**Sustainable future creation by utilization of green technologies**

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**Table of contents**

1. Abstract

2. Introduction

3. The types of green technologies

4. The green technology's objective

5. Benefits of Green Technology

6. The Function of Public Policies in the Promotion of Green Technology

7. The Moral Aspects of Adopting Green Technology

8. Being a Green Technology Is Challenging

6. Conclusions

**1. ABSTRACT**

Climate change is a fact. It is a rising issue that disturbs governments and society at large and poses a threat to human health and the environment. The use of so-called green technologies is one method of mitigating global warming. Globally, scientists and engineers are working on technical solutions to reduce and get rid of everything that contributes to climate change and global warming. This chapter will explore several green technology methods that are now in use and are environmentally benign.

**Keywords**: environmental sustainability, energy efficiency, environmentally friendly, solar energy

**2. INTRODUCTION:**

Across all industries, there is a general tendency toward sustainability. Society has seen an increase in sustainability, whether it is due to restaurants prohibiting plastic straws, switching to sustainable energy sources, or buying carbon offsets. Examples of green technology have grown in popularity recently. Learn all there is to know about green technology and why they are so important. With the environment in mind, green technology can help cut down on waste, save natural resources, and lower carbon emissions. It is a crucial component of sustainability, which attempts to satisfy current needs without compromising the capacity of future generations to satisfy their own. For a sustainable future, economic, social, and environmental factors must be balanced and taken into account as a whole. Green technology places a focus on sustainability, as the word "green" suggests. The technological component, on the other hand, covers a lot of ground. In general, green energy focuses on the development of sustainable technologies that take both immediate and long-term environmental implications into account. A broad term used to describe the application of science and technology to the development of environmentally friendly goods and services is "green technology." Green technology is associated with clean technology, which is more specifically used to describe goods or services that increase operational effectiveness while lowering prices, energy use, waste, or adverse environmental effects. Protecting the environment, repairing environmental harm from the past, and preserving the natural resources of the planet are the objectives of green technology. A booming business that has drawn significant sums of financial capital is green technology. Many different types of technology are categorized as "green technologies" because they help lessen human impact on the environment and promote sustainable development [1-3]. Social equity, economic viability, and sustainability serve as the essential criteria for green technology. Solar, wind, and nuclear power are just a few examples of the green technologies and renewable energy sources India is currently promoting. These technologies can significantly contribute to the development of the nation.

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**Figure 1: Green Technology and Sustainability**

**3. The types of green technologies**

1. Reduction of emissions

Main aim of green technology [4-7] includes the handling of industrial pollution. The greenhouse impact can be considerably reduced by managing the exhaust air produced during industrial production processes. Environmentally harmful compounds include methane and carbon dioxide. To prevent major environmental impact, industries including the chemical, petrochemical, and pharmaceutical sectors must reduce their toxic emissions.

2. The Waste to Energy program

Waste-to-energy technology, often known as energy from waste, produces energy from waste. The acronym "W2E" is also used occasionally to refer to this technology. Waste can be converted into energy using a variety of procedures, such as incineration or pyrolysis. Check out a few options for waste management that produce steam, hot water, or power. Production facilities can employ this additional energy for internal operations, which has clear financial and environmental benefits.

3. Waste reduction and management

Unreasonable increases have been seen in both industrial and domestic trash. Both businesses and people are committed to managing solid waste. Innovative technologies can sort mixed plastics by separating them from others, including smart containers, automated food waste tracking systems, and automated optical scanning technologies.

4. Biodiesel

It is economically viable to value-add plastic trash into a product like biofuel [8, 9]. It is a really successful business. Fuel oil and char, two flexible, in-demand products, are the two byproducts produced at pyrolysis plants.

5. Treatment of waste water

Although there haven't been many technological advancements in this subject, those that have occurred are significant. Membrane filtration, microbial fuel cells, nanotechnology, the creation of biological treatments, etc. are some significant advancements. All of these procedures are used to either make water safe to drink or greatly minimize the amount of pollutants that are released into the ocean and rivers.

6. Solar power

Solar power is power derived from the sun [10,11]. This technology strives to promote eco-friendly alternatives while reducing reliance on energy derived from hydrocarbons and fossil fuels. The renewable energy sources that have been studied and worked on the most are solar energy systems. High vacuum tubes for heating water, polypropylene collectors for heating water, photovoltaic collectors for generating electricity, and solar streetlights are a few examples of solar energy conversion technology.

7. Tidal and wave power

That is, power derived from ocean tides and waves [12]. Eight kilometers inland from the shore in Aguçadoura, Portugal, was where the first wave energy management facility was constructed. With a 2.25 MW capacity, the plant has the ability to power up to 1500 dwellings. The "Pelamis" exhibit consists of steel tubes with a 150-meter length and 3.5-meter diameter floating on the ocean's surface. These components, which are partially submerged in the water, convert the motion of the waves into electrical energy.



**Figure 2: Types of Green Technologies**

8. Eco-friendly cars

These so-called ecological vehicles don't release toxins into the atmosphere [13]. They are known as "eco" products since using them does not harm the environment and helps to lower the amount of damaging gases in the atmosphere. These notably include lead and sulfide compounds, carbon dioxide (CO2), carbon monoxide (CO), nitrogen oxide (NOx), unburned hydrocarbons (HC), and air pollutants like CO and NOx.

9. Smart structures

Smart buildings, also known as self-sufficient buildings, are those constructions that can run on their own power without assistance from the outside world [14]. Utilizing clever solar tracking devices to maximize the utilization of radiation is one technique to increase production with the same area of photovoltaic panels.

10. Farms and vertical gardens

The addition of vertical gardens to buildings has a positive impact on the environment and aids in energy conservation. Vertical gardens don't require routine watering practices that waste water, and because they are mounted against a wall, they lessen both the extreme outside noise pollution and the noise you can create yourself. Additionally, it aids in isolating the extreme heat brought on by climate change, resulting in significant energy, heating, and cooling cost reductions. By using this technology to farms, we can conserve a significant amount of water and look after the rich soil. There are now vertical farms that can cover up to 100 hectares.

**4. The green technology's objective**

The objective [15, 16] is to protect the environment, repair previous environmental harm, and preserve the natural riches of the planet. Green technology is now more visible to individuals looking to make investments that have a good social and environmental impact due to the depletion of resources and increased awareness of these effects. Renewable energy technology is not a special focus of green technology. It also examines material science, agriculture, hydrology, and other fields of science in addition to energy. As was already said, it has much greater goals:

**1. Positive environmental impact**

One goal of green technology is to lessen human impact on the environment, which benefits the environment. It is frequently grouped with renewable energy because of this. Many green technology programs target carbon dioxide and other greenhouse gas emissions with the intention of lowering or eliminating them. One example is solar energy.

**2. Enhance the standard of living**

For those who invest in green technology, today's possibilities are just as important as future ones—cleaner futures for our kids, less chance of another Dust Bowl, etc. Sustainable agriculture strategies, for instance, consider the future and how to help crops grow better today. Examples include crop rotation, integrating crops and animals, and investing in irrigation technology.

**3. Becoming commercially feasible**

A research project, scientific discovery, or investment opportunity must also be commercially viable in order to qualify as green technology. Good investments should have a favorable impact on the national and international economies in addition to providing good returns for both companies and individual investors. For instance,emerging markets like 3D printing offer a wide range of opportunities for economic expansion and the development of new jobs.

**5. Benefits of Green Technology [17-19]**

* Power Sector: Power generation is the industry where green technology has the most potential to change things. Green energy sources, such solar PV, biogas production, and wind power, can successfully be adopted to give energy solutions to distant communities and create new job opportunities.
* Assists in lowering input costs: For any business, lowering input costs is one of the main goals. Energy and resource savings have been attributed to green technology, including green manufacturing, green buildings, and energy efficiency techniques. This enables businesses to fulfill their social obligations in addition to helping them cut their input costs.
* Manufacturing industry: Green manufacturing has a number of advantages for businesses in this industry. By altering consumption and production patterns, green technology in the manufacturing sector can help minimize waste and pollution. Because the amount of input from the source is reduced by design, this reduces a product's environmental impact while simultaneously making production more ecologically friendly and economically viable.
* Trickles Effect: Given that all green technologies take into mind the needs of both people and the environment, it is not surprising that success in one area leads to success in others. People in India, for instance, use alternative green power generation techniques to not only fulfill their own energy needs, but also to sell their energy to the grid and make a sizeable profit.
* Approach of Green Farming-Green farming methods have been shown to be both healthier for humans and productive for the soil. In contrast to inorganic farming approaches, which resulted in a decline in production after a given amount of time, green farming leads to increased productivity over longer periods of time.
* Helps in creating avenues-Green technology has the potential to create new industries that were previously unimagined, especially at a time when the economy is slowing. Previously, waste management was restricted to garbage dumping. In South Asia alone, waste management is already a $25 billion business. As a result, the environment will be cleaned up, jobs will be created, toxic and greenhouse gas emissions will be reduced, and there will be numerous benefits.
* Advantages for rural areas: Local communities could benefit significantly from green technologies. Offering bio-gas plants to rural families has the potential to strengthen local economies and increase output. It was observed when solar lanterns were distributed as part of a number of initiatives, including the TERI's Lighting a Billion Lives Campaign. It is clear that through utilizing and trading the results, people have benefited from it.



**Figure 3: Ways of Green Technologies**

**6. The Function of Public Policies in the Promotion of Green Technology**

Understanding how government policies support and promote the adoption of green technologies is essential. Governments all around the world have implemented a number of measures to encourage the use of renewable energy sources and reduce carbon emissions. One way they do this is by providing tax credits or incentives to people, companies, and families who invest in renewable energy sources like solar or wind turbines. These incentives could make green technology more affordable and available to a wider range of people. Governments may also force utilities to generate a certain percentage of their electricity from renewable sources and set renewable energy goals. Green technology is therefore needed, and industrial innovation is encouraged [20-22]. Even though they can be divisive and vary from country to country, government policies have been successful in promoting the use of green technology in various industries.

**7. The Moral Aspects of Adopting Green Technology [23-25]**

The ethical implications of green technology must be discussed. There are many benefits, but there may also be disadvantages that must be considered. For instance, developing renewable energy sources might have unintended consequences on the ecosystems and populations in the area, including forcing people to relocate or destroying habitats. It is essential to make sure that green technology is developed in a way that limits these negative consequences and is long-term sustainable. Additionally, it's crucial to guarantee that everyone has access to renewable energy sources, particularly disadvantaged groups who might not have the resources to purchase these innovations. Fairness and inclusion must therefore be prioritized while developing and implementing green technology policies and programs. All things taken into account, it's imperative to approach green technology from a holistic stance that makes sustainability a priority in its application and considers both the environmental and social elements.

**8. Being a Green Technology Is Challenging**

Green technology ranges from inexpensive solar panels and programmable thermostats to more expensive wind turbines, with electronic cars falling somewhere in the middle. Composting is a great place to start for free solutions. There are other factors to take into account, such as the storage of renewable energy. To combat climate change, civilization must be completely upended, which includes continuing to use green technology. There are obstacles as well as drawbacks to adopting green technology that must be taken into account. The initial cost of investment is a significant issue since it frequently entails a high upfront cost that could prevent people and organizations from spending. Additionally, it may be required to make infrastructural adjustments to make room for renewable energy sources, which can be expensive and difficult in places that are not prepared for these changes. Finding qualified labor to install and maintain new systems could also be difficult. However, despite these difficulties, green technology has clear advantages. There are initiatives happening to increase everyone's access to and affordability of renewable energy.

**9. CONCLUSION:**

A change to sustainable systems is becoming more and more necessary. both monetarily and in terms of commodities and activities. The link between sustainability and economic success is impact investing. Any initiative or investment needs to be profitable before it can be considered sustainable. The full range of agricultural, water, and renewable energy industries must be covered. It must also be founded on efficiency and science. A wide range of manufacturing and consumption technologies are included in green technology. Utilizing environmental technologies for monitoring, evaluation, pollution prevention and control, remediation, and restoration are all part of the adoption and usage of green technologies. Technologies for monitoring and assessment are used to gauge and monitor environmental conditions, including the release of hazardous natural or man-made pollutants. Technologies for prevention stop the production of environmentally dangerous substances or change human behavior to lessen environmental harm.

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