GREENHOUSE GASES AND GREENHOUSE EFFECT: AN INTRODUCTION

Adnan Rashid[1], Trimurti Narayan Pandey[2], Ujala Mishra[3], Amit Choudhary[4]

[1]*M.Tech Scholar, Civil Department, Bhagwant University, Rajasthan, India*
[2]*Assistant Professor, Civil Department, Bhagwant University, Rajasthan, India*
[3]*M.Tech Scholar, Civil Department, Bhagwant University, Rajasthan, India*
[4]*Assistant Professor, Civil Department, Bhagwant University, Rajasthan, India*

ABSTRACT

In this paper we are presenting an introduction of greenhouses gases and greenhouse effects. GWP is a comparative measure of how much heat a GHG traps in the atmosphere. The problems begin when human activities distort and accelerate the natural process by creating more greenhouse gases in the atmosphere than are necessary to warm the planet to an ideal temperature. In aquatic systems, the concentration of greenhouse gas, CH4 and N2O depends on sure biological and chemical phenomena. The concentration of GHGs in the Earth's atmosphere increases continuously, thereby average surface temperature of the Earth. As a result of this, evaporation rate of water from ocean and other water reservoir increases and hence moisture content of the atmosphere increases. Energy from the sun drives the Earth's meterorological conditions and temperature. Gases present in the atmosphere helps to control earth temperature.

Keyword: - *GHGS, GHE, Environment, LCA, Life Cycle Inventories, GWP.*

1. INTRODUCTION

According to the Inter-Governmental Panel on Climate continuously evolving, both globally and regionally, with some of the changes being attributable to human activities, and resulting in emissions of Greenhouse Gases. Energy supply systems and fossil-fuel systems in particular, are the dominant contributors to the emissions of these gases. This article provides comparisons of Greenhouse Gas (GHG) emissions primarily derived using the most recent results from a comprehensive Swiss study addressing Life-Cycle Assessment (LCA) issues based on environmental inventories of European-wide energy systems [1]. The work has been undertaken by PSI and its partners in the framework of the ecoinvent 2000 Project [2]. Results are compared with other selected studies carried out in other countries. Information on the methodological aspects of LCA, as applied in the Swiss study, The main aim of ecoinvent 2000 was to achieve consistency between the different LCA databases maintained by the participating organisations, and to update and integrate them within the ecoinvent database. Those included are: energy systems (PSI); materials and metals (EMPA); transport systems (ETHZ); waste treatment and disposal (EMPA); chemicals (ETHZ); and agricultural products (FAL). Approximately 2500 individual processes have been modelled, and 1000 elementary environmental flows placed in the inventory, including emissions, solid wastes, resources and land usage. The modules are integrated based on an algorithm reflecting the interaction of industrial activities within the economy. The energy systems which have been assessed, making up about half of the processes available in the database, include electricity and heating systems. Fossil, nuclear and renewable systems, associated with Swiss and European power plants, boilers and cogeneration plants, have all been assessed; these reflect prevailing conditions around the reference year 2000. The centralised, web-based, LCA data system convent 2000 has been developed and implemented by the Swiss Centre for Life Cycle Inventories, and supported by Swiss Federal Offices. Since September 2003, its first user-friendly version has been available via the Internet.

2. GREENHOUSE GASES (GHGS) AND GREENHOUSE EFFECT

Energy from the sun drives the Earth's meterorological conditions and temperature. Gases present in the atmosphere helps to control earth temperature. GHGs (Greenshouse Gases) trap heat in the atmosphere and keep earth warmer this mechanism is known as Greenhouse effect, most of the sun light which enters in to the earth atmosphere will observed by land and water and rest is reflected into the space the earth surface warms up and gives up energy in different form called infrared radiation, this energy travel back towards outer space GHGs trap some of the energy before it escapes making the earth warmer. We need some GHGs without them earth will be too cold for survival but higher levels of GHGs grasp more of the sun's radiation within the earth's atmosphere and increase its temperature.

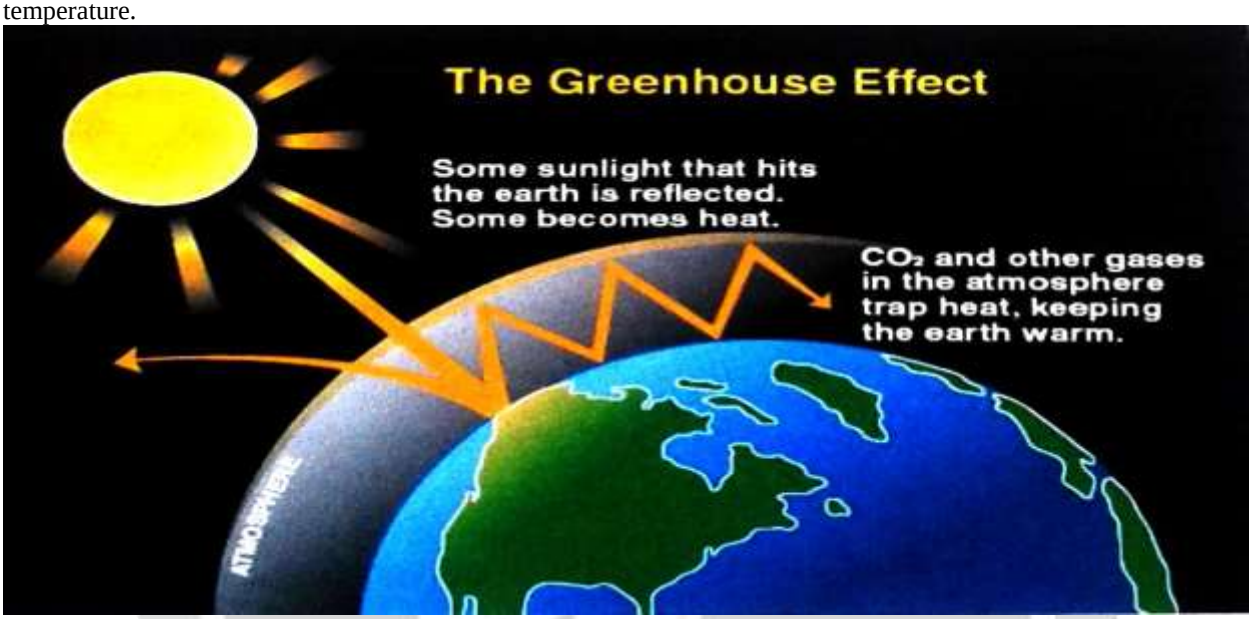

Fig. 1.1: Greenhouse effect

3. PRINCIPAL FORCING GREENHOUSE GASES

The major GHGs are: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Chlorofluorocarbon (CFC) and Sulphur hexafluoride (SF6). There are some minor GHGs, e.g., ozone, sulphur dioxide, water vapour etc.

4. IMPACTS OF GHGS

The concentration of GHGs in the Earth's atmosphere increases continuously, thereby increasing average surface temperature of the Earth. As a result of this, evaporation rate of water from ocean and other water reservoir increases and hence moisture content of the atmosphere increases. As water vapor itself is a GHG, this increased moisture content further increases the surface temperature of the Earth. Further, one important parameter for food-grain production is temperature. Due to global warming atmospheric temperature rises. Food-grain production is affected with increase in temperature even by 1°C. Also, atmospheric temperature increases and hence surface temperature of water increases. Thereby, dissolved oxygen content decreases which threatens the aquatic ecosystem. Further, surface temperature of ocean water increases, as a result of which, transfer of nutrients from the bottom layer of ocean to the surface is prohibited.

5. GLOBAL-WARMING POTENTIAL (GWP)

GWP is a comparative measure of how much heat a GHG traps in the atmosphere. It relates the quantity of heat entombed by a certain mass of the gas in question to the amount of heat entombed by a similar mass of (CO2). A GWP is considered over a certain time period, generally 20, 100 or 500 years. GWP is expressed as a factor of CO2. The GWP governed on the following factors:

1. Infrared radiation absorption by a given species.
2. Spectral location of its absorbing wavelengths.
3. Atmospheric lifetime of species.

6. HUMAN CONTRIBUTION TO GREENHOUSE GASES

The problems begin when human activities distort and accelerate the natural process by creating more greenhouse gases in the atmosphere than are necessary to warm the planet to an ideal temperature. The activities are given as follows:

1. Burning natural gas, coal and oil - including gasoline for automobile engines-raises the level of carbon dioxide in the atmosphere.
2. Some farming practices and land-use changes increase the levels of methane and nitrous oxide.
3. Many factories produce long-lasting industrial gases that do not occur naturally,yet contribute significantly to the enhanced greenhouse effect and "global warming" that is currently under way.
4. Deforestation also contributes to global warming. Trees use carbon dioxide and give off oxygen in its place, which helps to create the optimal balance of gases in the atmosphere. As more forests are logged for timber or cut down to make way for farming, however, there are fewer trees to perform this critical function.

7. IMPORTANT SCIENTIFIC ADVANCES

The ever increasing global energy demand and the concern about the changes in environment have led to an urge to assess the hydropower 'footprint' in terms of GHG emissions to the atmosphere. Since the early 90's the role of hydroelectric reservoirs as sources or, as the opposite, sinks of GHG has rapidly become a global topic of investigation.

8. CLIMATE SYSTEM AND GREENHOUSE GAS EFFECT

As described in IPCC (2007), "the climate system is a complex, interactive system consisting of the atmosphere, land surface, snow and ice, oceans and other water bodies, and living things". The climate system changes with time because of the influence of its own internal dynamics and due to changes in external factors that affect climate (called 'forcings'). External forcings include natural phenomena such as volcanic eruptions and solar variations, as well as human-induced changes in atmospheric composition (IPCC, 2007). Solar radiation controls the climate system. The greenhouse effect comes from molecules that absorb the terrestrial infrared radiation in the range from 5 to 25 pm. Water vapor is the most important greenhouse gas, carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) being the three next ones by decreasing importance of additional radiative forcing since pre-industrial times. As discussed in previous sections, greenhouse gases are naturally present in the Earth's atmosphere, causing the natural greenhouse gas effect. Increasing concentration of GHGs (including water vapor, carbon dioxide, methane, nitrous oxide, and others) in the atmosphere strengthen the green house effect, this is the so-called additional green house effect. This led to an increase of global surface and atmospheric temperatures; it is referred as the global warming. Global warming causes different changes such as increase in extreme weather events, rising sea levels, ecosystem migrations. Further more generally, interactions between the atmosphere, the biosphere and the oceans are disturbed by the global warming.

The energy that is not reflected back to space is absorbed by the Earth's surface (168 W.m-2) and the atmosphere (67 W.m-2). To balance the absorbed incoming energy, the Earth must, on average, radiate the same amount of energy back to space. Because the Earth is much colder than the Sun, it radiates at much longer wavelengths, primarily in the infrared part of the spectrum. To emit the equal amount of energy absorbed by the surface-atmosphere system (241) W.m-2), a surface would have to have a temperature of around -18°C. This is 33°C colder than the conditions that actually exist at the Earth's surface (global mean surface temperature is about 15°C). The difference between the radiative temperature (-18°C) and the actual mean temperature at the Earth surface (15°C is due to the presence of greenhouse gases in the atmosphere.

9. CONCLUSIONS

The problems begin when human activities distort and accelerate the natural process by creating more greenhouse gases in the atmosphere than are necessary to warm the planet to an ideal temperature. GWP is a comparative measure of how much heat a GHG traps in the atmosphere. It relates the quantity of heat entombed by a certain mass of the gas in question to the amount of heat entombed by a similar mass of (CO2). We need some GHGs without them earth will be too cold for survival but higher levels of GHGs grasp more of the sun's radiation within the earth's atmosphere and increase its temperature.

The energy systems which have been assessed, making up about half of the processes available in the database, include electricity and heating systems. Fossil, nuclear and renewable systems, associated with Swiss and European

power plants, boilers and cogeneration plants, have all been assessed; these reflect prevailing conditions around the reference year 2000.

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