



GREEN HOUSE GAS (GHG) ONE OF THE CAUSES OF CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT MEASURES- A STUDY

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ABSTRACT-

Climate change, also known as Global warming or Global Cooling is a term that explains long term effect in the environment that affect life of living organisms adversely. Not some regions but the whole world is facing problems due to it. In 2014, The Inter-governmental Panel on Climate Change (IPPC) published the 5th Assessment report on climate change based on long-term scientific evidence. This stated that the increase in greenhouse gas (GHG) concentrations (namely carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆) over the past 100 years has predominantly been caused by human activities. GHGs are able to absorb long wave radiation (heat) that is reflected off the Earth's surface. They are then able to remit this radiation back down to Earth. If there were no GHGs in our atmosphere the Earth would be too cold for life as we know it to exist. However, as more fossil fuels, are burnt and other GHGs are released; the atmosphere is able to absorb more radiation and so is warming up. This is known as the **greenhouse effect**.

Using secondary data from the earlier published research papers and published data from official websites, this paper is an honest effort to study greenhouse Gas Concentrations, its reasons, impact on environment and possible remedial actions to be taken to minimize it.

Keywords- Green House Gas, Sustainability, Climate Change,

INTRODUCTION:

Climate change, the term is related with the change in earth's climate. It refers to the moves in things like wind patterns, precipitation, and temperature over a period. Climate change is a continuous process, may be started from birth of the earth. The global climate is the linked arrangement of the oceans, the sun, the earth, wind, snow, rain, deserts, forests, and also everything that the people do. The change in temperature in recent period is the results of natural and human activities. But the natural

causes are not that intense as it is because of human activity. According to American Association for the Advancement of Science (AAAS), it is revealed scientifically that global climate change is caused by human beings and it is increasing threat to society. The rise in temperature is explained by more and more of manufacturing and activities that includes emission of Greenhouse Gases, carbon dioxide, methane, etc. (Albergelet.al, 2010).

Before the interference of human in climate changes, five factors of nature were only treated as responsible. Those are-

1. Atmosphere (Air)
2. Biosphere (Living Things)
3. Cryosphere (ice and permafrost)
4. Hydrosphere (water)
5. Lithosphere (earth's Crust and upper mantle) (Terrapass 2020).

Objectives-

1. To study the concept of Climate change and Greenhouse Gas.
2. To study the causes of climate change
3. To study the effects of climate change with reference to GHG
4. To suggest remedial actions to minimize the effect.

RESEARCH METHODOLOGY:

Secondary data has been extensively used from research papers published and the official websites.

New factor that is influencing the Earth's climate in the last 200 years, is human activity. And its effect is defined through the Term coined, 'Greenhouse Effect' Moumen et.al., 2019 & Chehabedine, Tvaronaviciene, 2020)

The graph illustrates the change in temperature related to 1980 -2020 average temperatures. Nineteen of the warmest years have occurred since 2000. The graph depicts how the temperature rising progressively since 1880 to 2020. (source: NASA/GISS). The research is done by Climatic Research Unit and

the National Oceanic and Atmospheric Administration.

Greenhouse Gases -

Greenhouse gases are very important for the earth's climate cycles. When the earth gets hit with the rays of sun, some of the energy is absorbed, and the excess of that energy and heat gets returned into space. Greenhouse gases in the atmosphere trap the reflected energy, transmitting it back down to the earth and hence adding to global warming. Different gases are contributing to it. they are Carbon dioxide (CO₂), Methane, Water vapor, Nitrous oxide, Chlorofluorocarbons (CFCs) (NASA 2019)

One of important elements from greenhouse gases, water vapor are naturally occurring, others like CFCs, is synthetic. CO₂ is emitted into the atmosphere by nature as well as Human being. And so adds to climate change. CO₂ has been growing at a worrying rate. It will remain on the earth unless it absorbed by the ocean, land, trees, and other sources. (NASA 2019). But it is impossible to absorb it at this increasing rate. Worsening it, the absorbing resources are diminishing like deforestation, chemicals in soil, polluted water etc. International Commission on Climate Change forecasted that the global temperature will rise by 6°C in coming century if the current style of using fossil fuels and deforestation continued. (Denisova et al., 2019, Elzan and Hohne, 2008; 2010).

This shows different % of gases that contributes to climate change. The share of CO₂ is highest i.e. 65%.

Source: European Environment Agency.
<https://www.eea.europa.eu/data-and-maps/datat/greenhouse-gas-emission-projections-for-6>

Causes of Climate Change-

a. Nature-

Nature contributes to CO₂ emission, because of volcano eruption (International Intergovernmental Panel on Climate Change – IPCC 2019) But its proportion is only 130 to 230 million tons of CO₂ per year as compared to the Human consumption of fossil fuels- which is in excess of 100 times more, i.e. 26 billion tons (NASA 2017)

b. Human Contribution-

Advancement of technology and new innovations leads to usedifferent vehicles, industrialization and Transportation,which require more and more consumption of fossil fuels like oil, coal and natural gases or for energy consumption. House hold services contribute approx. 16% in CO₂ emission That leads to CO₂ emission which is near about 75% of total global emission of GHG.

c. Fossil Fuels-

Black carbon, power generation, industry transportation etc. require the use of fossil fuel. Energy production accounts for near about 30% emission of CO₂.

d. Agriculture-

Animals, like cows, pigs their extractions, dead bodies, adds to CO₂. Also chemicals, fertilizers, manures, that damages the soil quality and also emit the unwanted gases. forest fires such activities are the causes of Greenhouse Gas emissions.

e. Deforestation-

Deforestation has been made for taking more and more land under cultivation. Wild fires, manmade or by the force of nature, construction of buildings, erection of Industrial areas deforestation takes place.

f. Other Human Activities-

According to Environment Protection Agency (EPA 2019), burning of fossil fuel, for electricity generation, transport, airways, industries, manufacturing, accounts a larger portion of total CO₂ emission.

Effects-

1. Extreme Weather- a pronounced effect of Green House Gas Emission is extreme weather. According to National Climate Assessment (NCA), extreme weather events may occur continuously which affect human life, agricultural yield and health. Storms, hurricanes, heat waves, flood, cloud busting, drought are its outcome.

2. Safety Challenge- Disaster Management, National safety and security are intense problems created by it. Global challenges of instability, poverty, inflation, corruption are by product of safety challenges. That's a vicious circle.

3. **Economic Challenges-** agricultural problems, social issues, health issues all throw the human and national life in crisis. To tackle these issues is a great challenge. Developing and under developed countries have to pay a price.
4. **Health related Issues-** Heat related sickness, injuries due to natural calamities, hunger, respiratory problems, cardiovascular problems, food adulteration, scares resources are hard to tackle.
5. **Rising sea levels-**Rising temperature cause melting of ice and causing flood. Decrease in ocean and wetland habitats (NOAA 2018)
6. **Affects Ecosystem-**Ecosystem is an interconnected link of living organisms. Biological life gets endangered. Change in weather threatens survival of biological organisms, disturbs food chain. Animal and plant species are on the verge of extinction.
7. **Acidification of water sources-**Ocean absorbs CO₂ in greater amount. Artificially created CO₂ causes acidification as PH level of ocean decreases. Acidic rain, disturbance in ocean biological species occur.

Solutions-

It will be highly difficult to meet the Paris Goals without removing the GHGs from atmosphere. (Roe et al. 2019). Globally, the GHG emission should be dropped by 50%

(about 25 Gt CO₂) in near future. The target is to hold it to 1.5°C and not to allow going beyond that. For those following measures should undertake-

1. Immediate Action- Each country should make action plan immediately, without losing a single minute. Policies should be well prepared. Delay is not affordable.
2. Government- Government should declare incentives and subsidies for motivating the people to undertake the activities which will lessen CO₂ and methane emission. Global Co-ordination and efforts and engagements with stakeholders and land users based on cultural, political and socio-economic understanding. (Roe et. al.) Developing countries will need assistance from developed countries in the form of Technological Support, Finance, capacity building and awareness campaigns.
3. Alternative Energy sources- Alternative sources for energy should be found out for those young researchers, scientists should be motivated. Government should collaborate internationally for it.
4. Improving Management Practices- Proper planning of vegetation and plantation, forest recovery increasing organic carbon should inputs residing improving community composition to improve carbon storage and reduce methane emissions in wetlands.

5. Sustainable Development- searching the ways to restore the balance of GHG emission. Minimizing the unnecessary use of natural resources and CO2 emitting instruments, searching for Industrial innovations and technological advancement for emissions curtailment is necessary.
6. Public Awareness- Right from schooling, the public awareness should be created through different Government enforcement, social activities.

CONCLUSION:

Climate Change and GHG emission are unavoidable part of life. In order to generate sustainable life, for future generation, it is the perfect time to start the action to make human life more convenient and worth living proper attention for curtaining CO2 and Methane emission is the need of the day for whole globe.

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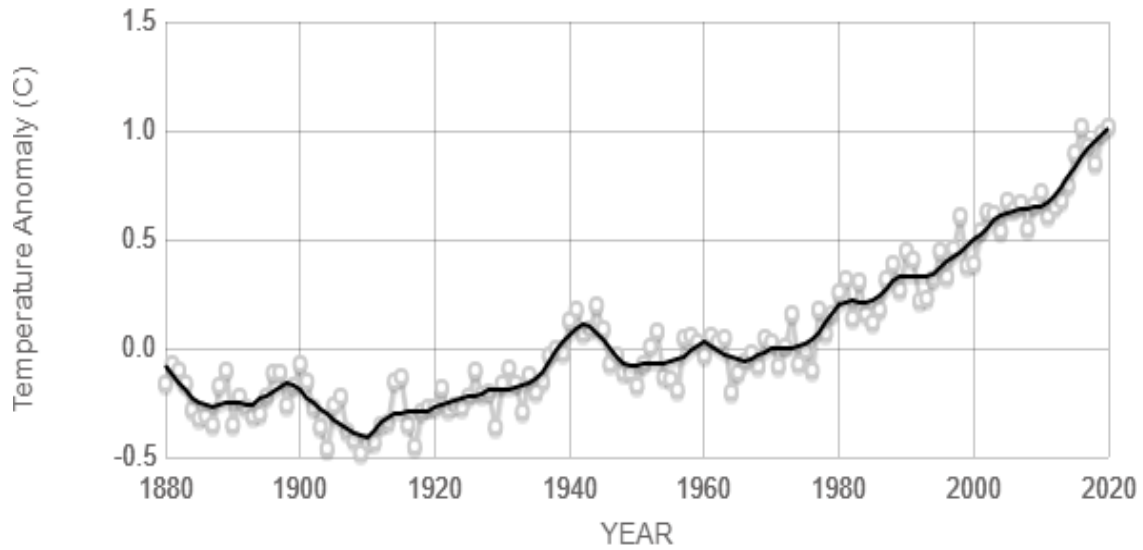
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Source: climate.nasa.gov

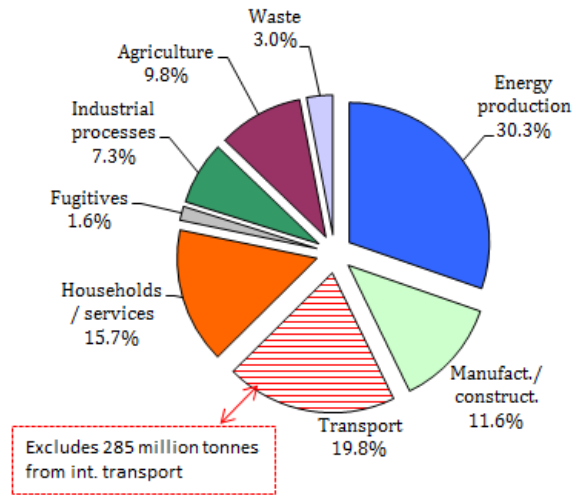
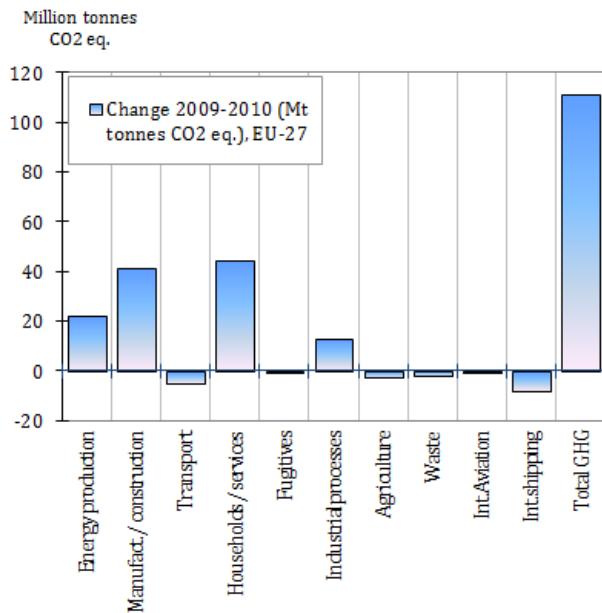
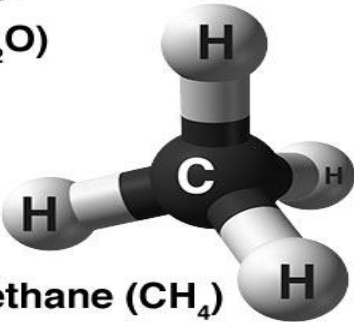


Figure 1 Green House Gas emissions

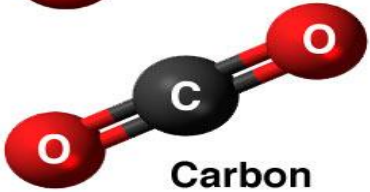


Water vapor (H_2O)

Nitrous oxide (N_2O)



Methane (CH_4)



Carbon dioxide (CO_2)

