

Reduction In CO₂ Emission In Atmosphere By Using PV/T System

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ABSTRACT

The primary green house gas consists of CO₂, methane, bio-methane emission (CH₄), chlorofluorocarbons (CFC), and nitrogen oxide (N₂O). 25% of CO₂ emissions are absorbed by the ocean and another 25% of the CO₂ emissions are absorbed by the biosphere, such as tree, plants and soil, etc. This leaves 50% of the CO₂ emissions that are not absorbed and remaining in our atmosphere. CO₂ emissions are linked primarily to the burning of fossil fuels (power plants, cars, trucks, etc) and deforestation. The power plant uses fossil fuels for electricity generation and as we know, the fossil fuels reserves are depleting. Burning of fossil fuels causes pollution. In this paper PV or PV/t system helps in reducing the CO₂ emissions in the atmosphere. There is reduction in CO₂ emissions in PV/T system by 30.8 tons per year when compared to conventional system. We can reduce the burden of the power plant station by using PV/t system, thus helping in maintaining pollution free environment.

Keywords- global warming

I. INTRODUCTION

Two sectors play a pivotal role in the continued growth of global CO₂ emissions: *power generation* and *road transport*. Global CO₂ emissions from these sectors have increased steadily with very limited interruptions between 1970 and 2010. Both had almost the same growth rate over time until 2002, when China joined the WTO. This led to an accelerating Chinese industrialization and the demand for power reached a level where it starts to be visible in the global total trend of power generation. At global level, both sectors had consistently similar annual growth rates of 5% per year in the seventies, declining to 2.5% growth rate by the early nineties, which continued for the road transport but accelerated for the power sector to 4% from 2002 onwards. The developing countries have had continuous growth in emissions from both sectors over the entire period with increasing growth for power generation after 2002, as mentioned above, while the industrialized countries saw much lower growth in electricity consumption the early 90s due to the economic decline of the EIT countries in the early 90s. Again electricity consumption was relatively stable in these countries and the USA in the late 90s and early 2000s, due to the global recession. Around 91% CO₂ emission comes from fossil fuels and cement industries. The amount of CO₂ in the atmosphere effects the temperature of the planet. As more and more CO₂ builds up in the atmosphere, less heat can escape and the planet gets hotter. The CO₂ traps radiation from the sun like greenhouse. This is called global warming or the greenhouse effect. Global warming is becoming a serious problem and CO₂ is the major cause. The earth is now warmer than it has been in 1000's of years. The amount of CO₂ deposited in the earth's atmosphere from human activities is expected to double by the year 2050. Global warming causes many environmental problems. By raising the world's temperature, sea levels rise, mountains glaciers recede and snow cover decreases. 1100 square miles of Antarctic ice shelves have broken up in last year.

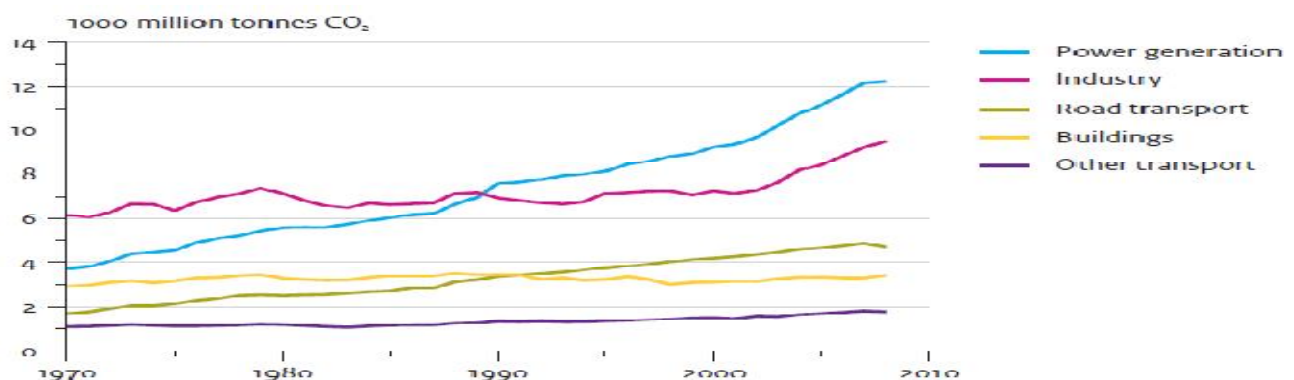


Fig1: Shows the CO₂ emissions from various sources. (Source: EDGAR4.2)

2. METHODOLOGY

A dining hall of 800 sq ft area is considered with a flat roof located in Chennai. The specification of the room is as follows-

ZONE	PARAMETER
External Wall	0.124 W/sq m k
Roof	0.063 W/sq m k
Floor	0.350 W/sq m k
Window to Wall Ratio	30%
Glass (Single pane)	1.22 W/sq m k
SHGC	0.25
AC	PTAC

Table 1: shows the parameters used in modeling the hall.

In this paper three models are considered- 1) Conventional roof, 2) with photovoltaic, 3) with photovoltaic thermal (PV/T). According to the type of system the parameters are changed. The above parameters are for conventional roof (which is considered as average base case system). The base case is designed according to ASHRAE 9.0. The following fig shows the hall with PV system. The same hall can be considered for analysis by changing the type of system. (Eg in conventional roof, the PV panel can be removed. In PV/T fluid like water or air can be used for removing the heat from the PV).

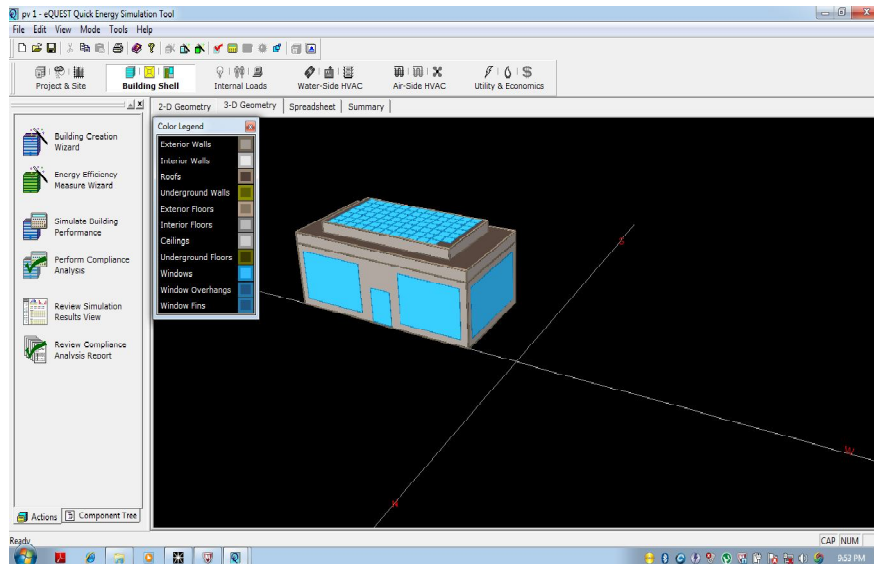


Fig 2: Simulated model of dining Hall with PV on roof.

3. Computation

The following table shows the computed values of CO₂ emissions obtained from the three systems. There is reduction in CO₂ emissions in PV/T system by 30.8 tons per year when compared to conventional system. The power plant uses fossil fuels for electricity generation and as we know, the fossil fuels reserves are depleting. Burning of fossil fuels causes pollution. The table below shows that we can reduce the burden of the power plant station by using PV/t system, thus helping in maintaining pollution free environment.

ALTERNATIVE	CO ₂ EMISSION (Tons per year)
Average Base Case	124
PV system	117
PV/T	91.5

Table 2: showing the CO₂ emission from the three systems.

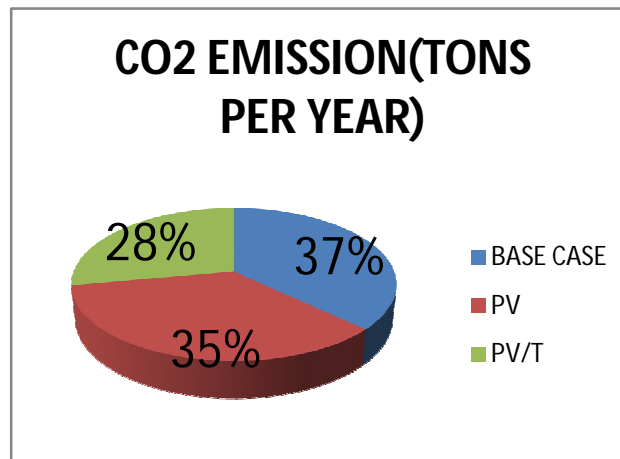


Fig 3: Pie chart showing the CO2 Emission (percentage) for each system

The graph shows the CO₂ Emission in percentage for a year. From this graph we can conclude that around 2% of CO₂ emission can be reduced by using PV and 9% of CO₂ emission can be reduced using PV/T system. This will help in reducing the load on power plant sector and thus maintaining the check on CO₂ emissions.

4. CONCLUSION

The study shows that around 2% of CO₂ emission can be reduced by using PV and 9% of CO₂ emission can be reduced using PV/T system. This will help in reducing the load on power plant sector and thus maintaining the check on CO₂ emissions. By controlling the CO₂ emission we can help in maintaining pollution free environment.

5. REFERENCE

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