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HARNESSING RENEWABLE ENERGY TECHNOLOGIES TO MITIGATE CLIMATE CHANGE AND ADDRESS RISING ENERGY DEMANDS

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ABSTRACT----------
Climate change and its impacts present significant challenges to global sustainability, with businesses often contributing to the rise of greenhouse gas emissions through reliance on finite fossil fuel resources. As energy demands increase due to societal and economic development, renewable energy (RE) technologies offer a viable solution to mitigate climate change and meet global energy needs. This study explores various RE technologies, bioenergy, solar energy, geothermal energy, hydropower, and wind energy, and their roles in reducing greenhouse gas emissions and promoting sustainable energy practices. The findings highlight the advantages of renewable energy, including reduced carbon footprints, cost efficiency, and energy security. The study also addresses the challenges posed by climate change to renewable energy resources, emphasizing the need for robust policy interventions and investments in climate-resilient infrastructure. Adoption of RE technologies is essential for transitioning to a sustainable energy future and mitigating the adverse effects of climate change.

KEY WORDS: *Renewable Energy Technologies, Climate Change Mitigation, Sustainable Energy Solutions, Greenhouse Gas Emissions, Energy Security*----------

INTRODUCTION

Climate change and business hold a relationship. Business is considered a dual-edged sword as it assists the countries or an individual to gain economic prowess, but at the same time, it has some considerable effect on the climate. In the context of climate change business is considered as the major reason for having a hand in climate change. Many types of businesses use different methods to use the earth's natural energy (Asdrubali et al., 2015). The use of natural and finite sources always proves to be profitable for business, but as the sources are finite, so soon it is predicted that some sources will be depleted even to the point of extension, which may have a substantial effect on the climate.

Many large companies around the world are involved in emitting poisonous gases and thus are the prime contributor to the rise of greenhouse gases. This rise in greenhouse gas inflicts the issues regarding climate change. As many researchers have stated that after industrialization, the world successfully entered a state of self-destruction. Other researchers argued and stated that industrialization may not be the prime reason for climate change, but there is a considerable amount of contribution.

RENEWABLE ENERGY AND CLIMATE CHANGE

In recent periods it can be identified that the demand for climate energy is increasing. The major reason behind the increase in energy demand is the development of society and economy. The need for an increase in the welfare of humans also led to a rise in energy demand. Energy is even used by societies for fulfilling basic human needs like cooking, traveling, and even for communication. Another basic and most important thing is electricity, which can be used for the betterment of the products by considerable means (Dornan & Jotzo, 2015). Around 1850, humans started using fossil fuels like gas and oil for personal use, but it can be identified that the usage led to the rise in carbon dioxide emissions. The increase in the use of fossil fuels is so brutal that the concentration of greenhouse gases in the

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atmosphere started to increase by considerable means. As per one of the reports, it can be identified that the concentration of greenhouse emissions increased by 39% above the preindustrial level by the end of 2010.

Many options can reduce the emission of greenhouse gases into the atmosphere without compromising the demand for energy in society. Some of the major alternatives that can be identified are energy conservation, energy efficiency, switching the fossil fuels, use of nuclear energy, and implementation of carbon-capturing techniques. It is expected that if the emission of greenhouse gases decreases then the issues related to climate change can be mitigated by considerable means. Many researchers suggested that the implementation of RE can successfully increase access to energy and maintain the energy supply (Goswami & Kreith, 2015). Thus, it will also reduce the negative impact on the environment. It is also important to note that in the process of the implementation of RE, proper policies also need to be introduced in a business environment that can improve climate change by considerable means. It is necessary as many nations and big corporations implement RE technology in their operations so that the emission of greenhouse gases can be reduced by considerable means.

RENEWABLE ENERGY TECHNOLOGIES AND MARKETS

As many researchers, it can be identified that renewable energy technologies are considered heterogeneous types of technologies. RE technology can transfer large amounts of electricity, mechanical energy, and thermal energy. It also assists society in having fuel and thus satisfies the immediate needs for the fuel for the operation of the business. Some RE technologies can be implemented at the point of use thus, enabling both rural and urban society to the essence of the technology. Another type of RE technology can be stated as centralized technology, which is implemented at a specific place and distributed through the networks of energy. Some of the major RE technologies are as follows:

Bioenergy

Bioenergy mainly being created from various types of biomasses like residues of livestock, agriculture, and forest. The process includes short-rotation forest plantations, energy crops, different types of organic components related to municipal solid waste, and other organic waste streams. Over a variability of procedures, these feedstocks can be used to harvest power or warmth or can be rummaged to make gaseous, liquid, or solid fuels. The variety of technologies related to bioenergy is comprehensive and maturity differs considerably. Some of the major examples of commercially available skills include small- and large-scale cisterns, domestic pellet-based heating systems, and ethanol manufacture from sugar and arrowroot (Luthra et al., 2015). Progressive biomass combined gasifier positive ion combined-cycle control plants and lignocellulose-based conveyance fuels are examples of knowledge that are at a pre-commercial stage, while liquid biofuel production from algae and other types of biological change methods are at the research and development (R&D) phase. Technologies like bioenergy have claims in central and dispersed settings, with the old-style use of biomass in emerging nations being the most prevalent present request. Bioenergy can provide continuous or manageable production. Bioenergy developments typically hinge on resident and local fuel supply obtainability, but recent expansions indicate that hard biomass and liquid biofuels are progressively dealt with globally.

Direct Solar Energy

Direct solar energy technologies can be harnessed through the energy of solar irradiance to harvest electricity using photovoltaics (PV) and intent solar power (CSP), to harvest thermal energy (heating or cooling, moreover overactive or passive), to encounter straight lighting requirement and possibly, to harvest fuels that strength to use for conveyance and other drives.

Geothermal Energy

Geothermal energy uses the nearby thermal energy from the Earth's inner. Heat is removed from geothermal tanks using shafts or other ways. Reservoirs that are adequately hot and holey are called hydrothermal tanks, whereas pools that are adequately hot but that are better with hydraulic inspiration are called improved geothermic systems (EGS). The moment is at the surface, liquids of numerous temperatures that can be cast off to make electricity or can be utilized for more direct applications that need thermal energy. It can also be identified that heating or low-temperature heat can be used for the extraction of geothermal energy that can be utilized for different purposes, especially in different industries.

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Hydropower

Hydropower can be used to harness the energy of water that shifts from higher to lower elevations. Initially, it was used to create electricity. Hydropower projects mainly include dam projects with tanks, run-of-river, and in-stream projects and cover a range in project scale. This diversity gives hydropower the aptitude to encounter huge central municipal requirements as well as dispersed rural needs. Hydropower technologies are more mature than other energy-producing sources. Hydropower projects feat a reserve that differs temporally. This power can be implemented for both commercial use and industrial purposes, which assists the environment in replenishing its finite energy.

USE OF RE TECHNOLOGY

As per the recent report, it can be identified that the total use of RE energy to meet the demand for global led to 12.9%. The report also includes that the major contributor of RE energy is biomass, which accounted for 10.2%, which comes to around 60%. The adoption of biomass can be identified in major parts of the world even in underdeveloped and developed nations. The biomass is mainly used for cooking and heating appliances. The process is very famous in developing nations. It also increases the use of modern biomass as well. Hydropower, which is another RE technology, is also popular among individuals. Thus, it represented almost 2.3% of RE technology uses. Hydropower is considered one of the major contributors to the global electricity supply, which accounts for 19% of global electricity supply. It can also be identified that biofuels can be used for road transport purposes. Thus, it provides almost 2% of the fuel supply globally. As discussed above there are 2 types of biomasses. They are modern biomass and traditional biomass. The report indicates that traditional biomass is in use of more than 17% and on the other hand 8% of modern biomass is in use globally. Both geothermal and solar thermal energy are used combinedly. It fulfills 27% of the total global demand for heat. Based on different countries, the use of RE technology is being used to assist the rising demand for energy supply.

In recent periods it can be identified that the adoption of the use of RE technology can be seen by many nations globally. The deteriorating charge of numerous RE technologies, fluctuations in the values of fossil fuels, an upsurge in energy needs, and other issues have fortified the ongoing upsurge in the usage of RE. Contempt global financial encounters, RE volume sustained to produce speedily in 2009 likened to the increasing connected volume from the preceding day, counting wind power (32% increase, 38 Gigawatts (GW) added), hydropower (3%, 31 GW added), grid-connected photovoltaics (53%, 7.5 GW added), geothermal power (4%, 0.4 GW added), and solar hot water/heating (21%, 31 GWth added). Biofuels were reported for 2% of worldwide road conveyance fuel needs in 2008 and nearly 3% in 2009. The yearly manufacture of ethanol increased to 1.6 EJ (76 billion liters) by the end of 2009 and biodiesel to 0.6 EJ (17 billion liters).

Approximately 300 GW of renewable electricity-producing capacity internationally ended the two years from 2008 to 2009, 140 GW came from technologies of RE accompaniments. Collectively, developing countries host 53% of global RE electricity generation capacity. At the end of 2009, the usage of RE in high-temperature markets included recent biomass (270 GWth), solar (180 GWth), and geothermal (60 GWth). The usage of dispersed RE (without old-style biomass) in conference country energy wants at the domestic or community level has also augmented, counting hydropower stations, various modern biomass options, PV, wind, or hybrid systems that combine multiple technologies.

ADVANTAGES OF RENEWABLE ENERGY

The advantages of renewable energy are as follows

- Renewable energy technologies use properties directly from the atmosphere to create power. These energy bases comprise sunshine, wind, tides, and biomass. As these resources are numerous in the environment they will not run out. This statement is true for many fossil fuels.
- In many instances, renewable energy technologies consist of less maintenance cost than traditional generators that mainly harness traditional fuel sources. The main reason behind such phenomenon that can be identified is that creating renewable technologies like solar panels and wind turbines have no moving limbs and they are not based on flammable, combustible fuel sources for operations. Thus, it can be determined that less maintenance cost required translates to more time and money saved.

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• Renewable energy creation mainly emits less greenhouse gases or other different types of pollutants that are included in the air. This indicates that a smaller carbon footprint and thus, impact on the natural environment is comparatively very less. During the burning procedure, fossil fuels produce large amounts of greenhouse gases that have been proven to impair the rise of global temperatures and the frequency of extreme weather events.

CLIMATE CHANGE AND RE ENERGY

Climate change will have a considerable effect on the size of geographic distribution, which is the potential source for renewable energy technologies. As renewable technologies are mainly dependent on climate change, the use of renewable energy will be reduced, which may affect the availability of renewable energy in society. The process of biomass production and soil conditions are greatly affected by climate change. It is important to identify that climate change has a direct effect on soil conditions. The continuous change in the climate may directly affect the overall soil conditions, which in some cases erodes the maximum amount of soil that affects the conditioning of biomass.

Hydropower energy also gets affected due to the overall impact of the technical impacts on the global environment. The substantial variations may affect the overall performance of the company by considerable means. As per the research, it is observed that climate change may not affect greatly the technical potential for hydro energy, but the change or rise in the level of water may destroy all the necessary structures, which may affect the harness of hydro energy. Thus, it is necessary to reduce climate change by considerable means.

Wind energy is also another type of renewable energy that can be used for the development of energy by considerable means. It can be identified that climate change has no direct effect on the process of harnessing energy using wind energy. Climate change can cause changes in the direction of the winds, which may affect the harness of wind energy. If such things occur, then they will directly affect the energy demand. As the demand increases then the need for power also increases. Due to the change in the direction of the wind, it can be stated that the government needs to invest in creating a new system that can mitigate issues, but it requires huge cost (Tazvinga et al., 2018). These costs may affect the economic condition of the country.

CONCLUSION

After analyzing the above information, it can be identified that issues related to climate change that arise need to be mitigated otherwise the world must face a considerable amount of effect. Thus, the world needs to adopt the usage of renewable energy, which can improve the quality of the atmosphere by reducing the emission of greenhouse gases and other harmful pollutants. Thus, the use of renewable technologies like hydro energy, wind energy, and biomass are some of the major technologies that can be used to reduce pollution in the environment and improve the quality of the atmosphere. It is also important to note that the increasing demand for energy in society is becoming a big issue, which is affecting the overall performance of the company. The depleting sources of energy affect the energy demand. Thus, renewable energy technologies can be implemented to mitigate such issues and meet the demand for energy in the world.

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