



Utilizing Clean Technologies Can Aid in Sustainable Development and Climate Change Mitigation

D. Santoshi Kumari

Ph.D. Research Scholar, Osmania University, Hyderabad, Telangana

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ABSTRACT: The developments that are making our life easy and comfortable are due to the latest science and technology advancements that are causing an adverse effect on the environment. The population explosion is creating a multi-fold requirement of all the natural resources. The need for agricultural production has increased the freshwater usage resulting in ground water depletion and soil degradation. The industrial production has also increased to meet the needs of the people causing air pollution, water pollution. Deforestation is increasing due to the expansion of cities, developmental projects, increase in habitation of the growing population. The technological development has intensified the developmental projects at the same time the global warming is increasing resulting in climate change creating an irreparable damage to the environment causing harm to ecosystem and the biodiversity, many species are getting extinct, and many are on the brink of extinction. Development done in a way that does not damage the environment and deprive the future generations needs is the need of the hour. The sustainable development practices are to be adopted to address the prevailing problems of climate change with developing clean technology that is safe for the environment. The shift towards the clean technology and replacing the harmful technology to meet the Sustainable Development Goals must be taken up effectively by the governments and the people. This chapter discusses about the developments and adaptations of clean technology.

KEYWORDS: Sustainable development, clean energy, clean technology, climate change

I. SUSTAINABLE DEVELOPMENT

The development done in a way that it does not exhaust all the resources in providing the present generation but meets needs of the future generations is called sustainable development.[1] The present-day requirement is to achieve

development in a sustainable manner. The international cooperation for the achievement of sustainable development is the need of hour and the “2030 Agenda for Sustainable Development” and its Sustainable Development Goals (SDGs).

International Institute for Sustainable Development is working towards the resolving the issues relating to most crucial and powerful threat to the environment which is climate change. The conscious efforts towards reducing the emissions of ChloroFloro Carbons can make a difference. To see strong and powerful impacts in the environment all the nations should come together and work towards reducing the negative impact of climate change.

International Institute for Sustainable Development has taken up the two important steps that are adaptation and mitigation in order to combat climate change. It associates with other countries that are facing effects of climate change and helps them in this respect as well as encourages countries to shift from fossil fuel to clean energy usage without delaying any further. There are certain important steps being taken fossil fuel subsidy reform and planning towards climate change. The expertise of the institute helps in lowering the movement and amount of greenhouse gases and lends support to people in making a resilient future.

II. CLEAN ENERGY

Different countries are taking initiatives towards reducing the global warming effects. The steps taken in India can be discussed through this report.

[2] In the report of “India's State-Owned Energy Enterprises, 2020-2050 Identifying evidence-bases diversification strategies”, our country has taken up the initiative to work towards the climate action from the emerging economies, making advancements towards usage of renewable power by the year 2030 and achieve the target of net-zero by the year 2070. The public sector



undertakings have very important role as the national state-owned energy enterprises in making India become a net-zero by 2070, but there is dependency on coal by most of them. The study that was conducted shows us the diversification of strategies with evidentiary approach that will contribute towards the firm's future at the same creating revenues for the government, generating jobs, and attending the needs of local communities. Among growing economies, India started taking steps towards making itself as a steadfast supporter of climate action and making an effort towards installing a non-fossil electricity 500 GW by 2030 and forging towards taking up lead in the International Solar Alliance, it has also taken up considerable steps towards increasing renewable energy. India is making strong decisions in order to achieve net zero emission by the year 2070 and has taken up strategies for reducing the usage of thermal energy in accordance with the Glasgow Climate Pact of 2021 at the 26th COP to the UNFCCC.

This promise has sparked an analysis into potential decarbonization strategies for businesses that rely on fossil fuels. The scaling up of clean energy and these decarbonization goals are interwoven, and as a result, they bring both opportunities and risks. The majority of the nation's energy system is controlled by state-owned companies (SOEs), sometimes referred to as public sector undertakings (PSUs) in India.

Many PSUs are among the most successful companies in the nation, and they have historically contributed significantly to investments in underdeveloped areas. As major employers in the conventional energy sector, they also undoubtedly have a role to ensure a fair transition for employees and communities over the ensuing decades. To address this, future SOE planning must be evidence-based. The Indian government had not yet developed official goals or a schedule for phasing out coal as of the time of writing. This problem is not addressed in the revised contributions defined nationally to the UNFCCC (Government of India, 2022).

Therefore, the anticipated nationally decided contribution proposed in the year 2015, which indicated that coal is essential "to provide dependable, adequate, and affordable supply of electricity", is the best source for its formal position (Government of India, 2015). Despite accepting this official stance, they believe it is crucial for SOEs that rely on coal to prepare for the prospect that aspirations may likely alter in the coming years. This reflects a number of things,

such as how crucial it is to cut back on coal use in order to meet climate goals, how increasing policy ambition is incorporated into international climate negotiations, and how quickly renewable energy's economics are advancing.

III. CLEAN TECHNOLOGY

Technology has also caused harm to the environment and now new technology that can be environmentally friendly has to be developed to look forward to a sustainable development.

The paradoxical idea that, even though technology had a very detrimental effect on our environment, environmental technology theory could protect our world from the damage that has already been done. According to World Wildlife Fund for Nature, technology might offer solutions, but it can also contribute to problems.

Technology is the term used to describe the practical implementation of the scientific knowledge in addition to the resulting gear and gadgets. Technology developments are transforming how we live at this time, but they are also bringing us closer to a catastrophe brought on by climate change and resource shortages. This fast-paced transitional period is what we are currently witnessing.

Let us discuss the two aspects of technology, one that damages the environment by causing few of the grave environmental problems in the world, the other aspect of technology that holds the ability to protect the planet from these same problems. Lastly, it will examine how the unique environmental technology of the gas sensor reduces the amount of unfavorable environmental effects.

The industrial revolution led to the development of new, extremely powerful technology. In the years between roughly 1760 and 1840, modern manufacturing methods were implemented in both the US and Europe at this time. This was followed by more industrialization and technological advancements in developed countries all over the world, which have had a negative impact on the environment by creating misuse and damage to our earth's natural resources.

The two main ways that these technologies have harmed our planet are through contamination and the exhaustion of natural resources.



IV. POLLUTION OF THE WATER AND AIR

The toxic gases when released from combustion of fossil fuels and decomposition of waste including e-waste enter the atmosphere and causes air pollution. The toxic gases include carbon dioxide, methane, sulfur dioxide, carbon mono oxide and nitric acid. The factories and thermal power plants, and pesticides used in agriculture all contribute to the pollution of the air. The global warming is the result of the rise in the greenhouse gases that retains thermal energy and causes the increase in the global temperature due to the air pollution.

The water pollution is caused due to the adulteration of water forms like the groundwater, rivers, lakes, and oceans by the human interventions. The water is polluted due to the industrial effluents, domestic waste, agricultural waste is few of the water polluters. The discharge of untreated water into the freshwater bodies destroys the aquatic life. Polluted water also causes cholera, typhoid, eutrophication. There is an imbalance in the ecosystem effecting the food chain.

V. DEPLETION OF THE NATURAL RESOURCE

Natural resources are of two kinds, renewable and non-renewable. The renewable natural resources are the ones which can be replenishable after period of time and on the natural resources other ones which cannot be replenished. Natural resources get depleted when they are used to such an extent that the frequency of usage is higher than the refilling frequency in the case of renewable natural resources, while the non-renewable natural resources get totally exhausted. Depletion of natural resources is a detrimental effect of technology on the environment. Deforestation, mineral and fossil fuel extraction, soil erosion, and soil degradation, excessive resource consumption, ground water depletion are the different types of resource depletion.

The excessive demand for food for the growing population has increased the usage of pesticides and fertilizers in agriculture to yield more quantity of crop resulting in the soil degradation, ground water depletion. The excessive need and usage of fossil fuels have severely damaged environment which has been enabled by advanced technology. The increasing global population is creating the need for excessive exploitation of natural resources, because of this,

the assumption of world eco-footprint as 1 and ½ times capacity of the world to offer each person the resources they require to sustainably meet their consumption needs.

The limited natural resources are being exploited to such an extent that they are getting depleted since the industrial revolution and development of advanced technologies. The natural resources are being exploited more intensely with the aid of new technology that helps in detecting and exploring natural resources. The technology has made more easy-to-use different natural resources to fulfill all the demands of the growing population making enormous increase in the excavation of the natural resources.

The growing urbanization and increasing deforestation for the developmental purposes and agricultural purposes which has impacted on the environment very badly, according to the World Bank during the period between 1990 and 2015, there was a 1.3 million square kilometer of world's forest land lost. The lost of forests is a major setback as it negatively influences the biodiversity and the ecosystem as well. There is a need of new technology that is environmentally friendly which means that its usage would not cause harm to the environment.

The efforts made towards developing a technology that conserves, prevents further damage to the environment and sustainably utilizes the natural resources is known as "environmental technology", also referred as "clean or green technology". The negative effects of technology that has resulted in global warming and climate change can be addressed by adapting new environmental technology that aims at low carbon emissions by shifting to alternative choices.

It is the collective effort of all nations of the world to cut down the carbon emissions as required under the Paris Agreement of 2016 to take massive measure to fight the climate change by restricting the increase in average global temperature to under 2 degrees centigrade over the preindustrial level.

VI. RENEWABLE ENERGY

In this segment, the advancement of environmental technology such as the renewable energy usage like electric vehicles, solar power panel usage, windmills, and smart technology, carbon dioxide removal, can be safe to the environment.

The energy that is produced by the geothermal heat, tides, waves, wind, and sunlight are called as "clean energy or renewable energy"



which is naturally replenishing renewable resources. We can now utilize this naturally present energy to generate power or usable heat thanks to advancements in environmental technology, which is a really good thing.

The use of renewable energy sources has taken up by many countries all over the world. When we observe the performance of UK in 2015 it produced around 20% of all the electricity used generated laying behind coal. There are many large-scale renewable energy projects, and we also find many renewable technologies suited for isolated locations and underdeveloped countries where energy is essential for development.

The governments also encourage by providing aid. The rise in usage of renewable energy technology grows the prices of solar panels and wind turbines decreases. In Australia it is observed that there is a manyfold increase in rooftop solar installations in the period 2007 to 2017 from 4,600 households to more than 1.6 million households.

When the global usage is being taken under consideration, there is an increase of renewable energy all over the world, in the year 2019, about 16% of the world electricity was from hydropower. According to data given on the website "Our world in data" relating to the renewable energy, based on the renewable energy's portion in the energy mix, worldwide, about one-quarter of our electricity is renewables. In the year 2019, about 11% of the universal core energy was from renewable technology and, about 5% of worldwide electricity was generated from wind and about 16% of global electricity was generated through hydropower and about 7% of the universal energy was from hydropower. [3]

VII. SMART TECHNOLOGY

The new technology that is being developed to make smart choices is called the smart technology where smart homes are use gadgets like connecting sensors to make efficient use of energy meet to the needs of the users and the other appliances that can be linked to Internet of Things (IoT), which could be operated and monitored remotely. This new technology IoT, is a network of items with inbuilt sensor technology that are connected to the web and is capable of gathering and exchanging data. The information received through this internet allows networked devices to take action independently and take decisions based on the current available information. Let us take an example in the intelligent thermostats which keep homes on

certain temperatures at certain times of the day, enables the reduction of unnecessary wastage of electricity by clever lighting systems illuminate areas where there is a need for it.

The deep expansion of internet facility has enabled the use of WiFi, Bluetooth, and smart sensors in the residential areas, corporate houses, cities has made the environment technology accessible to maximum people. The experts have futuristic cities planned where every car, cell phone, air conditioners, lamps and other devices are to be connected through energy efficient smart cities.

VIII. ELECTRIC VEHICLES

The electrical vehicles that use energy from rechargeable batteries are devices that use environmentally friendly technology which is a good initiative towards addressing the environmental issues like air pollution and greenhouse gases emissions. It is a good alternative to regular petroleum vehicles due to which the electric vehicles production has increased.

The electric vehicles do not emit carbon dioxide that is the main contributor in the greenhouse effect resulting in global warming is a big advantage and is helpful in cutting down the carbon emissions and it is environmentally friendly technology. They are safe and can be very efficiently utilized to address the severe global warming threat.

The governments all over the world are more inclined towards making electric vehicles more comfortably used easily charged at charging power points as the governments are promoting environmentally friendly technologies to be utilized by people. There is a huge rise in the sale of electric vehicles and a more demand in the coming years. The governments are also promoting through providing subsidies and incentives towards the production of electric vehicles. The future that needs a greener and clearer environment can be achieved by replacing the petroleum vehicles by making electric vehicles easily affordable.

IX. DIRECT AIR CAPTURE (DAC) – USING ENVIRONMENTAL TECHNOLOGY TO REDUCE ATMOSPHERIC CARBON

The extraction of carbon directly from the atmosphere is a good idea that was being discussed in climate change mitigation research for a long while, though it sounds good, but it is in its early phase of development.



“This technique of removing carbon dioxide directly from the atmosphere and producing a concentrated stream of carbon dioxide for usage or storage” is called as Direct Air Capture (DAC) in the environmental technology. When the air is pushed through a filter containing many huge fans the CO₂ is eliminated and this technology may be utilized to regulate air pollution caused by several polluters. It is estimated that an annual carbon emission of automobiles can be absorbed by fully operational DAC operations. It has been seen that DAC can play a crucial role in the climate change mitigation because carbon dioxide is the main pollutant in the atmosphere, and it can help in reaching the aims of Paris Climate Agreement. The drawbacks to the utilization of this technology is besides being a highly priced it may encourage people towards carbon emissions as they rely on this technology to reduce it later on. Since CO₂ in the atmosphere has been the primary source of the issue, many contend that the DAC is crucial in mitigating climate change, and it might assist in achieving the aims of the Paris Climate Agreement. However, DAC's expensive price prohibits it from being a widespread solution at the moment, and other experts worry that depending on this technology could raise emissions since people would imagine that most of their emissions will simply be erased. [4]

X. CONCLUSION

The present situation of the environmental deterioration is the result of our negligent practices of the technological development and unrestricted usage of the global natural resources. The drastic shift of technological advancement into a future that has revolutionized the global interactions has created new avenues of exploration that has a negative impact on the environment on a long run. The present global warming threat that is being faced by the people all over the world cannot be overlooked, major steps have to be taken and conscious efforts made towards environmentally friendly technological development and adaptation of clean energy and clean technology by the governments is important. The renewable energy usage has to be increased and getting rid of the electronic waste through some methods has to be developed. The technology that is solving the problems of environment has to be encouraged and adapted in order to make a move towards sustainable development. As many countries are moving towards clean energy, many more countries have to actively adapt clean energy and cut down the harmful usage of fossil fuels. The shift towards

the clean technology can only make the present problems to be solved efficiently. The environmental damage can only be reduced by correcting our practices and addressing the global warming warnings by collective efforts.

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