RENEWABLE ENERGY-SUSTAINABILITY ISSUES AND CLIMATE FACTOR

Report of the research work carried out under the

DEI Summer Research Fellowship Programme

(DSRFP – 2022)

by

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July, 2022

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Declaration

This is to certify that the research work carried out by me under DSRFP-2022 titled "Renewable Energy-Sustainability Issues And Climate Factor" is original. The contribution of others has been clearly indicated with due reference to the literature. This work has not been submitted elsewhere in any form.

(Kirti Agarwal)

Certificate

This is to certify that the report titled "Renewable Energy-Sustainability Issues And Climate Factor", submitted by Kirti Agarwal, in partial fulfillment of the requirement for DSRFP-2022, is the record of his/her own work carried out under my supervision. The matter embodied in this project has not been submitted elsewhere in any form.

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RENEWABLE ENERGY-SUSTAINABILITY ISSUES AND CLIMATE FACTOR

ABSTRACT

As the population increases the amount of requirement of energy also increases. The requirement for energy and its services to fulfill the needs of human beings' social development, welfare is also increasing. In order to meet the energy demand of future generations, going back to renewables to diminish climate change is a very good approach to sustain. The study includes the sources related to renewable energy which contain security of the energy, development in the animals, humans, change in climate aspects, and diminishing the impacts of environment. As everything has different aspects, here also we are having opportunities along with some challenges that obstacles the sustainability of renewable energy sources. These challenges include s

Access raw materials to meet future needs, less information, lack of markets. The paper includes some findings which should be considered to achieve the goal to less emissions and, reduce climate change in aspect of renewable energy sources. We have to work on that to give us best on giving clean and healthy environment to future generations.

KEY WORDS- Climate Change, Renewable Energy, Sources, Sustainability Issues.

1. INTRODUCTION

To fulfil man's basic necessities like: food, shelter, power, comfort, movements etc., we have to serve and use the sources properly. Preserving energy and to distribute energy to climate change factor are the two foremost obstacles of energy them to sustain future providing electricity and most of them, almost covering 85% of the aspects arises in the country side areas.

The number of people's depending upon the energy production of biomass conventionally for their livelihood are increasing day by day. From the studies it is estimated that it is rising from 2.7 billion to 2.8 billion in 2030. For different kind of sources that was from the 90s when the rate was increasing rapidly and it is proved that renewable sources are more convenient than fossil fuels and they would help to get the sustainable sources globally. The persons who want to get the goal to attain sustainability should work upon them and start more and more programs as more as possible.

It should be noted that the sustainable development works as the development opportunity for many countries and for many parts of the world. The global Sustainable Development Goals including 17 goals and 169 targets have been made by the UN general assembly in New York. Along with it, a preliminary set of 330 indicators was established in March 2015. As compared with the Millennium Development Goals, the sustainable goals of development offer large values and demands in the domain of scientific areas. For proper monitoring of the factors related to renewable energy, we should work on the areas that are depending on it like food, shelter, reducing change in climate and various activities done by humans.

In the following sections, we have covered as follows- Section 2 represents sustainability and renewable energy sources. Section 3 includes technologies and sources related to renewable energy. Section 4 covers sustainable development and renewable energy and section 5 concludes the paper.

2. SUSTAINABILITY AND RENEWABLE ENERGY SOURCES

To make the energy susatianble we should not go with the artificial flow of energy because natural flows in these areas will give us more fruitful reasults as they all are relevant to environment. To make energy sustainable, it must be infinite and should not harm environmental goods and services. It should be remembered that the release of

carbon dioxide should be as minimum as possible. Moreover, it should not affect security of food and also should not threaten biodiversity. I don't think so, it will really happen? Because here we are expecting more results and they all are naturally occurring so it is a time taking process.

2.1 Sources of energy and their applications

Hydropower- generation of power
Modern biomass -generation of heat and power
Geothermal- Urban heating
Solar- home systems driven on solar energy
Wind- windmills, generation of power, wind generators (all turbines relevant to wind energy)
Wave and tide-barrage, Numerous designs
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2.2 Renewable energy and climate change

The phrase "climate change" is a hot topic for debates and discussions in the present scenario. One of the threats we are going to face frequent climate change in the subsequent years. The concentration of carbon dioxide has rapidly grown over the past 36 years (1979–2014) [8] "On average, 1.4 parts per millions per year before 1999 and 2.0 parts per million per year" (Earth System Laboratory, 2016). Manmade activities are responsible for change in climate as per the UN framework convention. defines climate change as being responsible directly or indirectly because human activities totally change the internal structure of the atmosphere which in turn brings a variation in natural climate. More than ten years, maintaining the increase in the temperature that is the main threat for the society (global warming) beneath 2 degrees Celsius has become the topic which needs more attention of main in the international climate debate. From the year 1859, we are going with the use of fossil fuels which releases more amount of carbon dioxide gases. The end of 2010, assured that the release of greenhouse gases is mainly dependent on application of fossil fuels sources, where molecules of gases has increased subsequently to over 400 parts per million (40%) above the levels [4]. Technologies inculcated with renewable energy sources are prearranged as very clear sources of energy and positive use of these resources which minimizes negative environmental impacts, provides least waste materials and are sustainable based on the going and upcoming economic and social needs. Renewable energy technologies provide an opportunity for reduction of greenhouse gas emission and reducing global warming by using conventional energy sources (fossil fuel based) [7].

3. TECHNOLOGIES AND SOURCES RELATED TO RENEWABLE ENERGY-

Renewable energy is one such type of various energies wherein, there has been a constant flow of energy as it includes, geothermal energy, bioenergy, hydropower, solar energy and ocean and wind energy.

3.1 Hydropower

Hydropower source potential- Its general annual technical potential is 14,577 Terawatt-hour along with the total capacity potential of 3,821 gigawatt, however the global capacity of hydropower is much less than its potential in present scenario. There are mainly four countries that are Brazil, China, USA and Canada in which the 60% of the hydropower is introduced and this is according to the World Energy Council, 2013. Due to the change of climate in generation of hydropower, so much changes are observed and they are intended as less than 0.1%, [5].

Hydropower social and environmental impact- As this energy generation do not produce so much greenhouse gases so it is termed as the green source of the energy. Even though, it is usually having a positive effect on environment, it also has some negative effects which we can't ignore. It improves the socio-economic development while on the other hand if we consider the social issues, it grasps many people's homes although to start it, they are remunerated but are not sufficient. Moreover, water is drained off from water bodies and they indirectly reach to the mountains because of the tunnels otherwise they are elated by the channels for long distances. Hydroelectric generation effects many things because it needs more space. It effects river's ecology, by introducing a change into its hydrological features and by disturbing the balancing equation of the ecological continuity for sedimentary rock transport or we can say that migration of aquatic organisms by the building of dams. [3].

3.2 Direct solar energy

The term "direct" solar energy may be referred as the energy sources that are connected to sun directly, or in other words this energy gets their maintenance, convention and the production directly drawn from the sun. Some applications of solar energy are wind and ocean thermal. Also, there are some machineries that inculcates solar energy for their application like wind machineries and ocean thermal machineries for their efficient use when it has been absorbed on the earth and transformed into various forms of the energy. The solar technology is obtained from solar sources to produce electricity photovoltaic cells [6] and focusing on the solar power. This makes it very much applicable like it includes to provide energy related to heat that is the thermal energy, to meet the needs of heat and light of the people. This can be utilized by the people in many specific ways. [4].

3.3 Geothermal energy

Geothermal energy is found from the interior part of the earth, that is from the three layers of the earth. It is represented as the source of heat. These are generated from the internal structure of the planet and the processes or we can say that physical processes between the layers, here the heat is mainly present in the earth's outer layer, that is the crust part but it is not evenly distributed, very less focused, and at the bigger depths they are exploiting physically or mechanically. In some contexts, geothermal energy is difficult to produce and needs more convenience and equipment.

3.4 Bioenergy

Biomass has a great potential to reduce the levels of greenhouses gases up to great level and it gives more surety than other sources to meet the fulfilment of the energy in the future. Many researches are done in the field of biomass energy which are totally involved in magnifying the technology in the biomass. According to Hoodwink, , Eickhout, de Vries, the potential of bioenergy at the total surface is about 3,600 per year. The most of the part of this study is shown in the sides of America and Caribbean (47–220 per year), Saharan Africa (31– 316 per year). The generation of biomass and its potential varies from place to place and medium yields in temperature to high level in sub tropic and tropic countries. With biomass, a lot of research is focusing on an environmentally efficient and sustainable source to reduce climate change [4].

Bioenergy environmental and social impact-

The application of biological equipment's that are relevant with sources of plants (flora) and animals (fauna) to generate energy has always been a problem in many cases specifically to the public sector. and we are to use it properly whether its food production or related with greenery. The biological fuel should be used standardized because the case of food aids is increasing universally. Studies have shown that our human food is derived from mainly two sources, the terrestrial environment (99.5%) and the marine side (0.4%). The land which is adequate for generation of biomass energy is used previously. [7]. We had reached to the both positive and negative factors which affect our environment as per the recent studies. Like, bioenergy can destroy soil and vegetation degradation related with the over exploitation of forest, bad crops or the used crops, the improper use of water and removal of surplus forest material. [5]. The sequenced manner of using the bioenergy can reduce the negative results up to a great extent and this mainly enhances our diversity and different species and less degradation. [6].

3.5 Wind energy

For commercial increment in the energy, the wind is playing an important role as it is present in every part of the world. By considering energy outputs or we can say that the densities of the energy, we can estimate the availability of the sources. Energy generated by the wind formulates the energy by the virtue of the motion from the moving air. From the onshore land and the offshore land, we generate electricity from the big turbines, this is the common application in terms of wind energy to reduce climate change. Wind energy is comparably has less maintain and producing because the main source that is the wind is easily available in every part of the world, but we are to use fresh air in it so that needs some equipment.

3.6 Ocean energy

When the wind moves across the water, a kind of waves are produced which are known as surface waves. The speed of wind is directly proportional to the distanced covered by the wind. Hence the more the sped, more the distance will be and longer distance leads to the bigger height, which increases the amount of energy. [4]. The ocean energy has power up to at that level by which the needs of the energy can be fulfilled and it can cover all the heads for the energy consumption. This energy is in the form of waves generated, tides generated and the heat generated. In the year 2009, the first commercial energy device for the ocean is started, it is the first time and it was

developed in the Seagen, a section of UK Broadly, to get energy from coastal areas or the areas that are covered across the sea are- the differences in the more waves and less waves of the sea, breeze generated and the winds produced. [5].

4.RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

Due to the impacts of social, economic and human development, renewable energy is directly linked with the sustainable development of the sources. It inculcates:

4.1 Energy access

The objective of sustainable development is to make sure that energy is accessible, clean, affordable and available to all and this can be only possible with the renewable energy sources that are sustainably developed. Access concerns are needed for the local distribution and as we know that these are spread across the globe and there is a huge difference in the distribution or applying sources in the city and village areas. In Sub-Saharan Africa and South Asian area these are commonly distributed. The distribution of sources is more complex in rural areas due to less knowledge. Due to different and prompt distances in the nation and the less production of energy starts the renewable energy, we need more equipment and comforts to cover these distances and to provide more and more energy using stations and energy-attached with mini-grid systems to available them with access of complete electricity.

4.2 Energy security

It is the association or we can say that the organization that is concerned with the national security and the sources available for energy consumption. It is based on the fact that to run an economy in an efficient level energy security is most important. A proper energy security index is scheduled with the facts including-components: physical availability of sources; technological development; economic affordability and availability; accessibility; governance; threats due to unconventionality and environment impacts.

4.3 Social and economic development

For the economic development of the society the sources of energy and their development is a major factor that can affect this. Here the concept of per capita incomes is used and the use of energy and the growth of country are connected with the per capita income. We can consider the growth of the economy as the major and necessary factor for the use of energy. In return, it makes unemployed persons employed, the employment rate is enhancing by this way and some studies also proved that the rate of employment was increased from 2.4 million. Hence the rate of employment increases so the awareness towards education, safety of environmental sources, health facilities are also increasing in a rapid way. [7]

4.4 Challenges affecting renewable energy sources

In low-carbon energy content economies renewable energy has a major issue due to the composition or we can say that the awareness. Some alternations should be taken widely to provide it in all facets of societies. Providing energy content from non-sustainable to renewable energy content is one of the difficult tasks for the century. [6]. Some innovations and new concepts in the technical sources also increase the cost which decreases the affordability of the energy.

Below mentioned issues still have to be dealt with-

(a)Barrier created by the lack of information

(b)Affordability issue

(c)Lack of resources

(d)Location of the resources

(e)Quality of the power.

4.4 Climate change reduction and diminish of environmental and health impacts

It is affecting every country on every aspect. It is destroying or disrupting national economies. Weather patterns are changing, sea levels are rising, icebergs are melting and weather events are becoming more extreme. The energy sources related to renewable energy are used for energy generation which helps in decreasing the environmental problems, reduction of climate change, body problems that are generated from the pollution done by using fossil fuel energy sources. In environmental agencies of Europe, the change is noted that includes per capita income. It had a study which shows the reduction of the emission of greenhouse gases is done by 10% in the years 1996-2010. Also, there was some release of greenhouse gases up to some extent.

5. FINDINGS OF THE STUDY

There are some methods given below that we are getting from the study are going to help us to decrease the negative impacts of climate change and terms that are related to energy sources:

• The society or we can say that all the parties that are working in the should have that kind of technologies or the infrastructure should contribute to less the bad impacts.

• Reducing the carbon footprint through the changes in lifestyle and standard patterns of humans can play a great deal to the reduction of climate change.

To reduce the use of land and to diminish negative production of renewable energy, also to reduce conflicts some innovative ideas and guidance should be accomplished in the society.

• Enhancing cooperation and support for developing countries towards the higher level of structural unit of energy or improve it in other forms to serve it in a modern way and provides services that needs less equipment.

6. CONCLUSION

For economic growth and human development, the energy is our daily requirement. To meet the energy needs of future generations in a sustainable way that is with the reduced climate change, the return to renewables is an outstanding effort. The aim or the purpose of the paper is to aware people and to replace the energy sources from fossil to renewables. Qualitative research was done by reviewing, reading and analysing papers in the scope of the study. As this is a difficult task there are some barriers such as, the cost, price, political environment and market conditions. These are becoming the hinderance for the less developed countries to become a developing country and it also obstacles them to use their potentials this way. This is a creation of global golden opportunity through many cooperation's that supports the countries which are developing or less developed and encourage them to use renewable energy, efficient energy, technologies in the field of energy, structural components of the energy and less the price of the energy.

The paper brought light to the opportunities and chances that are liked with the renewable energy such as less environmental impacts, proper energy provision, safety of the energy, economic development of the society.

There are the obstacles on which we should work because they create obstacle in the way of sustainability. These obstacles include less awareness, less information, less market facilities, and the use of energy by people in an improper or in disbalancing way.

From the findings of the study, here some recommendations are given that should be given in the areas of renewable energy so as to protect the ozone layer and most importantly make is sustainable and the emission of greenhouse gases should be decreased:

Some firms and policies should be introduced from all parts that are relatable to renewable energy to aware more and more people.

•To limit the demerits in the upcoming generation, the research should be done as more as possible in these areas to aware them and alert them.

• We should use energy in a proper way whether we are using it as a group, as a community, as a whole, or as an individual. Techniques that decrease the source of fossil fuel and increase the source of renewable energy sources should be focused will clearly help us to reduce climate effects. Programs which increase efficiency of energy should be introduced in the world. By staring the program of reasonability of energy, providing the energy, equipment that are related with renewable sources should be started. The programs which increase energy efficiency should be linked with firms that provide funds to the programs which gives us boost to our renewable energy sources.

So, from the whole discussion, we can say that the energy is a source of living for us, so it's our duty to use it in a proper and efficient way and replace sources with renewables to meet our needs presently as well as for our future generations.

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8. Critical assessment of the Supervisor

This paper talks about need for switching to renewable energy sources to fulfil the energy requirements of the world. It further elaborates upon the various renewable energy sources being used around the globe and the technologies being used to efficiently extract energy from these sources. Some of the renewable energy source which have been discussed are Hydropower, Solar Energy, Geothermal Energy, Bioenergy, Wind Energy and Ocean Energy. This paper also talks about the environmental and social impact of using these sources in order to ensure sustainable development.