IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# A Review of Greenhouse Gas Emissions from Fossil Fuels and Climate Change.

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**Abstract:** Several studies have expressed the need for control measures on greenhouse effect which are a consequence of greenhouse gases. The consumption of energy from fossil fuels by most countries especially in Africa does not come without some environmental problems like pollution and climate change, which are a consequence of greenhouse gases. Even European countries still depend heavily on fossil fuels even with the advent of renewable energy sources. These gases are harmful to the health of living things and devastating to the environment that is dangerous to living things. It has been shown scientifically that different methods can be used to remove most of these greenhouse gases from the exhaust of vehicles and industrial generating plants. Land and oceans are heated by radiation (soft) as they pass through greenhouse gases to the earth's atmosphere. The increase in human activities through technological advancement is responsible for the greenhouse gases which also cause atmospheric temperature increase. This study tends to consider greenhouse gas emissions from fossil fuels and review its effect on the climate system.

**Index Terms – fossil fuels, greenhouse effect, environment, temperature, climate change.**

## I. Introduction

The consumption of energy from fossil fuels by most countries especially in Africa does not come without some environmental problems like pollution and climate change, which are a consequence of greenhouse gases. Even European countries still depend heavily on fossil fuels even with the advent of renewable energy sources. According to [1], vehicular and industrial pollution are the main contributor of greenhouse gases and climate change. The burning of fossil fuels has also caused an increase in sulphate and soot aerosols in the atmosphere. During the past 150 years the amount of carbon dioxide in the earth's atmosphere has increased from 280 parts per million to more than 380 parts per million on account of burning of fossil fuels [2]. When the quantity of carbon dioxide increases in the air, more heat is stored in the atmosphere; and this comes upon human beings thereby causing a great harmful effect to human health [3]. Increases in atmospheric carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons due to human activities over the past 200 years have increased the greenhouse gases by about 1% relative to the radioactive fluxes which turn like a blanket, gripping Infra-Red radiation that drive the climate System [4]; [5]. Everyday billions of vehicles release various gases into the atmosphere. This causes the earth to warm up and increase its average temperature [6]. It is concluded empirically that the observed increase in the greenhouse gases is sufficient to ultimately warm the planet by more than 2°C in the 21st century [7].

Greenhouse gases (GHGs) have been proven to be responsible for global warming with the consequent threat to climate change [8]. Greenhouse gases (GHGs) warm the surface and the atmosphere with significant implications for rainfall, retreat of glaciers and sea ice, sea level, among other factors [9]. Without the greenhouse effect the Earth's average global temperature would be much colder and life on Earth as we know it would be impossible. Climatologist believe that increasing atmospheric concentration of carbon dioxide and other "greenhouse gasses" released by human activities, such as burning of fossil fuels and deforestation, are warming the Earth. The mechanism is commonly known as the "greenhouse effect" is what makes the Earth habitable [10]. Several researchers have carried out studies on greenhouse gases, their effect and control. The present review summarizes research and studies on greenhouse gases from fossil fuels.

## II. Greenhouse gases emission from fossil fuels - brief review

Lincoln carried out a study on fossil fuels in the 21st century [11]. According to him substantial increases in energy derived from other sources, fossil fuels will remain a major energy source for much of the 21st century and the sequestration of $CO_2$ will be an increasingly important requirement. According to his studies two factors are responsible for this. The first is that even if viable technologies were now available to completely replace the use of fossil fuels, the enormity of the infrastructure change required to sustain present energy demand and to allow its growth would take decades to achieve. The second factor is that, despite their drawbacks, 235U fission and hydroelectric power are presently the most feasible options to provide the level of increase in high intensity energy supply capable of significantly slowing the rate of increase in fossil fuel usage in the next several decades, despite the promise of other alternative energy sources. According to this study extensive $CO_2$ sequestration program can help minimize fossil fuel energy dependence. Martins et al., carried out an analysis of fossil fuel energy consumption and environmental impacts in European countries [12]. According to them many European countries are still heavily dependent on fossil fuels. The values for the fossil fuel energy consumption indicator is higher than 60% for most countries,

which corresponds to 24 countries out of the 29 European countries analyzed in their study. According to this study 10 countries presented values higher than 80%, which includes countries, such as Germany and the United Kingdom, that are considered leaders in the shift to renewable energy. According to them renewable energy is a key issue to decrease fossil fuel usage and to the shift to low carbon energy systems.

Das et al., carried out a study to estimate the future demand of fossil fuel and the corresponding emission of carbon dioxide and the temperature variation in India [13]. This study has anticipated that the total demand for petroleum products will double in the future growing at a rate of 3.5 percent per year. In his study he estimated that the consumption of coal will also witness an annual growth rate of 2.6 percent and the growth of natural gas is likely to be highest among all at 5.1 percent. In total, the fossil fuel consumption shall grow at the rate of 4 percent per annum. According to them, this may cause the $CO_2$ level to rise to one and half times in the future in comparison to that of 2008 level thus causing an increase in the surface temperature by 0.0008 percent per annum. According to this study, the level of carbon dioxide emission and the increase in temperature can be controlled by replacing the petroleum oil and coal consumption with natural gas. According to studies carried out by Mattew et al., which examined the long run relationship between greenhouse gas (GHG) emissions and health outcomes in Nigeria [3]. Their study observed that emission of carbon dioxide is the main source of GHG emissions which are a consequence fossil fuels. The study posits that reduction in the emissions of carbon dioxide should be seen as a thing of importance in improving health outcome in Nigeria. According to them, this reduction can be done through the reduction of deforestation and conservation of land, controlling of wildfire, adopting better methods of combusting residues of crops and effective use of energy by forest dwellers amongst other measures. Giwa et al., carried out an inventory of (GHGs) released into the environment through consumption of fuels (gasoline and diesel) in Nigeria from 1980 to 2014 [14]. According to them the total amount of GHGs emitted into the environment for the period under consideration was 7.30 x 108 $tCO_2$ e (5.20 x 108 $tCO_2$ e and 2.10 x 108 $tCO_2$ e of gasoline and diesel, respectively). The study noted that gasoline consumption accounted for 71.23% of the total amount of GHGs with $CO_2$ making up 98.72 % (CH4 = 1.39 % and N2O = 0.61 %) of the emissions. According to them a national policy and enforcement on low or neutral emission fuels utilization should be enacted toward reducing GHG emissions in the country.

Sulaiman and Abdul-Rahim investigated how population growth influence $CO_2$ emissions in Nigeria using an autoregressive approach [15]. They used a distributed lag model covering periods from 1971-2000, 1971-2005, and 1971-2010 recursively. Their study observed that population was not a determinant of $CO_2$ emissions in all the three periods in the long run. However, they found that economic growth was the only long-run $CO_2$ emissions determining factor within the studied periods. In the short run, virtually all the explanatory variables and their lags, that is, population growth, economic growth, and energy consumption, were significant in determining $CO_2$ emissions. According to them encouraging the use of low carbon technologies like abatement equipment, renewal energy, and energy utilization efficiency can greatly assist in reducing $CO_2$ emissions without reducing energy consumption, and hence achieving sustainable economic growth. Jagarnath and Thambiran undertook an initial investigation on Greenhouse gas emissions profiles of neighbourhoods in Durban, South Africa [16]. According to them particular groups and economic activities are responsible for more emissions, and socio-spatial development and emission inequalities are found both within the city and within the high emission zone. According to this study, strong strategic planning and multi-level governance in developmental decisions and consideration of mitigation implications are required.

Heede carried out a quantitative analysis of the historic fossil fuel and cement production records of the 50 leading investor-owned, 31 state-owned, and 9 nation-state producers of oil, natural gas, coal, and cement from as early as 1854 to 2010 [17]. His analysis traced emissions totaling 914 $GtCO_2e$—63 % of cumulative worldwide emissions of industrial $CO_2$ and methane between 1751 and 2010—to the 90 "carbon major" entities based on the carbon content of marketed hydrocarbon fuels (subtracting for non-energy uses), process $CO_2$ from cement manufacture, $CO_2$ from flaring, venting, and own fuel use, and fugitive or vented methane. Cumulatively, emissions of 315 $GtCO_2e$ have been traced to investor-owned entities, 288 $GtCO_2e$ to state-owned enterprises, and 312 $GtCO_2e$ to nation-states. Lineback et al., carried out an evaluation of five (5) hypothetical scenarios for use and disposal of biomass waste to demonstrate effects of industrial combustion of this biofuel on the greenhouse gas emissions bundle [18]. They observed that the use of biomass residue as a fuel can be a positive strategy for mitigating greenhouse gas emissions. Gurney et al carried out a quantification of fossil fuel $CO_2$ emissions down to the scale of individual buildings, road segments, and industrial/electricity production facilities on a large city (Indianapolis, Indiana USA) [19]. They were able to compare the estimate of fossil fuel emissions from natural gas to consumption data provided by the local gas utility. Their study achieved a bias-adjusted Pearson r correlation value of 0.92 ($p<0.001$).

**Conclusion**

Fossil fuel remain the main source of energy globally in the 21st century despite the shift from it to renewable energy sources. Emissions from the combustion of fossil fuels is the main contributor of greenhouse gases which causes temperature changes in the atmosphere. Economic factors have been identified as the main reason for continuous emission of carbon dioxide from fossil fuel combustion rather than population growth. Their impacts have environmental and heath related consequences. In as much as some studies have suggested the use of other sources of energy as a strategy to mitigate greenhouse gases others have seen it as necessary to create a balance in the carbon dioxide cycle. This review summarizes studies on greenhouse gases as a consequence of fossil fuel combustion as a source of energy.

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