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# IMPACT OF GREEN ENERGY ON GLOBAL WARMING - A CHANGING SCENARIO

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## **ABSTRACT**

The climate of the earth is influenced by first six miles above the surface and the gap between the earth's surface and six miles above is considered to be the atmosphere. The atmosphere is maintaining a temperature up to 40 to 45 degree Celsius which is suitable for the living organisms to lead a happy life. Due to increase in the emission of green house gases like CO<sub>2</sub> the environmental temperature is gradually increasing. This is called Global warming. The emission of CO<sub>2</sub> is increasing day by day due to deforestation or burning fossil fuels. The major contributor for global warming is industries. Conventional energy production system pollutes the environment by emitting poisonous gases. The average increase in the temperature is found to be 0.4 to 0.8 degree Celsius. If the same situation continuous, then during 2100 the average temperature may increase up to 1.4 to 5.8 degree Celsius. The average increase in the temperature year by year brings threat to the living organisms around the globe. Now it is very important to think on this issue and find out the remedy to bring down the global temperature. In energy sector the main electricity production is done using thermal energy system. In this paper the impact of green energy on green house gases is explained. In this paper a comparative study of emission of CO<sub>2</sub> by the traditional energy production system and Renewable energy production system. The paper also suggests the methods to bring down the global warming by adopting Renewable energy sources.

**Index Terms :** Green energy, Green house, Renewable Energy, fossil fuels, Deforestation.

## **1. Introduction**

Global warming is the gradual increase in the atmospheric temperature of the earth.[1] This increase in the temperature is due to the green house effect. The radiation from the sun (heat) is absorbed by the atmosphere due to the green house effect which makes the life in the earth possible. If the atmosphere reflects the radiation from the sun then the atmospheric temperature of the earth would be so cold which would not permit any living organisms including human beings. The atmospheric temperature should be maintained for the life. It should not go below the permissible range or above the same. But the green house is getting disturbed because of the pollutions in the atmosphere due to several reasons. One such major reason is the imbalanced concentration of CO<sub>2</sub> in the atmosphere. Usually the atmospheric balance is achieved by the green trees consuming the CO<sub>2</sub> emitted by the living organisms for preparing the food. The trees thus release the oxygen in this process. The oxygen thus released by the trees will be utilized by the living organisms for breathing. Thus a balanced green house is achieved. But due to the industrialization process the trees are getting vanished day by day resulting in emission of CO<sub>2</sub> in excess. The earth's surface does not have enough trees to consume this excess CO<sub>2</sub> and produce oxygen. This results in gradual increase in the concentration of CO<sub>2</sub>. This increase in CO<sub>2</sub> gradually imbalances the green house.[2] This results in gradual increase in the earth's atmospheric temperature. This effect is called Global warming.

## **2. Contribution of Industries to Global Warming.**

The green house gas emission is mainly because of carbon in the form of CO<sub>2</sub>, methane, F-gases and nitrous oxide. One of the major waste product in the industries is CO<sub>2</sub>. These gases can be released by deforestation, burning fossil fuels, farming and some industrial activities. The World Resource Institute (WRI) has identified the contribution of Energy sector towards global emission to be 24.9%

[3]. Among all the other sectors contribution towards global emission from energy sector is found to be maximum. In energy sector maximum electrical energy generation is done using Thermal energy which contribute nearly 47% CO<sub>2</sub> and SO<sub>2</sub> in the global emission [4].

In India the total installed annual power production capacity is nearly 30,3083 MW [5]. Out of 303 GW annual power nearly 211 GW of power is generated from thermal energy.[5] The thermal power station uses fossil-fuels as main raw material to generate the steam from the water. This results in large contribution of CO<sub>2</sub> emission to the environment.

The other conventional methods of power production are electricity from gas and electricity from diesel. Both the methods emit CO<sub>2</sub> to the environment. The total installed capacity of both diesel and gas is 25,528 MW . The total emission of CO<sub>2</sub> in India from Fuel combustion is 1868.6 million tons [6].

### 3. Contribution of Renewable Energy to the global warming.

The total annual production of power from the renewable energy resource is 85138.4KWP (Kilo Watt Peak) [5]. Out of this amount major contribution is from the solar energy by means of solar PV modules. The energy from solar PV module can directly be connected to the central grid without any need of storage cells. This leads to the clean energy without any environmental pollutions. This method doesn't emit CO<sub>2</sub> to the environment. This leads to the control over the global warming. The main drawback of going to this energy is the amount of space for the production. Here just to produce 100 MW of power from solar energy we may require the space of 400 acers of land which is ten times larger than setting up the thermal power plant to generate the same amount of energy. Secondly the power produced from solar energy system is only during day time. The amount of energy thus produced is seasonal changing from season to season depending on the availability of the sun.

### 4. Objective

The objective is to study the contribution of global warming from the renewable energy and to compare the same with the conventional energy. The objective also includes the comparative study of various factors of conventional energy and renewable energy with ABCD analysis.

### 5. Methodology

The methodology includes the study of contribution of green house emission by the conventional electricity production and what are the improvements which could be possible from replacement of conventional energy by the renewable energy. In 2014 India was depending 50% of its energy needs from the coal operated Thermal energy. Later stage the govt. is giving importance to the renewable energy resource. By 2022 India is aiming at 175MW electricity production from renewable energy resource. Total installed Power generation capacity during 2015 in India is as shown in the table 1 [7].

Table 1 : Total installed Power generation capacity during 2015.

Energy Source	Capacity in MW	Percentage	Power captive capacity MW	Percentage
Electricity from Coal	164,635.88	61.51	27,588.00	58.60
Electricity from Water (Hydro)	41,267.43	15.42	83.00	0.17
Electricity from Renewable Energy resource	31,692.14	11.84	-	-
Electricity from natural Gas	23,062.15	8.61	5,215.00	11.08
Atomic Energy	5,780.00	2.16	-	-

<b>Electricity from oil</b>	1,199.75	0.44	14,196.00	30.17
<b>Total</b>	<b>267,637.35</b>		<b>47,082.00</b>	

The amount of coal required to generate 100 MW of electricity from thermal power station considering 70% efficiency of Turbine and 50% efficiency of boiler will be 16,80,000kg/day. The amount of CO<sub>2</sub> emitted to the environment by burning coal which produces one KWh is 2.07 pounds [8]. Thus totally the emission of CO<sub>2</sub> to environment is almost 1868.6 million tons. This contribution increases the global temperature by 0.15<sup>0</sup> Celsius to 0.20<sup>0</sup> Celsius per decade [NASA]. The amount of space required to generate 100 MW of energy from the solar PV cells will be nearly 400 acres. The same amount of energy production from thermal energy requires just 10% of the land. Thus if we switch over the total production of electrical energy from renewable sources we may have to spare around ten lakh acres of land. The advantage of using solar energy is the contribution of CO<sub>2</sub> to the environment which is absolutely zero. In addition to the carbon dioxide emission the contribution to the pollution either water pollution or air pollution from the renewable energy is negligible. National Mission for Enhanced Energy Efficiency (NMEEE) has identified the further need of 20 GW of power and over 30 years using renewable energy resources it aims at reduction of emission of CO<sub>2</sub> by 57 million Tons [9]. The problem of space for installing the renewable energy can be solved by means of decentralized production of energy by which the unused land can be effectively used without disturbing the nature.

## **6. ABCD Analysis**

Any innovative concept or model or system can be analysed using either SWOC, or newly developed ABCD analysis method. ABCD listing and ABCD framework are two models of qualitative [10-17] and quantitative ABCD analysis method [18- 24] respectively. In this section, we have used ABCD analysis for qualitative listing of advantages, benefits, constraints and disadvantages of renewable energy resources.

### **6.1 Advantages**

The advantages of using renewable energy resources include the zero contribution of green house gas emission. This method does not harm the nature . This method support distributed installation. The users can install the plan at their rooftop. Installation at the rooftop has several advantages. The area required to generate the power for the individual consumption will be less than the size of the rooftop. The direct radiation of sunlight to the rooftop is reduced by the installation of solar pv cells. This reduces the heat inside the house.

### **6.2 Benefits**

The usage of renewable energy has several benefits. This method supports the decentralized production giving a provision to the user to install the plant according to his need. The concept of centralized power production is now diluted. This new concept avoids the distribution losses and various other problems that are possible in the distribution line.

### **6.3 Constraints**

There are some constraints in using this method. Users who are living in apartments find it difficult to implement this decentralized power production using renewable method because of some policies to be followed in the apartments. The knowledge of this decentralized power production requires the minimum knowledge for the user to follow for the regular maintenance. Financial constraints will be an added ones. Lack of government support to promote the decentralized renewable energy is another big constraint.

### **6.4 Disadvantages**

The new method of adopting renewable energy has some disadvantages. The first and foremost disadvantage the need of the space. The conventional method of power production requires only 10% of the land that of the renewable energy. The decentralization of energy production using renewable is not possible in condition like industries, apartments, shopping complexes etc. wherein

the requirement of energy is more than the space available to install the renewable energy cells at the rooftop.

## 7. Conclusion

The usage of renewable energy contributes zero CO<sub>2</sub> to the environment. The result of this is the reduction in the pollution and global warming. The green energy reduces the carbon mining from the earth thereby the geological imbalance will be reduced. The energy production and utilization can be decentralized for the efficient result. The domestic energy requirement is fulfilled by installing the renewable energy at the rooftop to cater the individual need. This reduces the energy waste and the direct radiation of the sunlight to the rooftop is reduced. But this method of adoption may not be suitable for industrial requirements.

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