

# Physics research paper example

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## **Greenhouse Gas Emissions and two methods of reducing these emissions**

Greenhouse gas emissions are a rising concern facing the entire world today. Greenhouse gasses are essentially those chemical compounds found on earth which allow the passage of sunlight into the earth's atmosphere. When the sun shines down upon the earth it emits light that penetrates into the Earth's surface, however some of this light is reflected back into the space in the form of heat or infrared radiation. It is this radiation that is absorbed by the green house gasses and retained within the atmosphere. Greenhouse gases are necessary to maintain the atmospheric temperature on earth. According to studies, without greenhouse gasses the temperature on earth would have been -2 degrees; hence this shows the immense importance of naturally occurring greenhouse gasses. The problem arises due to the vast amount of greenhouse gases emitted due to human sources which is severely altering the climatic conditions on earth.

The balance of the Earth's temperature can only be maintained when the amount of energy sent from the Sun should be same as the energy radiated back. But due to the greenhouse gases this balance is severely affected causing a major concern. If the balance is not maintained, it could lead to severe climatic imbalance, hence causing a threat to mankind.

Some of the greenhouse gases naturally occur in the environment such as water vapor, carbon dioxide (CO<sub>2</sub>), Methane, Nitrous Oxide (NO<sub>2</sub>), Chlorofluorocarbons, per fluorocarbons and bio methane emissions (CH<sub>4</sub>). Apart from occurring naturally, these greenhouse gases also occur due to manmade sources such as; power plants using fossil fuel namely natural gas

power plants and coal fired power plants, combustion engines that are fueled with gasoline or petroleum diesel, deforestation and due to usage of gases for aerosols. Ever since the dawn of the Industrial Revolution, the emission of greenhouse gases has been on a rise.

The following diagram depicts the percentage of global greenhouse gas emissions caused by humans in various forms. The data is measured in a CO<sub>2</sub> equivalent basis.

According to the diagram it is clear that CO<sub>2</sub> emissions are a major source of concern and it is necessary to cut down the level of this emission.

### **Understanding CO<sub>2</sub> Emissions:**

Carbon dioxide emissions are caused due to a number of reasons apart from its natural occurrence. Human activities have caused a severe rise in the emission of CO<sub>2</sub>. Since the Industrial Revolution during the 1700's various human activities have contributed to CO<sub>2</sub> emissions in the atmosphere. Activities such as burning of fuels, coal and oil have significantly increased the levels of CO<sub>2</sub> emissions. According to data of 2005, the concentration of CO<sub>2</sub> in the atmosphere had risen by 35% than it was before the onset of Industrial Revolution. About 80% of the total greenhouse gas emissions are believed to be CO<sub>2</sub> emissions.

Since 1750, human activities alone have caused production of over 5 trillion pounds of Carbon Dioxide Emissions into the atmosphere. From these total emissions, around half of them are concentrated into the oceans which are causing severe damage to the coral reefs. The remaining half is the major cause of global warming.

Carbon dioxide mainly enters into the climate through various sources such as burning of fossil fuels like coal, oil and natural gases, solid waste, wood and tree products etc. Other chemical reaction in various industries such as in manufacturing of cement, cause CO<sub>2</sub> emissions.

## **Effects of Greenhouse gas**

The most basic effect of rising greenhouse gases is the rise in climatic temperature. As the temperature rises it causes overall disturbance of other natural cycles such as drastic change in climate, change in the sea levels, harmful effect on the natural fauna and flora on earth.

Studies prove that the emissions have caused a great imbalance in the earth's climatic conditions. The Earth's climate has become warmer than before. Human activities is enhancing the greenhouse effect and causing an imbalance in climatic conditions. Studies also rove that human activities is a major factor in the rise in air climate temperature as well as sub-surface temperature of oceans. Over the last decade rising human activities and is the sole reason for the climatic imbalance.

In order to survive the severe climatic disorder which maybe caused due to the greenhouse emissions, it is imperative to take a few concrete steps towards solving this issue.

## **Methods for reducing Greenhouse Gas emissions**

Transportation: Since the advent of motorized transportation along with technological progress, there has been an increase in transportation facilities as new and better methods are introduced. These transportation options even though helps the commuter, it increases the use of energy. Modern

transportations are usually supported by internal combustion engines that run on petroleum. This trend has caused a major greenhouse gas emission due to transportation. Unless concrete steps are taken, the emission of the principle greenhouse gas, CO<sub>2</sub>, will continue to rise due to transportation.

**Efficient energy management:** It is necessary to introduce fuel efficient cars and light trucks which can help control the emissions. Advanced diesel engines, electrical cars, gasoline hybrid vehicles etc. are a few steps that can be undertaken to reduce emissions.

**Use of alternative fuels:** replacement of petroleum fuels is necessary to control the CO<sub>2</sub> emissions. This can be achieved by use of alternative fuels such as natural gas and liquefied petroleum gas (LPG). Other lower-carbon alternative fuels such as ethers and alcohols that are derived from biomass can be merged with gasoline, thus helping to reduce emissions. Transition to hydrogen-powered transportation system might seem difficult, but the right infrastructure can help achieve the task.

**Use of public transportation:** Luxurious living along with wealth does not promote public transportation. More and more individuals are opting to own vehicles and use them for their transportation needs. It is important to generate awareness amongst the masses regarding the harmful greenhouse gas emissions caused due to use of transport and hence must be urged to use public transportation.

**Policies:** There are many policies that can be formulated to ensure less emission of greenhouse gases. Governments need to identify beneficial policies and consequently act upon them. Fuel efficiency of cars and trucks can help decrease the emission, hence this potential option must be

recognized and policies to that effect must be formulated. Similarly fossil fuel and carbon pricing can help control emissions as it will put off transportation demands. Policy makers can make use of Greenhouse Gas Inventory which helps to track the emission trends. Using this knowledge strategies are conceived using which policies are passed. Greenhouse gas inventories are also extremely useful for scientists to record the trends and generate economic as well as atmospheric modules to study and collect data. Even though transportation industry is a huge one, a few concrete steps can help achieve the objective of reducing greenhouse gas emissions greatly. Understanding the needs and offering best viable solutions that are in the interest of the environment is the need of the hour.

### **Reduction in emissions on a personal level:**

Small conclusive steps taken by every individual too can make a great difference in the reduction of Greenhouse gas emissions. Even though changes do not happen overnight, small steps can be extremely beneficial if every individual realizes the need for reduction of greenhouse gas emission.

**Planting:** Plants are a great source of food and energy. They not only offer us food but also absorb the atmospheric CO<sub>2</sub> hence helping us to reduce the levels of CO<sub>2</sub> in the atmosphere. When collective efforts are taken by the public, it could help reduce emissions in the atmosphere.

**Eating Locally:** Eating locally grown foods promotes agriculture within the country. There is no need to export foodstuff from other countries which causes a lot of use of transportation that causes greenhouse emission

**Redecorating homes with eco-products:** using eco-products such as latex paint for painting the house as latex release fewer harmful fumes rather than

the traditional paints.

Buying energy efficient products: Most products are now equipped with an ‘energy star’ label that indicates the product to be energy efficient. Such products require less energy to function which in turn makes for less burning of fossil fuels. Such products also help in the reduction of bills.

In case the products are not energy efficient, individuals can take steps to make it energy efficient. Small steps such as hang drying clothes rather than machine drying, switching of lights when not in use, loading dishwasher and washing machines to its full capacity before using etc. are some very small but effective steps.

Use renewable energy: most electrical companies are now offering 100% renewable electricity. Using such energy can be extremely helpful. Many companies also offer ‘green tariffs’, which the consumers can use and benefit from.

Reduction in heating: By insulating homes one can sufficiently cut down on heating and cooling. Using caulk and weather strips, changing windows with double glazing, using shades to cover during summer are some very little efforts which can make a great impact for energy efficiency. Individuals should also check the thermostat of the home as many a time’s heating is not required at all.

Reduction in use of electricity: While appliances are not in use, it is advisable to switch them off and unplug them as even when on standby, energy is used. Turning off lights when not in use, replacing old bulbs with energy efficient fluorescent bulbs or Ultra Compact LED’s which make use of less energy.

Use of alternative energy devices: Solar energy is the best form of energy that can be harnessed for daily used. Solar energy does not have any harmful effects but instead is efficient and extremely useful. From large solar cells to small solar heaters, solar energy equipments can be extremely useful.

**Using electric transportation: Electric transportation is a viable option rather than using conventional cars and bikes.**

Using public transport: Car pooling and using public transportation is extremely beneficial as less fuel is used which in turn leads to less emission of greenhouse gases.

On a community level like on a larger industrial level, change in attitude and shift in preferences seem difficult. But it is necessary to make the people aware of the harmful consequences of greenhouse gas emissions.

Government must take initiative to educate the masses regarding the current scenario and how every individual is responsible to undertake steps to reduce the emissions. Our everyday choices to eat commute, using electricity and housing can greatly influence the amount of greenhouse gas emissions. Hence it is important to reinforce this concept amongst the masses and urge everyone to become environmentally responsible.

Before setting personal gains in the fore, it is necessary for industries to realize the potential harmful effects of the high volumes of emissions due to the industries. Deforestation too needs to be addressed and initiatives must be taken to retain the forests as they are a source of absorbing the CO<sub>2</sub> in the atmosphere. The depleting forest cover throughout the world is a dangerous sign of impending doom; hence urgent steps need to be taken by



government as well as industries together.

Studies indicate that in near future the climatic condition of the world could face dramatic changes which can be extremely harmful to mankind.

Developed as well as developing countries require recognizing the need to lower down the emissions and hence work collectively in achieving them.

According to the above figure it is estimated that the greenhouse emission of gases especially CO<sub>2</sub> will escalate marginally in developing countries than that in developed nations. This clearly indicates the urgency of realizing the potential risks that the world faces due to the escalating CO<sub>2</sub> and other greenhouse gas emissions. According to assumptions, the demand for coal and gasoline is expected to rise manifold in the coming future. Such a rise directly indicates a rise in CO<sub>2</sub> and other greenhouse gas emissions.

As per The Fifth U. S. Climate Action Report, which assessed the current trends, it was concluded that greenhouse gas emissions have risen by 17% from 1990 to 2007. The rise in CO<sub>2</sub> emissions in US was due to extensive fossil fuel combustion.

Developing nations need to address the issue of global warming and come up with solutions that can help to curb the emission levels. An ignorant stance can be extremely harmful for the entire world and hence it is necessary for developed nations to intervene and find solutions for the control of emissions in developing countries.

Trends suggest many human sources of greenhouse gas emissions are going to rise in near future. This rise can be curtailed by the use of better energy efficient technologies.

The changing climatic conditions are an indication to the impending doom.

Due to the rise air-surface temperature of earth, the snowy covers of the Polar Regions are melting at a rapid state. This could mean a severe calamity if urgent steps are not taken. Hence it is important not only at a larger stage but also on a personal level to undertake steps, however small to safeguard the environment and overcome global warming issues.

### **Works Cited:**

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