

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

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## 1. ABSTRACT

Climate change is a fact. It is an increasing issue that worries governments along with society as a whole and endangers both the environment and human health. One strategy for reducing global warming is the deployment of green technologies. All throughout the world, engineers and scientists are developing technology solutions for reducing climate change/global warming causes. 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 (**Figure 1**), 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. On the other hand, the technology aspect is very broad. Green energy generally focuses on the creation of sustainable technologies that take into account both the short/long-term environmental effects. "Green technology" is a general word used to describe the science and technology applications to the production of ecologically friendly products. The term "clean technology" is more explicitly used to describe products or services that improve operational efficacy while reducing costs, energy use, waste, or unfavorable environmental effects. Green technology is often used interchangeably with clean technology. Green technology goals include protection of environment, undo environmental damage from the past, and maintain the planet's natural resources. It is a vibrant firm that has drawn enormous financial investment.. 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.



**Figure 1: Green Technology and Sustainability**

### **3. The types of green technologies (Figure 2)**

#### ***3.1. 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. Compounds that hurt the environment are methane and CO<sub>2</sub>. To avoid negative environmental effects, firms such as the chemical, petrochemical, and pharmaceutical sectors must reduce their toxic emissions.

#### ***3.2. 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. Manufacture facilities can employ this additional energy for internal operations that has clear financial and environmental benefits.

### **3.3. Waste reduction and management**

Both type of wastes (Domestic and commercial) have increased irrationally. Management of waste is a concern for both individuals and corporations. Innovative technology that can sort mixed plastics by isolating them from others includes smart containers, automated food waste tracking systems, and automated optical scanning technologies.

### **3.4. Biodiesel**

It is economically viable to value-add plastic trash into a product like biofuel [8, 9]. It is a really successful business. The two byproducts (char and fuel oil) from pyrolysis plants are versatile and in high demand.

### **3.5. Treatment of waste water**

Despite the fact that there hasn't been much technological progress in this field, membrane filtration, microbial fuel cells, nanotechnology, development of biologic remedies, etc. are some significant advancement. Most of them are utilized to make water safe for drinking and for minimization of pollutants released into the ocean/rivers.

### **3.6. Solar power**

Solar power is energy that comes via the sun. [10,11] that 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.

### ***3.7. 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 1<sup>st</sup> facility for managing wave energy was constructed. Its 2.25 MW capacity has the ability to power up to 1500 dwellings. The "Pelamis" exhibit consists of 150-meter-long, 3.5-meter-diameter steel tubes lying on the surface of the ocean. These generate electrical energy from the wave motion while being partially submerged in the sea.



**Figure 2: Types of Green Technologies**

### ***3.8. 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 (CO<sub>2</sub>), carbon monoxide (CO), nitrogen oxide (NO<sub>x</sub>), unburned hydrocarbons (HC), and air pollutants like CO and NO<sub>x</sub>.

### ***3.9. 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.

### ***3.10. 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**

Protecting the environment, reversing earlier environmental damage (**Figure 3**), and preserving the world's natural resources are the goals [15, 16]. Due to resource depletion and growing knowledge of these repercussions, green technology is now more readily available to anyone wishing to invest in things that have positive social and environmental effects. Green technology does not specifically focus on renewable energy technology. In addition to looking at energy, it also looks at agriculture, hydrology, and other scientific disciplines. It has considerably more ambitious, as has already been stated:

### ***4.1. Positive environmental impact***

Reduced human influence on the environment is one of the objectives of green technology. Because of this, it is frequently combined with renewable energy. Many green technology initiatives aim to reduce or even completely eliminate emissions of greenhouse gases like carbon dioxide. Solar energy is one instance.

### ***4.2. Enhance the standard of living***

Cleaner futures for our children, a lower likelihood of another Dust Bowl, and other possibilities are just as essential to those who invest in green technologies as the future ones. For instance, initiatives for sustainable agriculture take into account both the present and ways to improve crop growth. Crop rotation, combining crops and animals, and utilizing irrigation technologies are some examples.

#### ***4.3. Becoming commercially feasible***

In order to be considered a green technology, a research endeavor, a scientific discovery, or an investment opportunity must also be financially feasible. Along with yielding strong returns for both businesses and individual investors, good investments should have a positive effect on both the domestic and global economies.

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

- 5.1. 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.
- 5.2. 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.
- 5.3. 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.
- 5.4. Trickle 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 example, use alternating green production methods to meet both their own energy demands and the needs of the grid, earning a sizable profit.

- 5.5.** Green farming techniques have been demonstrated to be more productive for the soil and healthier for people. Green farming produces more over a longer period of time than inorganic farming methods, which led to a fall in production after a certain amount of time.
- 5.6.** Aids in the creation of avenues: Green technology has the ability to develop hitherto unknown sectors, particularly at a time when the economy is weakening. Prior until now, waste management was only possible through rubbish dumping. Waste management is currently a \$25 billion industry, only in South Asia. As a result, there will be several advantages, including the cleaning up of the environment, the creation of jobs, the reduction of hazardous emissions, and the reduction of greenhouse gas emissions.
- 5.7.** 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 across the world have put in place a variety of policies to promote the use of alternative forms of energy 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 these 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 varies from low-cost solar panels and programmable thermostats to higher-priced windmills, with electric vehicles fitting somewhat in the middle of the price range. Sanitation is an excellent place to begin when looking for free responses. 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:**

Green technology includes an extensive range of production and consumption technologies. The adoption and use of green technology includes using ecological technologies for tracking, assessing, and pollution avoidance and management, remediation, and reconstruction. Environmental situations, such as the release of dangerous naturally occurring or manmade contaminants, are evaluated and tracked using technologies for surveillance and assessment. Technologies for prevention reduce environmental harm by limiting the production of environmentally toxic chemicals or by adjusting how individuals act. To reduce environmental damage, avoid hazardous substances or alter the way people act.

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