

An Overview of Green Technology and Its Impact on Modern World

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ABSTRACT: *Green technology is an emerging technology that tackles many problems with the progression of technology; it has many positive impacts on the modern world. Technology has been develop day by day, with the progression, it also creates many issues such as electronic waste, deforestation and carbon dioxide (CO₂) emission due to this this the environment and ecosystem face many challenges. Green technology provides an effective and efficient solution to conserve the ecosystem based on the application of the green process, materials, monitoring and sensors/devices etc that overcome the adverse effect on environment. In recent years, green technology has expanded its area and develops various branches green nanotechnology, green city, green electronics and green chemistry etc. This review paper discussed about the green technology and its impact on the modern world. Recent advancement in the green technology as well as awareness among the general public about the importance of green products and services will help in rapid adaptation of this technology so that will help in conserve our ecosystem.*

KEYWORDS: *Ecosystem, Environment, Green Technology, Renewable Energy Resources, Waste.*

INTRODUCTION

Technology is the basic need of the modern world in order to achieve goals for providing products and services. It is a combination of the skills, approaches and processes. Technology has been utilized in order to solve problems and make life easier to live. Electronics, communication, transportation, medical fields and so on are highly demanding fields of technology. Almost every field in today's world is running on the technology. As world become more advance day by day, the technology is growing continuously. Apart from various advantages of the technology, on the other side there are various disadvantages are also associated with the progression of the technology including electronic waste, solid waste, harmful food products because of using the chemicals and deforestation etc. These issues are heavily damages our ecosystem that has negative impact on our health and wildlife as well as marine life etc. In order to conserve ecosystem, there is a need to develop a technology that provides an effective as well as efficient solution for overcoming these problems.

Green technology is the best alternative of the existing technologies that provides green solution to every field including nanotechnology, buildings, transportation and agriculture sector by adopting the green methods, materials and processes. In recent years, there are various branches has been explored such as green chemistry, green electricity ad green nanotechnology etc. The major field of the green technology is the green electricity; it is based on the renewable energy resources[1]. Commercial technologies for the generation of the electricity generally utilize the non-renewable energy resources such as fossil fuel and coal. But the most common issue associated with these technologies is generation of greenhouse gases. It heavily damages our ecosystem and increases the air, soil as well as water pollution. In agricultural sector, the high demand of the food by growing pollution encourage the utilization of the chemical pesticides and plant growth regulators for increasing the crop yield resulting in poor quality food that has an adverse effect on the health. In the food sector, the green chemistry and sensors will help to minimize these effects significantly. By giving an importance to the green technology, this review paper provides an overview of the green technology and its impact on the modern world. It will cover various aspects of green technology such as brief history of green technology, initiatives and accreditations for green technology, problems associated with the development of the technology and need of the green technology as well as its examples. This review provides a good reference to the researchers who works in the field of environment and ecology.

BRIEF HISTORY OF GREEN TECHNOLOGY

Green technology is well known to the people from many years. Green technology is not a new concept; the best example of the utilization of the green technology is shown by the Egyptians around thousands of years ago. They utilized wind power for carrying their ships from one place to another place over the water. There are some common renewable energy resources were available that has been used for different purposes such as transportation and food etc. These renewable energy resources are shown in the Figure 1.

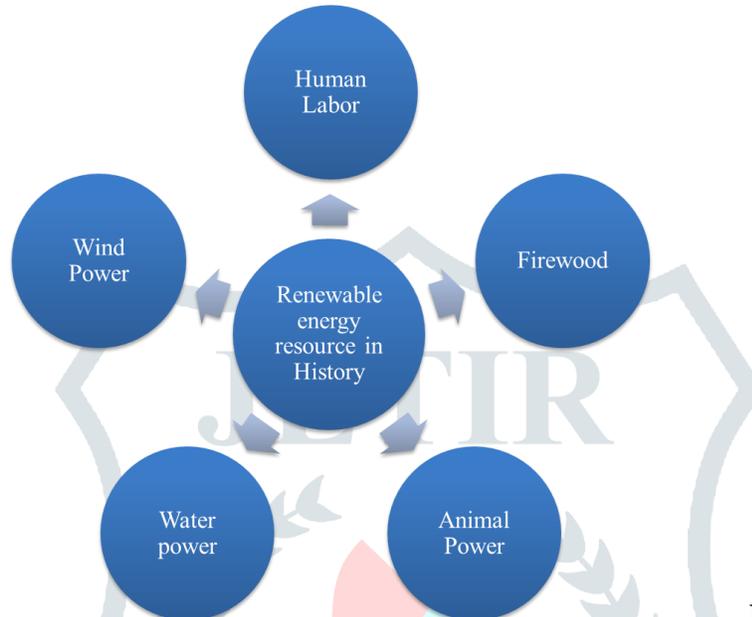


Figure 1: Schematic

Representation of the Renewable Energy Resources used in the History

In the eighties for the farming, an irrigation system has been developed based on the wind power and some cities were run on the renewable energy resources such as solar energy, wind energy and wave energy. After mid-eighties, the non-renewable energy resources such as fossil fuels and coals had begun to utilize for different purposes such as transportation and energy generation. Since the non-renewable energy resources heavily used for commercial purposes in order to produce electricity, heat and other form of energies, people were afraid about non-availability of the non-renewable energy resources in the future. Current, we are greatly depends on the fossil fuels and seems like it is difficult to shift to the new alternative technologies based on other energies. Since, non-renewable energy resources are available in limit and it also produces harmful gases and other hazardous wastes, people start again thinking about the usage of the renewable energy resources. From two to three decades, renewable energy resources gained significant amount of attention for fulfilling the demand of the energy by growing population by taking care of environment and ecosystem. In the modern world, there are five main renewable energy resources has been utilizes for the energy generation as shown in the Figure 2.

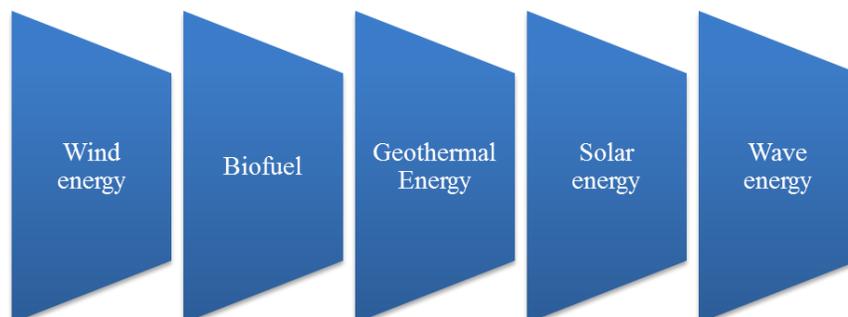


Figure 2: Schematic Illustration of the Renewable Energy Resources Utilizes in Modern World

Solar energy is produced by the sun in the form of heat and light. By capturing the solar energy through the photovoltaic cells for the generation of the electricity is one of the best examples of the utilization of the solar energy. The photovoltaic cell is a PN junction semiconductor device that contains n-type and p-type semiconductor. When solar energy falls on the device, large number of the covalent bond breaks followed by the generation of the electron-hole pairs that moves to the opposite terminal and contribute to the current flow[2]. Wind power produces energy by flowing the wind through the wind turbines. The main drawback of the solar energy is weather dependency and heavy initial financial investment. Wind turbines consist of blades that rotate the turbines when winds cross through it, these turbines are subsequently connected to the generator for the production of the electricity. Wind turbines are greatly depend on the geographical location, it is usually established near the oceans or open land farms where wind is available easily and can be easily cross through the wind turbines[3].

Biogas is generally produced from the organic wastes that come from various industries, agricultural sector. Organic waste consists of kitchen waste, food waste, vegetables and fruits etc. Biogas is produced by the anaerobic digestion process that takes place in the absence of the oxygen. There are various steps involves in the biogas production, firstly organic waste crushed into small pieces followed by mixing the liquid so that the process can takes place more easily. The slurrified organic waste put inside the digester system for the 2-3 weeks in order to anaerobic digestion process takes place. This process takes place in the presence of microorganisms[4]. During the process, carbon dioxide (CO₂) and methane gas produced followed by the separation of these two gases. After the separation, methane has been upgraded in order to remove the impurities present in it. The processed methane gas known as Biomethane that can be used for the production of the electricity, heat as well as steam. Geothermal energy is the heat energy present inside the earth[5]. The heat of the earth's core has been utilized for the generation of the high pressure steam that transfers to the turbines for rotation. Each turbine connected to the generator that produces electricity upon the rotation of the turbines. Each renewable energy resource which has been discussed above offers one common benefit that is there is no harmful gas emission and hazardous waste generation that helps in conservation of the ecosystem[6].

INITIATIVES AND ACCREDITATIONS FOR GREEN TECHNOLOGY

Green technology and its products as well services are still not known to many people. Rapid development in the green technology makes much advancement as time passes. Since, green technology helps to conserve our ecosystem, various government agencies comes forward to take initiative for the promotion and adaptation of the green technology. Some of the foremost green initiatives have been discussed in the Table 1.

Table 1: List of the Foremost Green Initiatives Taken by Government Agencies

Green Initiative	Detail
Climate Savers Computing Initiative (CSCI)	This initiative has been taken in the perspective of reduction of the power consumption by the all computers
The Green Grid	It is an international level association that works in the field of advancement of the efficiency of energy in various data centers as well as ecosystem of the computing. There are various information technology (IT) companies including Microsoft, Advanced micro devices (AMD), International business machines (IBM) corporation and Hewlett Packard (HP) are the founders of this association.

Energy star	Energy star is an organization that has been established in 1992 by the environmental agency of protection. The main responsibility of this association is that it labels the products which consume 25-30% less power as compared to the federal standards.
The Electronic product environmental assessment tool (EPEAT)	The main objective of this tool is to help while procuring the green computing products. It examines the computing products on 51 different benchmarks, in which 23 benchmarks are essential and 28 are optional. These benchmarks are checks the sustainability as well as efficiency related to the computing products.
Swedish Confederation of Professional Employees (TCO)	The TCO certification is established by the Swedish association that certified the computing production in order to maintain environmental standards in order to conserve our ecosystem more effectively and efficiently. TCO is considered one of the oldest certification agencies for the computing products for maintaining the ecological standards.

ISSUES ASSOCIATED WITH PROGRESSION OF TECHNOLOGY

Progression of the technology is definitely a need of the modern world in order to solve problems, to make task easier through the advanced process, methods and skills. Technology helps in improving our quality of life. As the technology progress, there are some issues also arises in front of the world that greatly affects our ecosystem as well as health of humans and animals. Some of the issues associated with the progression of the technology are listed in the Table 2.

Table 2: List of the Issues Associated with the Progression of Technology

Issue	Detail
Generation of electronic waste	Electronic waste is also referred as e-waste that is related to the end of life of the electronic products such as computers, laptops, mobiles, televisions and other common electronic machines. Some of the waste electronic products can be recycled and reuse. With the progression of the technology, the demand of the electronic products also increases significantly resulting in generation of the electronic waste at large scale. There are some materials associated with the components of the electronic products are hazardous that has huge negative impact on the environment in terms of pollution[7]. In recent years, recycling of the electronic waste gained significant amount of attention because it help up to some extent in the minimization of the impact on environment.
Consumption of Chemicals in agricultural sector	The population of the world growing exponentially due to which the demand of the food also increases by the growing population. Earlier, small land agricultural system used for the production of the food but the main objective of this system was to fulfill the need of food

	<p>by their family members and near ones. It was very difficult to produce the food on large scale by utilizing the small land agricultural system. In order to produce the food in large quantity, there has been a new agricultural system has been developed called commercial or industrial agricultural. In this system, the farming is usually done on the large farm lands. The main objective of this agricultural system is to produce food in large quantity and generate revenue. This sector mainly focused on the yield so that they can produce food at large scale in less time, for that it utilizes chemical pesticides as well as plant growth regulators. The use of the chemicals in the production of crops reduces the food quality significantly resulting in adverse effect on the health.</p>
Emission of Carbon dioxide (CO ₂)	<p>There are various sectors including transportation, industries and agricultural sector etc. emits the carbon dioxide to the atmosphere that increases the air pollution as well as responsible for the global warming and the climate change[8]. The main reason of the emission of the carbon dioxide is the usage of non-renewable energy resources such as fossil fuels and coal. For instance, the existing commercial technologies for the production of the electricity are generally utilizes for the fossil fuel and coal.</p>
Generation of Solid waste	<p>The generation of the solid waste is another issue associated with the progression of the technology. There are various industries such as generates solid waste in terms of scrap of metals, red mud as well as tailing etc. Some of these solid wastes heavily damage the ecosystem due to its hazardousness and increase the level of air, water as well as soil pollution.</p>

GREEN SOLUTIONS FOR TACKLING THE ISSUES

There are some green solutions that are the best alternative of the existing commercial technologies in order to overcome the issues that come up with the progression of the technology. Some of the major green solutions have been listed in the Table 3.

Table 3: List of the Green Solutions for Overcoming the Problems Associated with the Progression of Technology

Green Solution	Detail
Improve way of Living	<ul style="list-style-type: none"> • Don't spread wastes around the home • Avoid usage of plastic carry bags • Avoid usage of paper napkin, starts utilizing cloth napkins • Try to utilize the paper scrap • Try to purchase organic products • Purchase certified environment friendly products
Improve household activity	<ul style="list-style-type: none"> • Save water • Try to utilize natural light comes from

	<ul style="list-style-type: none"> the sun rather than electricity • Encourage home gardening • Utilize reusable carry bags as well as containers • Maintain and repair water pipes properly • Utilize compost bin
Use Green technology	<ul style="list-style-type: none"> • Turn off home appliances when not in use • Use paper as less as possible • Try to sell or recycle the electronic system or devices • Utilize bicycle or try to walk for covering small distances, avoid to use motor vehicles that consume fossil fuels • Promote electric vehicles • Purchase certified products
Improve Common surrounding activities	<ul style="list-style-type: none"> • Promote recycle and reuse formula • Try to utilize recycled paper • Don't use too many lights in a room • Avoid non-reusable products • Regularly maintain the home appliances in order to ensure the efficiency

EXAMPLES OF GREEN TECHNOLOGY

Recent advancement in the green technology expands its area of application in various fields in order to solve problems. Researchers and scientists from all across the world focused on the development of the technologies for minimizing the causing factors that contribute in the global warming as well as climate change. Some of the examples are listed in the table 4.

Table 4: List of the Examples of Green Technology in the Perspective of Conservation of Ecosystem

Example	Detail
Treatment of wastewater	There are various nanotechnology has been developed based on the membrane filtration and microbial fuel cells that makes waste water to drinkable condition by reducing the present contaminations[9].
Waste management and recycling	There are various sectors such as industries and agricultural sector etc. generates solid waste at large scale. Recently based on the green technology, various intelligent bins, waste related to the food real-time monitoring and tracking systems and various advanced systems for tracking the hazardous wastes.
Waste to energy	This is one of the best examples of the green technology that enables to generate energy from the wastes and garbage.
Electricity generation from natural resources	Renewable energy resources are the best alternative of non-renewable energy resources

	such as fossil fuels and coals. The production of the electricity from renewable energy resources such as wind power, solar power, wave power and biogas reduces the emission of the greenhouse gases significantly that helps in the conservation of the our ecosystem.
Electric vehicles	Commercial automobile technologies are generally based on the fossil fuels that emit harmful gases to the atmosphere at greater scale. In contrast, electric vehicles enables in minimizing the level of harmful gases in the environment.
Eliminations of industrial emissions	Green technology provides an effective and efficient solution to the management of industrial emissions that harm our ecosystem so badly.

DISCUSSION

Climate change, global warming and pollution are the major challenges in front of the modern world. Growing population and technological advancement creates many problems including solid waste generation, e-waste, and deforestation etc. The impact of these issues on the modern world is so adverse. The consumption of the fossil fuels in the various sectors such as power and transportation sector increases the level of emission of the carbon dioxide (CO₂) and other harmful gases. These gases damaging our environment health so badly. Green technology provides effective and efficient solutions that minimize this effect and overcome the challenges facing the world currently. It has many branches such as green nanotechnology, green electricity, green buildings, green cities and green chemistry, these branches serves as life saving for the planet. It promotes the consumption of the natural resources and develops ecofriendly process and materials so that the developed products and services must be environment friendly. The individuals and organizations either government or private must take responsibility to adapt and promote green technology so that the coming generations will have better ecosystem and environment for living.

CONCLUSION

Every nation in the country now worrying about the climate change because it heavily damaging our ecosystem that affects the survival of the humans as well as animals. Green technology comes up with the best alternative to save our planet. It promotes to utilize natural resources, materials and processes so that the products and services which we are utilizing for our purposes don't harm the ecosystem. Treatment of the wastewater, solid waste management, electricity generation from renewable energy resources, electric vehicles and waste to energy is the best example of the green technology. Green technology significantly reduces the emission of the harmful gases and minimizes the air, water as well as soil pollution significantly. Since green technology is still an emerging technology that is why it is recommended that financial investment in R&D of green technology is required, awareness among the general public about the green products and services in necessary in order to take this technology to the next level.

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