

Green Technologies for Environmental Sustainability :

A way for the Better World

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Abstract

Green technologies encompass a diverse range of innovative solutions aimed at minimizing environmental impact while promoting sustainable development. This paper comprises key facets of green technologies, focusing on their significance, applications, and future prospects. The adoption of green technologies is driven by urgent global challenges such as climate change, resource depletion, and pollution. Through advancements in renewable energy sources, energy-efficient practices, waste management technologies, and sustainable agriculture, green technologies offer promising avenues for reducing carbon footprints and promoting ecological balance. We will discuss current trends and challenges in the field, highlighting the pivotal role of technological innovation, policy support, and societal acceptance in accelerating the transition towards a greener and more sustainable future.

Keywords: Green building, Policy, Technologies, Sustainability

1. Introduction of Green Technologies and its types

Generally speaking, the term "green technology" refers to the application of science and technology to produce environmentally friendly products that improve the quality of the environment and make it safer. One aspect of green technology is the transformation of renewable resources, such as the sun. We can employ energy from sun, wind, and water to create a safer and better world. Examples of green technologies that are safer for the environment and do not produce waste byproducts from fossil fuels are hydroelectric, solar, and wind dams. Besides the environmental benefits, these alternative energy sources can be used to power a home or a utility power plant and conserve natural resources.

Sustainability is another name for green technology. A green product or technology is made with consideration for renewable resources, energy efficiency, recycling, health and

safety issues, and more. Clean energy production can also be referred to as "green tech," which is a shorthand for "green technology." Utilizing technology and alternative fuels that are less damaging to the environment than fossil fuels is known as "clean energy." With over \$200 billion invested globally in green processes and renewable energy.

A significant global movement is underway to make use of commonplace technology that may both assist the environment and save money for regular people. It is a truth that the depletion of resources affects us on two levels: on the one hand, waste harms our planet and puts a financial burden on our family. Thus, using green technologies is the ideal method to enhance our environment, improve our health, and save money. One can broadly categorize the green technologies as its usages in following different categories

1. **Production of clean Energy**

i) **Solar Technologies-** One excellent illustration of the green technology-driven energy revolution is found in photovoltaic solar panels. Sunlight may be converted into electricity using these solar panels. These panels come in a range of sizes, from tiny enough to power a tiny house to enormous enough to power industrial complexes. The majority of the electricity used in the headquarters of Microsoft, Google, and even Facebook is produced by solar energy.

It is an inexpensive and sustainable method of producing large amounts of affordable electricity.

The International Solar Alliance (ISA) is a step in the right direction for green technologies. It was formed as a coalition of nations with abundant solar resources to address their unique energy needs and will offer a forum for cooperation on filling in the gaps by using a shared, agreed-upon strategy.

ii) **Wind Technologies-** Another more environmentally friendly method of producing electricity is through wind turbines. The only legitimate criticism of wind turbines that anyone can level is with its ability to manage landscapes through wind farms. However, there's no denying that these wind farms are an incredibly sustainable and clean energy source. Finally, it is a very affordable answer for all power requirements—residential, business, and industrial.

iii) **Geothermal Technologies** - Geothermal power, which also uses heat from the Earth's core, is a viable renewable energy source. The Earth always produces enough heat and energy for homeowners to take advantage of geothermal opportunities worldwide, even though varying types of terrain and other regional variances determine the amount accessible. In actuality, it's among the world's most passive methods of producing electricity.

iv) **Hydroelectricity Technologies**- The energy produced by the flow of water is called hydroelectric energy. Water is mass-filled. Because of gravity, it falls and flows downward. It possesses kinetic energy that can be used when it moves. Electricity produced by generators propelled by water flow is known as hydroelectricity. As a result, the turbine rotates, turning a generator that produces energy. About one-sixth of the power produced worldwide is produced from this renewable energy source. Since water makes up two thirds of the world, dams can be built to harness the power of water using environmentally friendly technology.

2. **Production of clean water**- Around the world, water is purified using green technology. Green technologies provide a way to clean up contaminated water or remove salt from seawater so that people in need can have access to drinking water, given the scarcity of water resources in some parts of the world. Israil is purifying its seawater to make it fit for human consumption using green technologies.

3. **Production of clean air and environment** - Green technology lessens the amount of carbon emissions and gases that manufacturing facilities and plants emit into the atmosphere, therefore improving the quality of the air we breathe. Green technology aids in the reduction of carbon emissions that are bad for the environment. Because of reduced respiratory problems and better air, the populace benefits.

4. **Waste management and recycling** - garbage, such as paper and cardboard, is recycled using green technology, and garbage is also incinerated. Recyclable materials can be made into fuel, fertilizer, and polymers. Waste management using plasma torches, which burn waste at extremely high temperatures and disintegrate all garbage with very little byproducts left behind, is one of the greatest examples. Production also uses green technology, for example, in the recycling of trash or water during the manufacturing process.

5. **Smart Technologies**- A typical water heater can be replaced with a far more efficient model, saving the average family a significant amount of money annually. Although smart

power bars and strips have the same appearance as their conventional counterparts, they are superpowered. An electrical equipment that is plugged in can be fully turned off by smart bars. Additionally, these gadgets have the ability to turn off "related" electronics—like the TV and X-box—that are also plug-able into the bar. Usage of water-saving and energy-efficient appliances, such as an environmentally friendly dishwasher, can guarantee reduced energy usage. These energy-efficient appliances protect the environment, save electricity costs, and use less energy. A programmable thermostat is affordable, environmentally friendly, and practical.

This device can program the HVAC system in your house or place of business to run at the proper temperatures when you need it, turning it on and off.

2. Green Technology and environmental sustainability

Environment sustainability means conservation of environment and natural resources for human benefit and maintains them for long term usage. Green technologies played a very important In order to solve several important concerns, including the mitigation and adaptation of climate change, the growing demand for energy and resources, and sustainable waste management, the development and implementation of green technology should be a feasible path toward a sustainable environment. Green technologies have the potential to mitigate climate change, increase energy and resource efficiency, and prevent severe environmental damage. This will lessen the possibility of resource scarcity, enhance social fairness, the environment, and human wellbeing while advancing the Sustainable Development Goals

For environment sustainability one should keep in mind the following issues such as

- **Prevention from man-made global warming and pollution-** rearranging housing in the form of sustainable cities, eco-villages, and eco-municipalities. Establish laws to prevent the planet's ecology from worsening to the point where future generations experience shortages of things like water, extreme weather, excessive heat, etc., which are the result of overuse of both natural resources and man-made resources.
- **Maintenance of healthy ecosystems-** safeguarding the long-term health and productivity of resources, such as food supply, farms, and fisheries, in order to satisfy future social and economic demands.
- **Prevention of natural resources like species diversity and ecological structure-** Certain plant species may have components that are needed for certain treatments. Future technological advancement is limited if some species become extinct. Thus, one must

reconsider employment methods (sustainable architecture) or economic sectors (permaculture, green building, sustainable agriculture).

- **Make long term policies for future not present short term policies** - Future generations should be considered while making economic decisions, not only the ones we are making now. For instance, burning coal results in temporarily cheaper electricity, but future generations must pay for the additional pollutants.
- **Switch to renewable resources**- Working on the development of new technologies is necessary (green technology, renewable energy, etc.). extending one's horizons and exploring non-renewable energy sources. Take solar and wind electricity, for instance.
- **More focus on happiness and social welfare not GDP**-one must prioritize environmental sustainability over GDP in favor of societal benefit, economic welfare, and happiness.
- **Value the importance of environmental** - To put it another way, we shouldn't only consider a monetary value; rather, we should preserve rainforests because they are worthy of protection rather than determining whether doing so will improve our bottom line. making changes to personal habits that protect the environment.

3. **Green Technology Policies: Fostering Innovation and Sustainability**

Green technology policies are essential frameworks established by governments and international bodies to promote the development, adoption, and integration of environmentally friendly technologies. These initiatives seek to improve energy security, spur economic growth, and address urgent environmental issues like pollution, climate change, and resource constraint. A few essential components of green technology policies are:

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1. **Incentives and Subsidies:** Financial incentives, including grants, tax credits, and subsidies, are frequently offered by governments to incentivize firms and people to participate in environmentally-friendly technologies. These incentives help offset the higher initial costs

associated with environmentally friendly technologies like renewable energy systems and energy-efficient appliances.

2. **Regulatory Frameworks:** Regulatory measures set standards and requirements for industries to reduce their environmental impact. These can include emissions standards, waste management regulations, and mandates for energy efficiency in buildings and transportation. Regulatory frameworks create a level playing field and ensure compliance with environmental goals.
3. **Research and Development (R&D) Funding:** Funding for green technology research and development is provided by governments and international organizations. Innovation in fields including waste management, clean transportation, sustainable agriculture, and renewable energy is encouraged by this funding. Public-private partnerships are frequently essential for maximizing research and development expenditures and launching novel technologies.
4. **Public Procurement:** By adding environmental requirements to public procurement procedures, governments can stimulate the market for green technologies. Governments can show leadership in sustainability by acquiring eco-friendly goods and services, which also opens up new markets for suppliers of green technologies.
5. **Education and Awareness Campaigns:** Policies also include initiatives to raise awareness about the benefits of green technologies and promote sustainable practices among businesses, communities, and individuals. Programs for education promote a mindset of environmental stewardship and behavioral adjustments that advance sustainability objectives.
6. **International Cooperation:** International cooperation is necessary to address global issues like climate change. Policies encourage international cooperation in the development and application of green technologies by exchanging best practices, technologies, and expertise.

Comprehensive, flexible, and supportive of long-term sustainability objectives are characteristics of effective green technology strategies. They promote creativity, lessen their negative effects on the environment, and help create a future that is cleaner and more robust for coming generations.

4. **Societal Acceptance of Green Technologies in India: Influencing Factors and Trends**

Green technologies, encompassing renewable energy, sustainable practices, and eco-friendly innovations, are gaining traction in India amidst increasing awareness of environmental issues and the need for sustainable development. Several factors influence their acceptance:

1. **Environmental Awareness:** Growing concern over air and water pollution, climate change impacts, and resource depletion has heightened environmental consciousness among Indian citizens. This awareness drives demand for cleaner technologies that reduce environmental impact.
2. **Economic Viability:** The affordability and cost-effectiveness of green technologies are critical factors for acceptance. Renewable energy sources, like wind and solar electricity, are now competitive with traditional energy sources because to technological advancements. Government incentives and subsidies further bolster economic feasibility.
3. **Policy Support:** India has put in place a number of laws and programs to support environmentally friendly technologies, such as the National Action Plan on Climate Change and the challenging goal of 175 GW of renewable energy capacity by 2022. These policies create a conducive environment for investment and innovation in the green technology sector.
4. **Technological Advancements:** Rapid advancements in technology have made green solutions more efficient, reliable, and scalable. Innovations in battery storage, smart grids, and energy-efficient appliances are enhancing the attractiveness of green technologies.
5. **Public Awareness and Education:** Educational campaigns, media coverage, and outreach programs play a crucial role in informing and mobilizing public support for green technologies. Awareness programs highlight the benefits of sustainable practices and encourage behavioral change.
6. **Cultural Acceptance:** India's cultural ethos, which emphasizes harmony with nature (as seen in practices like sustainable agriculture and reverence for natural resources), aligns with the principles of green technologies. This cultural acceptance provides a foundation for integrating eco-friendly practices into everyday life.

Challenges to widespread adoption still exist, such as initial costs, technological limitations, and infrastructure constraints. However, the positive trajectory indicates increasing societal acceptance and integration of green technologies into India's development agenda. Continued efforts in policy formulation, technological innovation, and public engagement are crucial for accelerating this transition towards a sustainable future.

5. Conclusion

Green technologies represent a pivotal pathway towards achieving sustainable development goals globally. By harnessing renewable energy sources, promoting energy efficiency, and embracing eco-friendly practices across sectors, green technologies offer solutions to mitigate climate change, reduce environmental degradation, and enhance resource efficiency. By incorporating these technologies into daily activities, carbon footprints are decreased while simultaneously promoting economic growth, enhancing public health, and bolstering energy security.

However, there are obstacles in the way of the broad adoption of green technologies, including upfront expenditures, technological restrictions, and gaps in the execution of policies. Governments, corporations, academia, and civil society must work together to develop creative solutions and policies that will help overcome these obstacles. Campaigns to raise public awareness and mobilize support are essential for promoting sustainable practices.

Looking ahead, advancements in technology, coupled with proactive policy frameworks and international cooperation, hold promise for accelerating the deployment of green technologies worldwide. The United Nations Sustainable Development Goals and the Paris Agreement, for example, offer a framework for group action towards a sustainable future.

In conclusion, while the journey towards sustainability is complex and multifaceted, green technologies offer a transformative pathway towards building resilient and inclusive societies. Adopting green technologies promotes a more wealthy and just world while also protecting the environment for coming generations.

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