and oceans to act as "sinks" may become less effective in future**, thus reducing their ability to absorb carbon dioxide and act as a buffer against larger temperature increases.

▪ **Concerns:**

- An **increase in the temperature is expected** by the end of this century far in excess of the **Paris Agreement targets** of 1.5 to 2 degrees Celsius above pre-industrial levels.
- **Parts of the Amazon rainforest** have gone from being a carbon sink that sucks carbon dioxide from the air to a source of CO₂ due to **deforestation** and reduced humidity in the region.
- Given the long life of CO₂, the **temperature level already observed will persist for several decades** even if emissions are rapidly reduced to net zero. Alongside rising temperatures, this means **more weather extremes** including intense heat and rainfall, ice melt, sea-level rise and ocean acidification, accompanied by **far-reaching socioeconomic impacts**.

▪ **Related Indian Initiatives:**

- Seaweed-Based Animal Feed to reduce methane emissions in bovine
- India Greenhouse Gas Program
- [National Action Plan on Climate Change](#)
- [Bharat Stage-VI Norms](#)

Type of Greenhouse Gases	Source	Removal Source	Gas Reaction
Carbon dioxide (CO ₂)	<ul style="list-style-type: none"> • Burning of fossil fuels • Deforestation 	<ul style="list-style-type: none"> • Photosynthesis process • Ocean 	
Nitrous oxide (N ₂ O)	<ul style="list-style-type: none"> • Burning of biomass • Combustion of fossil fuels • Fertilizers 	<ul style="list-style-type: none"> • Removal by soil • Photolysis in the stratosphere 	<ul style="list-style-type: none"> • Absorption of infrared radiation • Indirectly affect the ozone concentration in the stratosphere
Fluorinated gases	<ul style="list-style-type: none"> • Emitted through various industrial processes. 	<ul style="list-style-type: none"> • Photolysis and reaction with oxygen 	
Methane (CH ₄)	<ul style="list-style-type: none"> • Burning of biomass • Rice paddies • Fermentation by enteric bacteria 	<ul style="list-style-type: none"> • Microorganism uptake • Reaction associated with hydroxyl groups 	<ul style="list-style-type: none"> • Absorption of infrared radiation • Indirectly affect ozone concentration and water vapor in the stratosphere • Production of CO₂

Source: [TH](#)

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