Role of Green Technology in Fostering Sustainable Development

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1. Introduction

India is placing greater emphasis on sustainable manufacturing as it seeks to strike a balance between environmental responsibility and economic growth. In the past, the materials we used were returned to nature and could be recycled. But now, even though technology is advanced, most of the waste cannot be completely recycled, creating a depletion of resources. Waste management is gaining importance since it is a future challenge. (Wu & Strezov, 2023)

Green technologies have become crucial instruments for accomplishing sustainability objectives because of their minimal environmental impact and resource efficiency. It is critical to comprehend the benefits and difficulties of technology transfer in the context of green technologies as countries work to shift to greener economies. With an emphasis on identifying potential and obstacles for technology transfer, this article attempts to examine the landscape of green technologies and sustainable development. (System, n.d.)

2. Statement of the Study

In a time when worries about climate change and environmental degradation are on the rise, adopting and spreading green technologies has become essential to reaching global sustainable development goals. The purpose of this research is to examine the complex relationships that exist between sustainable development and green technologies to highlight how these technologies may be able to reduce the effects of climate change, preserve natural resources, and promote economic expansion while maintaining environmental sustainability.

2.1 Key Aspects of Green Technology for Sustainable Development

Energy-efficient technology, green manufacturing, and renewable energy infrastructure investments boost economic activity, draw in private capital, and propel technical development. Additionally, green innovation boosts resilience and competitiveness in the global marketplace

by spurring the development of new supply chains, sectors, and business models. Green technologies provide a route to equitable and sustainable prosperity by utilising the synergies between environmental sustainability and economic development. Green technologies also provide promise for advancing social justice, raising living standards, and improving the standard of living in underserved areas. Underprivileged communities are empowered, energy poverty is decreased, and resilience to environmental shocks is increased when they have access to clean energy, sustainable mobility, and clean drinking water. Additionally, community-led projects are made possible by decentralised renewable energy systems, which promote local ownership and involvement.

Countries must use technologies and approaches to economic activity that are less harmful to the environment and that preserve resources in light of the growing global issues of climate change, population growth, environmental pollution, and the wasteful use and depletion of natural resources. Less environmental harm is linked to sustainable development, which is fuelled by all-encompassing, comprehensive policies that consider the requirements of future generations in both individual and international contexts. A number of these policies recommend the use of green technologies (Yuldashova et al., 2024).

2.2 Reasons for Green technologies and innovation for sustainable development

1	Environmental Conservation	Green technologies reduce pollution, conserve resources, and promote renewable energy sources, thereby mitigating their adverse environmental impacts. This helps protect biodiversity, ecosystems, and natural resources for future generations.
2	Climate Change Mitigation	In order to tackle climate change by lowering greenhouse gas emissions, innovation in green technologies is crucial. Technologies that help reduce the consequences of climate change and meet global climate targets include renewable energy, energy-efficient appliances, and sustainable modes of transportation.
3	Resource Efficiency	Green technologies encourage the economical use of raw materials, energy, and water. These technologies aid in resource conservation and lessen the ecological impact of human activity by maximising resource use and minimising waste output.

4	Economic Growth and Job Creation	By generating new markets, industries, and employment possibilities, investments in green technologies promote economic growth. The shift to a green economy promotes competitiveness, entrepreneurship, and innovation, which results in sustainable growth and wealth**.**
5	Health and Well-being	By lowering air and water pollution, two of the main causes of respiratory disorders and waterborne infections, green technologies help to improve public health. Communities benefit from healthier and more habitable surroundings because to cleaner energy sources and sustainable urban development.
6	Resilience and Adaptation	Green technologies increase ecosystems' and societies' resistance to the effects of environmental deterioration and climate change. Communities are better prepared to adjust to shifting climatic conditions thanks to innovations like climate-resilient infrastructure, sustainable agricultural methods, and ecosystem restoration initiatives.
7	Global Collaboration	Green technology makes it easier for nations to collaborate and form alliances for sustainable development. Through programs for capacity building, technology transfer, and information exchange, nations can cooperate to address shared environmental issues and accomplish sustainability objectives.

3. Green Technology Types

The term "green technology" refers to a wide range of environmental remediation techniques. There are several initiatives to address local environmental dangers, even though climate change and carbon emissions are currently regarded as two of the most urgent global challenges.

3.1 Alternative Energy

Many companies are working to develop alternative energy sources that don't release carbon dioxide into the atmosphere in order to offer a competitive substitute for fossil fuels. These days, solar and wind energy are two of the least expensive energy sources, and solar panels

are within the reach of American homeowners. Large-scale implementation of other options, such as geothermal and tidal energy, is still pending.

3.2 Electric Cars

According to the Environmental Protection Agency, transportation-related activities are responsible for almost one-third of greenhouse gas emissions in the United States. Many automakers are looking into ways to lower emissions from their vehicles, such as switching to electric power or creating engines that use less fuel.

However, a number of other advances are needed for electric vehicles, like charging infrastructure and high-capacity rechargeable batteries. Furthermore, many power systems still rely on fossil fuels, which limits the advantages of electric automobiles.

3.3 Agriculture That Is Sustainable

From the high expenses of land and water use to the ecological effects of pesticides, fertilisers, and animal waste, farming and livestock have a significant impact on the environment. Consequently, there are several prospects for green technologies in the agricultural sector. For instance, improvements in calf feed can lower methane emissions, organic farming methods help lessen soil fatigue damage, and meat alternatives can cut down on livestock consumption.

3.4 Reusing

Recycling looks for sustainable alternatives or repurposes items in an effort to conserve finite resources. While plastic, glass, paper, and metal waste are the most familiar forms of recycling, more sophisticated operations can be used to recover expensive raw materials from e-waste or automobile parts.

3.5 Capturing Carbon

A collection of experimental technologies known as "carbon capture" aims to extract and store greenhouse gases from the environment or at the site of combustion. The fossil fuel business has actively pushed this technology, but it hasn't lived up to the hype yet. 5. The largest carbon capture facility can absorb 4,000 tons of carbon dioxide per year, a minuscule amount compared to annual emissions.

3.6 Green Building Design

Sustainable architecture and building practices focus on minimizing the environmental impact

of construction and operation. This includes using eco-friendly materials, optimizing energy use, and designing for natural lighting and ventilation.

3.7 Sustainable Materials

Developing and using biodegradable or renewable materials instead of traditional materials with high environmental impacts, such as plastics derived from fossil fuels.

3.8 Ecosystem Monitoring and Restoration

Technology plays a role in monitoring and restoring ecosystems. For example, remote sensing and data analysis can help track deforestation, monitor biodiversity, and assess the health of ecosystems. (Dushing, 2024)

References

[1] Yuldashova, N., Choriyeva, S., Ziyadulloyeva, M., Shadiyeva, D., & Umirova, M. (2024). Role of harnessing green technologies and innovation for sustainable development. *BIO Web of Conferences*, *141*, 04014. https://doi.org/10.1051/bioconf/202414104014

[2] Dushing, A. J. (2024). GREEN TECHNOLOGY: SHAPING a SUSTAINABLE FUTURE. In *Futuristic Trends in Renewable & Sustainable Energy* (pp. 109–112). https://iipseries.org/assets/docupload/rsl20245C798E414CA0CD3.pdf

[3] Guo, M., Nowakowska-Grunt, J., Gorbanyov, V., & Egorova, M. (2020). Green Technology and Sustainable Development: Assessment and Green Growth Frameworks. *Sustainability*, *12*(16), 6571. https://doi.org/10.3390/su12166571

[4] Wu, J., & Strezov, V. (2023). Green technologies and sustainability: A new trend. *Green Technologies and Sustainability*, *1*(1), 100008. https://doi.org/10.1016/j.grets.2023.100008

[5] System, D. O. I. (n.d.). *doi-ds link :: Digital Online Identifier-Database System*. https://doi-ds.org/doilink/05.2024-59682141/IJAEAST.2024.05.0003,%20Volume-2,%20Issue-5,%20pp.154%20-%20160

[6] Mohd Shafiei, W., & Abadi, H. (2017). The importance of green technologies and energy efficiency for environmental protection. In Research India Publications, *International Journal of Applied Environmental Sciences* (Vol. 12, Issue 5, pp. 937–951) [Journal-article]. https://ripublication.com/ijaes17/ijaesv12n5_18.pdf