

# UPSC Preparation

## Greenhouse Gas

A greenhouse gas is a gas that absorbs and emits infrared radiation. They absorb infrared energy (heat energy) emitted from the earth's surface and reradiates it back to the earth's surface. The greenhouse gases trap heat in the earth's atmosphere and warm the planet.

### What are Greenhouse Gases?

- In simple terms, gases that trap heat in the earth's atmosphere are known as Greenhouse Gases, abbreviated as GHGs.
- They contribute to the **Greenhouse Effect**, which is the resultant heating effect.

### Greenhouse Effect Explanation

- A greenhouse or a glasshouse is a closed glass structure in which plants are grown in regulated climatic conditions.
- In such a structure, the solar radiation passes through the glass and is absorbed by the floor, earth, and other contents inside.
- They, in turn, become warmer and reradiates the energy as infrared (heat) radiation, which is of a longer wavelength.
- This radiation cannot escape from the glass, since glass cannot transmit infrared radiation. Thus, the temperature inside the greenhouse increases.
- This is the Greenhouse Effect.

### Natural Greenhouse Effect

- The Greenhouse Effect is a natural phenomenon.
- It has been happening on earth for millions of years.
- The natural greenhouse effect happens due to water vapour and particles of water present in the atmosphere.
- This phenomenon has enabled life to emerge on land from the oceans.
- This is also the reason the earth has sustained life, as it maintains an average temperature of 15°C on earth.

### Greenhouse Gases Examples

The Primary GHGs are:

1. Water vapour
2. Carbon dioxide
3. Methane
4. Nitrous oxide
5. Ozone

Other GHGs are carbon monoxide, fluorinated gases, chlorofluorocarbons (CFCs), black carbon (soot), and brown carbon.

Among the greenhouse gases, only water vapour can absorb both incoming (UV) and outgoing (infrared) radiation.

## Global Warming

- Since the dawn of the Industrial Revolution, carbon dioxide content in the atmosphere has been steadily increasing.
- From 280 ppm in 1750, it has risen to 406 ppm in 2017. For information on Industrial Revolution check the linked page.
- Most of the anthropogenic carbon dioxide emissions arise due to the burning of fossil fuels, and also from deforestation, soil erosion, and agriculture.
- If GHG emissions continue unchecked, by the end of this century, the global temperatures may increase by 5°C, causing global warming.
- There will also be other climatic repercussions like the melting of polar ice caps, melting of the Himalayan snowcaps, increased occurrence of El Nino, etc. Read in detail about El Nino on the linked page.
- Over many years, there will also be a rise in sea level leading to a submerging of many coastal places, islands, etc.
- It will also lead to a loss of ecosystems like marshes and swamps.

## Global goals

- The goal envisaged in the Paris Agreement is to limit global warming to well below 2 degree Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.
- To achieve this goal, greenhouse gas emitting countries have to make commitments to cut their climate pollution.

- The countries, which are part of this agreement, communicate their actions to reduce GHG emissions in the Nationally Determined Contributions (NDCs) in order to reach the goals of the Paris Agreement.

