

The Overall Influence of Using Thermal Energy, Biomass, Geothermal Application, Green Building Architecture on Reducing Industrial Pollution Throughout the Globe

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Abstract

The study has focused on the industrial pollution and implication of renewable energy to reduce it. Geothermal application has prior concern of the globalized industries to minimize the carbon emissions along with biomass energy production also accelerate the process to minimize the industrial pollution. Green building architecture practices also have been considered in the study to enhance the sustainability of the environment. Considering all the consequences of renewable energies are discussed over here to evaluate the impact of the renewable energies in reducing the industrial pollution. Advantage and disadvantage of renewable energies both have been discussed in the study. The study also focused on the waste management to enhance the quality of the environment. Discussion segment of the study has focused the interpretation of the data analysis findings that helps to meet the objectives of the study with justification. An overall study description has been stated in the conclusion segment of the study.

Keywords

carbon emissions, pollution, Renewable energy.

INTRODUCTION

Environmental sustainability is the prior concern of the global community including industrial activities as the industrial pollution is mostly affecting the ecological balance of the environment. Global warming is the major issue of the World that hampers the environmental sustainability that affects the socio environmental structure considering the industrial environment. Most of the pollution has occurred in the industrial belt as the carbon emissions and waste product creation are the basic polluted products of different industries. Considering the prioritization of the reduction of industrial pollution, the implication of advanced technology has been influenced by the globalized industries. Most popular initiatives taken by global industries are using thermal energy, Biomass, Geothermal Application, Green building Architecture. Renewable energies are the key factors to reduce carbon footprints of the industries in the global aspect. Waste management is also a vital criterion for the reduction of the industrial pollutants along with prioritizing environmental sustainability.

Using natural energies as resources helps to reduce pollution in a cost effective way. Implication of Green technology in the business operational process of the companies has assured the environmental sustainability along with increasing the profitability rate of the business in a global aspect. Cost effectiveness of renewable energies increases the probability ratio of the CSR activities of the globalized industries [1]. Industrial pollution can lead to

global warming that can affect human health along with eco environmental dis-balance. Brand reputation and recognition both have reached the goal of a company through maintaining the environmental responsibility. Companies and environment both are benefited with the CSR activities of the companies towards the environment. Controlling the pollution along with conserving energy for the future is also considered a noble initiative of globalized industries that are moving ahead towards the progression of the world.

Objectives

The study aims to analyze the influential factors of renewable energies in reducing industrial pollution and creating a sustainable environment.

- To evaluate the impact of geothermal application to control industrial pollution.
- To analyze the influence of biomass energy utilization in industrial pollution reduction.
- To understand the green building architecture practices in globalized industries to minimize the industrial pollution.

MATERIALS AND METHODS

The aim of the study is to evaluate the impact of using natural energies on reducing industrial pollution in a global aspect. Secondary data collection method has been used in this study to reach the goal of the study with more informative justification in an authentic way. Peer reviewed journals have been used in the study to collect the secondary

data as the peer reviewed journals are reliable sources [2]. This helps to obtain the observation regarding the sensitive issue of environmental pollution. The effect of industrial pollution also has been focused in collecting the secondary data from peer reviewed journals. The authentic journals also help to collect data regarding using the natural resources such as thermal energies, biomass and other energies by the globalized industries. After collecting the secondary data, the thematic data analysis process has been used in the study to meet the subject of the study. Flexibility and independence characteristic of the secondary data analysis procedure have enhanced the quality of the study. Themes are developed based on the topic and peer reviewed journals are used for developing the themes. The authenticity and reliability of thematic analysis have made the study trustworthy for the readers.

RESULTS

3.1 Geothermal application and its impacts on global industrial pollution reduction

Conduction, radiation and convection are the main characteristics of the thermal energies that help to reduce the pollution and maintain the sustainability of the environment. The chemical generated pollution of the thermal energies are in minimal quantities that can be considered as negligible. Beside this the thermal energy pollution can be controlled by constructing artificial lakes, cooling ponds and cooling towers that helps to maintain the sustainability of the environment [3]. Therefore, globalized industries use thermal

energies for the production of heat. Natural resources such as coal, fuel can be conserved for the future by using thermal energy. Coal energy creates excessive carbon emissions that hamper environmental sustainability whereas geothermal energy reduces the carbon emissions and saves the environment. Prioritizing the concern of reducing pollution, globalized industries used the geothermal energies that can be reusable and cost effective also. The maintenance cost of thermal energies is lower than using other resources for heat generation.

Labour cost also has been reduced by the implication of thermal energies in the business operations. Most of the companies are targeting zero carbon emissions in the next 2050. The advanced technology of the digital era has been improvised the resource technology that benefited both the company and the environment. Geothermal energy can be defined as the elimination of the combustion of fossil fuel that lowers the requirement of the power generation [4]. The significant purpose of geothermal energy is to minimize the use of non-renewable resources extraction to stop the damage of the environment by reducing the emission of greenhouse gasses. Geothermal energies offer the low carbon and energy efficient heat generation that impacts the reduction of industrial pollution. Due to the Covid 19 pandemic the carbon emissions have been decreased by 2.5 billion metric tons that creates a history in controlling industrial pollution [5]. According to the statistics it has been stated that the inactivity of industrial affairs have enhanced the reduction procedure of carbon emissions.

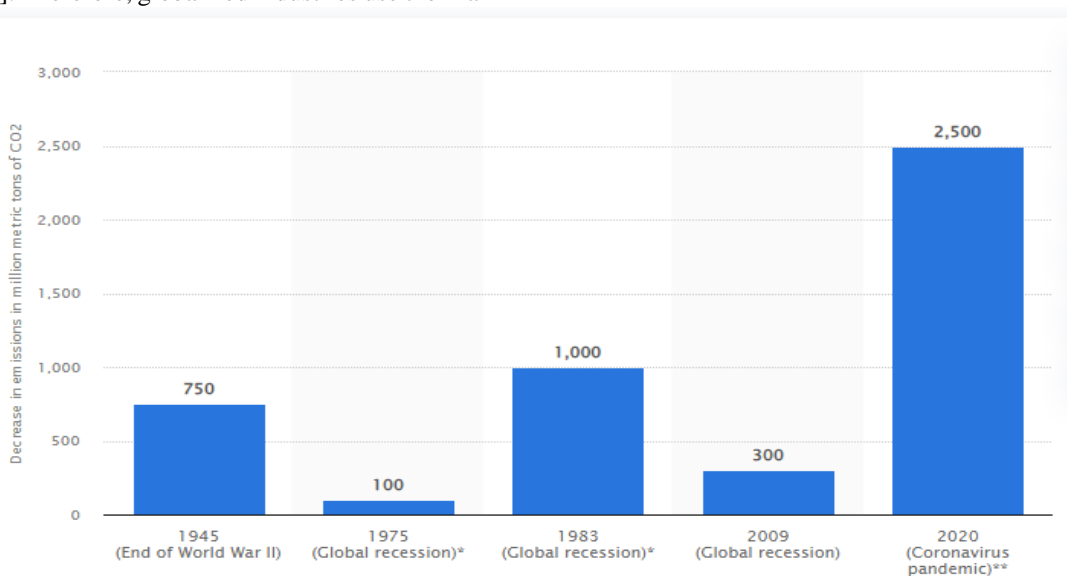


Figure 1: Impact of Covid 19 on reduction of carbon emission

Anti pollution technologies are used for the reducing industrial pollution such as selective catalytic reduction, electrostatic precipitators, fabric filters, flue gas desulfurization, wet ESP, mercury control method that enhance the probability of environmental sustainability by

reducing the industrial pollution. Thermal energies have the efficiency to act as an eco-friendly energy resource using precaution to decrease the carbon emissions and sustain the environment. Geothermal energy is a renewable source of energy that helps to maintain the environmental sustainability in a cost effective way. The characteristics of geothermal energy assure the globalized industries a long lasting service

with safe and reliable approach toward the companies and environment [6]. Low maintaining cost of geothermal energy increases the profitability rate of the business along with enhancing the environmental responsibility of the industries considering the positive consequences. Globalized industries have used geothermal energies for heat building and electricity generation.

Geothermal energies are helping to reduce the fossil fuel causing carbon emissions up to 99% in a large power plant. Acid rain caused by sulphur compounds generated in the also have been emitted by the using of geothermal energy in larger power plants. The energy of geothermal can be controlled by the industries whereas wind and solar energy depend on the climate change aspect though these also are the reliable renewable energy sources. Global warming also can be controlled by the geothermal energy activities by reducing the emissions of pollutants [7]. Geothermal energy has been extracted from the hydrothermal, geo-pressurized, hot dry rock and magma which are the reliable sources of geothermal energy production in the global aspect. Sustainability of geothermal energy has influenced environmental sustainability considering air pollution and public health.

3.2 Biomass and its influence on reducing Industrial pollution

Ecological balance has been controlled by the use of energy of biomass as the plants are observing the carbon dioxide which is released by the biomass energy utilization. Photosynthesis of plants has been completed by using the biomass generated carbon dioxide. The entire process benefits both the environment including plants and the industries by reducing the industrial pollution. Controlling the biomass energy utilization has to be focused by the industries to maintain the sustainability of the environment. Biomass also can be used as a renewable resource for energy generation. Carbon neutral activities of Biomass energy have helped to maintain the eco environmental balance which reduces global warming [8]. Industrial corporations also have benefited by using biomass energy in a cost effective way to produce heat for production purposes. Waste management in the industries also have been driven by the Biomass energy as the garbage production becomes lower in this process.

Over Reliance of fossil fuels has been reduced by the utilization of biomass energy. Biomass energy has acted as a cleaned and renewable energy source that helps to improve the environment and increases energy security. The abundant nature of biomass energy increases the reliability of the renewable energy sources along with enhancing the carbon neutral activity. The cause of climate change and global warming to some extent depends on the GHG production that can be minimized by the utilization of biomass energy to maintain the sustainability of the environment [9]. Biomass originated from the plant and considering the correlation of the plant and planet, biomass production as a renewable source is going on that also reflects on the eco environmental balance management. Organic materials burning considering biomass energy has helped to emit particular matters such as

nitrogen oxides, carbon monoxide, sulphur dioxides, mercury and other hazardous air pollutants.

Biomass energy has considered the cow manure using energy, garbage burned energy, ethanol energy production. Beside this, increasing population increases the waste products and biomass energy has generated from these garbage to reduce the environmental pollution. The waste products are used for valorisation, energy production and bio-fertilizers that develop environmental sustainability. Reducing the GHG emissions simultaneously production of the biomass fuelled electricity and heat generations applications are maintaining the eco environmental balance considering the reduction of industrial pollution [10]. Long term effect of the biomass energy generation has enhanced the quality of the environment that creates a symbolized revolutionary initiative taken by the globalized industries considering the reduction of global warming. On the other hand, the industrial pollution control ability has increased by the biomass energy utilization process.

3.3 Implication of Green Building architecture to minimize industrial pollution throughout the globe

The concept of Green Building Architecture has highlighted the construction that features efficiency to improve the surroundings environment quality and lifespan where the building is situated. Reducing environmental pollution, Green construction has played a vital role as it can control the carbon footprints in air along with decreasing water waste to enrich the quality of the water. Water conservation, preservation of natural resources, and defending biodiversity also has been driven by the green building construction [11]. Controlling the toxic gas productions in the air and reducing the waste products helps to maintain the environmental sustainability. Green building practices focused on the aluminium weather resistant panel to control the temperature of the work environment along with production houses. Energy efficient windows also have been prioritized by the green building practices including green roof. Solar power, water conservation, recycling, and landscaping are the environmental factors that have been influenced by the green building practices.

Based on five principles globalized industries are adopting the concept of green building practices that are focusing on the optimization of site potential, optimization of energy uses, protection and conservation of the water including waste products management. Optimization of material utilization and enhancement of environmental quality also have been prioritized by the green building practices [12]. Operational optimization considering the maintaining practices of green construction is a priority concern of green practices. Green architecture has considered the environmental quality to build the construction following the probability of energy efficiency of that particular space. Water usage also has been impacting the green building practices as the major renewable resource is the water. Air quality also has been checked by green practices to improve the health quality of industrial belts including the reduction of

the environmental pollution. Resource conservation and water conservation also have been improvised by the green building practices.

Most of the globalized industries are focusing on the green building architecture to assure the resource availability considering the less amount of industrial pollution. Utilization of natural resources has been concerned by the green building practices to reduce the carbon emissions along with other industrial pollution. Green building practices limit the material uses that encourage the waste management of the companies. Recycling of the waste products also has been implicated by the green building architecture that enhances the brand reputation of the companies considering the environmentally responsible corporate characteristics of the industries. Smart growth and development of the sustainability of business along with the environment using green building practices has influenced the other industries to adopt the concept of green building architecture to maintain the sustainability of the environment [13]. Sharing resources is another generous initiative of green building practices that ensures the reuses of the natural resources and enforcement to

use the renewable resources in the industrial operations.

Environmental pollution also has been driven by the green building practices by reducing the carbon emissions in the environment. Following the global business trends as a responsible corporate globalized industry are influenced by the green building practices. Globalization of the business organizations also has prioritized the green building practices in the execution process of businesses [14]. Eco-friendly approach of green building practices enhances environmental health along with industrial health by reducing the industrial pollution. The goal of green architecture is to decrease the use of natural resources and increase the use of renewable resources to conserve natural energies for the future. Environmental elements are driven by the green practices of globalized industries. According to the statistics it has been shown that 54% of industries are responding to the green building activities to reduce the industrial pollution worldwide [15]. Beside this, Green building activities are low budget construction that determines the profitability of the industries along with environmental responsibilities.

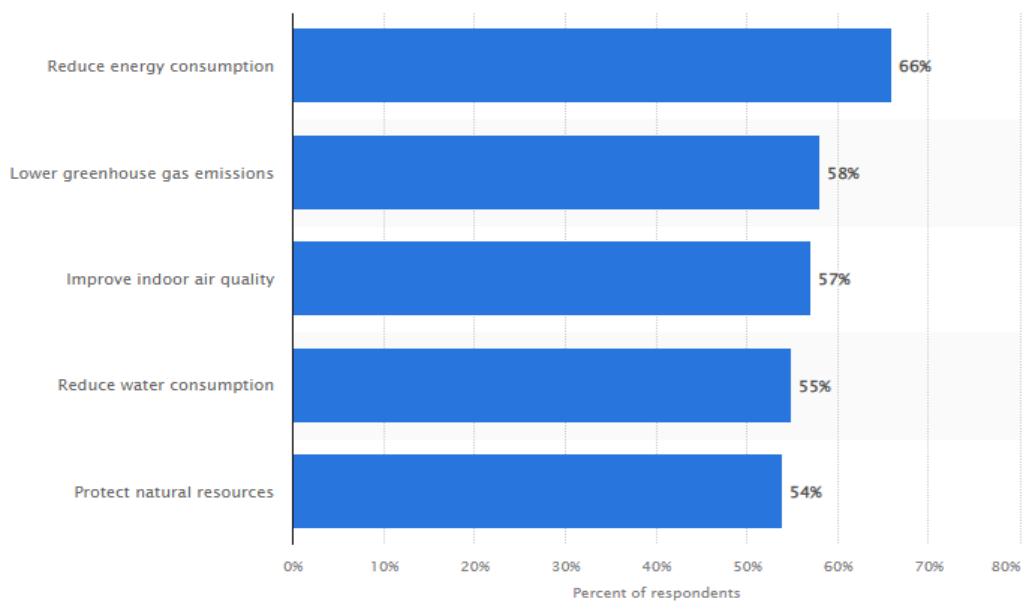


Figure 2: Influence of green building architecture practices in globalized industries

3.4 Critical evaluation of the advantage and disadvantage of the resources considering reduction of environmental pollution

The study has mostly focused on renewable energies such as geothermal energies, biomass energies and green building architecture practices which have a great impact on the reduction of industrial pollution in a wider aspect. Considering both consequences positive and negative, renewable energies acted as an eco-friendly driver to reduce the pollution of the environment. The most influential advantage of geothermal energy is to lessen the carbon emissions in the air and maintain the sustainability of the environment [16]. Another affecting advantage of

geothermal energies are reducing the amount of the waste products to create an eco-friendly approach to geothermal energy. However, initial installation of geothermal energy plants is quite expensive to adopt by the globalized industries.

After installing the geothermal plant in industries it can impact the companies with long term beneficiary aspects. Biomass energy itself releases the air polluting components such as carbon dioxide which helps to complete the process of photosynthesis of plants. Hence, biomass enactment causes responsible environmental factors that determine environmental sustainability. Reliability of biomass oriented much more as a renewable resource as it depends on the plants and organic compounds that have no ends. Cost

effectiveness of using biomass energy also ensures the increasing probability of environmental sustainability. Utilization of garbage for energy production in biomass energy production plants has helped to maintain the waste management of the products [17]. Carbon neutral activity of biomass energy production also has increased the potential of reducing the carbon emissions in the environment.

Lack of proper utilization of biomass energy panels can cause adverse effects on the environment. On the other hand, bigger space for installing the biomass panel in industrial belts has created obstacles as managing the bigger place is time taking and expensive. Implication of green building architecture for reducing the industrial pollution in the environment is the popular current trends of the global business platforms. Green building practices assure the minimal carbon emissions, waste management and conservation of the resources and water [18]. Infrastructure of the industries are focusing on the resistant ability of the temperature, assuring the conservation and reservation of natural resources along with recycling the waste products to utilize them and maintain the sustainability of the environment considering the green building practices. All of the benefits of utilization of green building practices has been a prior concern of the globalized industries to play a role of environmentally responsible corporate that increase the brand reputation of the companies.

Impact of green building architecture practices benefited the environment in a wider range by reducing the air pollutant, managing the waste products and recycling it. Lowering the toxic gas production and security of energy also has been prioritized by the green building practices. Initial building construction cost is expensive to implicate the green building practices in the industries [19]. Green construction material unavailability also has created obstacles for the execution of the strategy of green building practices. Time consumption of constructing the green building is quite long and can increase the operational cost of industries. Considering all pros and cons of renewable energy sources it can be considered that the implication of renewable energies increase the efficiency of the industries to reduce industrial pollutants and enhance the quality of the environment considering the sustainability of the environment.

3.5 Discussion

The evaluation of the impact of renewable energies on reducing industrial pollution has been briefly interpreted with the help of peer reviewed journals to meet the objectives of the study. The study has focused on the geothermal application and its influence on the reduction of carbon emissions in the industrial belt. Chemical generated pollution of the geothermal panels can be controlled by the industries that enhance the sustainability of the environment. Zero carbon emissions target of the globalized industries can be succeeded with the application of geothermal energy in the industries to generate heat. Combustion of fossil fuel in geothermal application has lowered the requirement of the power generation as the energy source has the capacity to

generate more heat using a minimal energy source. Risk of finishing energy is negligible for geothermal energy as its enactment highlights the renewable potential of the energy. Passively the eco-friendly approach of geothermal energy helps to reduce the GHG pollution and improve environmental sustainability. Disadvantage of geothermal application is the initial cost of installing the application in industries that can create obstacles to reduce the industrial pollution.

Using the geothermal application globalized industries perform a socio-environmental responsibility as a CSR towards the environment considering enhancement of brand reputation. Carbon neutral enactment of biomass energy sources has increased the sustainability of the environment. Waste management potential of biomass energy implication also has been improving the ecological balance of the environment. Garbage and waste products originated from the living particles have been recycled by biomass energy sources. Active initiatives of globalized industries to reduce the GHG production have been reduced by the application of biomass energy. Global warming to some extent depends on the biomass energy production that helps to reduce the greenhouse gas generation. Eco environment also has benefited with the application of Biomass energy generation as the pollution created by the energy including carbon dioxide has been used by the plants to complete the process of photosynthesis which brings food for plants.

The contradictory misuse of biomass panels can affect the environment with adverse impact of pollution. Expensiveness of the biomass panel installation and time consuming scenario has the negative aspects of this renewable resource. Considering all the consequences, Biomass energy application helps to reduce industrial pollution along with minimizing the effect of global warming in the environment. Green building architecture practices are the current trends of the industrial belt considering the digitalization of business operations. Assurance of renewable energy availability is the priority concern of the green building practices along with conservation of water and natural resources also have been focused by the green building practices. The infrastructure of green building architecture ensures the temperature controllability and landscaping factors of the industrial belt. Optimization of energy resources considering the sharing of energy and recycling the energy have been influenced by the green building practices.

Carbon emissions have been remarkably reduced by the implication of the green building practices. Limitation of material use in production by green building practices in globalized industries helps to enhance the waste management procedure. Recycling of waste products has also been used by green practices to improve environmental sustainability. Unavailability of materials for the construction of green building architecture increases the installation cost of green building. Despite these negative consequences, green building practices are the best option to reduce industrial

pollution in the environment and CSR activities of globalized industries have increased that reflects on the brand reputation of the companies. The interpretation of secondary data analysis of this study based on authentic peer reviewed journals has met the objectives of the study with justification.

4. CONCLUSION

Evaluation of impact of renewable energies on reducing industrial pollution and maintaining the sustainability of the environment has been briefly discussed in the study. Geothermal energy, biomass energy and green building architecture practices have been highlighted in the study and the influential characteristics of renewable energies also have been highlighted in the study. Efficiency of geothermal energy has reduced the carbon emissions in a large scale that increased the environmental sustainability. Beside this, carbon neutral activities of biomass energy also have increased the quality of the environment. Utilization of garbage to produce renewable energy has been highlighted by the biomass production that also helped to maintain the waste management. Green building architecture practices assess the renewable energies availability in the industries along with managing the waste products with an efficient manner. Global warming and environmental pollution reduction are the prior concerns of the globalized industries that increased the probability of environmental sustainability. Considering all pros and cons for installing renewable energies in the globalized platform of industries, it can be concluded that renewable energies are contributing a great effort to reduce industrial pollution and maintain environmental sustainability. The study has created a critical analysis of the renewable energies activities in creating a sustainable environment worldwide.

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