Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 43 No. 4 (2022)

A Review on Green Technology and Sustainability

[1] Vishnu Lohar, [2] Geetanjali, [3] Shubh Gupta, [4] Rudra Pratap Singh

[1] Asst. Professor
Civil Engineering
Arya Institute of Engineering and Technology, Jaipur
[2] Asst. Professor
Civil Engineering
Arya Institute of Engineering Technology & Management, Jaipur
[3] Science Student
Emmanuel Sr. Sec. School, Bundi.
[4] Science Student
D.S.S.V. College, Buxar, Bihar

Abstract: Climate change, global warming, and energy depletion have led to the emergence of green technologies, which are expected to contribute to sustainable economies and communities. These technologies include energy efficiency, recycling, safety, health concerns, and renewable resources. While green technologies have a promising future for economic sustainability, they also present ecological disruptions. To ensure sustainable growth, both environmental and social sustainability factors must be considered. This paper reviews green technologies, discussing challenges in advancement and implementation, and trends leading to sustainable development. It also discusses the adaptability and implementation issues of various technologies for contemporary living towards a sustainable environment. The focus should be on economic and sustainable growth.
Keywords: Green Technology, Sustainable Development, Environment.

1. Introduction:

Green technologies are environmentally friendly innovations that lead to social and economic sustainability. Clean technology is the same as green technology. Green technologies were once referred to as environmental technology. When compared to other technologies, green technology has the potential to greatly enhance environmental performance. The use of science to preserve the environment and lessen the negative effects of human activities is known as "green technology."

In this paper, we address the challenges that green technologies confront as well as their application areas.

Some sectors of Green Technologies:

1. Management of water and waste
2. Power
3. Conventional Energy That's Cleaner
4. Green and Clean Sectors

1. Management of water and waste

Water is an essential element in life:

There are many places in the globe where there is inadequate and contaminated water. The process of eliminating undesirable impurities from water is known as water purification. It is possible to employ undesirable substances for other purposes, such as biological, chemical, or even physical contaminants. Many developing nations use water treatment as their primary method of reducing water stress. Applications like industrial and human activities will determine which viewpoints this solution focuses on.

The most common methods of water purification:

A. Coagulation and flocculation:

A positively charged chemical is introduced to the water, while the negatively charged substance is bound to the soil. Through this process, foreign proteins that form big particles known as Floc are separated from water.

- **Sedimentation:** Sedimentation is then used to get rid of those big particles.
- **Filtration:** Small particles that escape is caught by the filters. Most water treatment facilities use advanced filtering devices like membrane and nano filters as a result of the advent of new green technologies in water treatment operations. These screens capture minuscule particles.
- **Disinfection:** This phase gets rid of things like bacteria, viruses, parasites, and protozoa. Chlorine and chlorimide are the disinfectants that are frequently found in contemporary treatment facilities. However, the approach has been shown to have a carcinogenic impact. As a result, many developing nations use the ozonating technique. Water that is safe and clean is necessary for life to exist. Chlorination, safe storage, filtration, and treatment of solar electricity are methods employed in green technology. purifying of water.

B. Sewage Treatment:

The removal of sediments, organics, and nutrients from residential and commercial effluents is sometimes referred to as wastewater treatment. Green technologies have been adopted in this industry to assist clean up the effluents by removing chemical, biological, and physical impurities, making them more ecologically friendly. The ability to cleanse industrial wastewater before it is released back into the environment makes sewage treatment important. According to current theories, the effluent is thought to include dangerous substances that might negatively impact human health in addition to interfering with environmental quality. When planning a wastewater treatment facility, the following elements are taken into account:

- Get rid of anything organic and biodegradable.
- Take out the solid portion.
- Eliminate harmful microorganisms There are four main phases of wastewater treatment: screening, primary, secondary, and final.
- Screening: This process rids wastewater of big particles and items.
- The first stage involves separating the organic portion of the waste by letting it sink and settle in sedimentation tanks. High levels of biochemical oxygen demand are present in the effluent that exits the primary treatment system.
- The organic debris is further broken down by biological processes in the secondary treatment. There are a lot of nutrients in wastewater.
- Before releasing the wastewater into the rivers, the last step lowers the nutrient content. Green technology have made it possible to utilize the wastewater generated by homesteads and industry in

C. Solid Waste Management

One of the main facets of sustainability on which attention has recently been focused is solid waste. Maintaining a hazardous waste-free workplace is crucial for all businesses. Landfill garbage dumping is in opposition to sustainable development. The six steps covered by the recommendations for sustainable development are as follows:

1. Reduce, 2. Reuse, 3. Recycle, 4. Recover, 5. Incinerate, 6. Landfill

It is against the principles to dispose of garbage in landfills, as this requires the processing of new items from the ground up. The ultimate effect will be a rise in the need for energy, fuel, and other resources. Furthermore, when garbage decomposes in these landfills, more greenhouse gas emissions, including carbon dioxide and methane, are produced. There are differences in waste management technologies between established and developing nations, as well as between residential and industrial zones and rural and urban locations. The creation of aerobic digesters, such as bioreactors that include in-vessel waste treatment, is the result of the most recent green developments. The latest technological developments serve as a source of renewable energy in addition to trash management. Additional waste management techniques encompass gasification and plasma synthesis.

2. Power

- **Renewable Energy:** With rising power consumption turning into a worldwide concern, energy has become a crucial component of social and economic development in every nation. As a result, efforts have been made to create alternative and energy-efficient technologies. For ages, people

have exploited fossil fuels as a source of energy. Fossil fuel is defined as a material that is obtained by solar power conversion into chemical energy and then preserved in long-dead plants and animals. When energy is extracted from plants, greenhouse gases are released.

- **Energy Conservation:** The efficient generation of energy that satisfies present demands without sacrificing supply in the future is referred to as energy conservation. The need to develop new energy sources, particularly renewable ones, to replace fossil fuels has been spurred by the development of green technology. Green technologies have never been a problem because of the energy crisis. In actuality, they have prompted the invention of low-energy devices. Stated differently, energy efficiency, often known as energy conservation, is a key component of sustainable development. The banking, social security, and economic sectors will all benefit from energy saving. By the 2050s, it is anticipated that increased energy efficiency in households, companies, and transportation would lower energy consumption.

Opportunities for Green Technology Markets

- Building and research into materials that are exceptionally robust and energy-efficient to offer a dependable energy source
- Sustainable goods and services
- By lowering the number of resources required to create green products, negative effects may be greatly mitigated, preventing a collapse in the environment and economy. The green technology market has determined that the most important reasons for development and export prospects are renewable energy, water recycling, and treatment services.

3. Conventional Energy That's Cleaner

This energy is identical to that of non-conventional fossil fuels and is not unique. Because the energy derived from these fossil fuels has no negative effect on the environment and ecology, conventional energy is referred to be cleaner energy. Among the traditional energy sources that are cleaner are:

- **Cleaner Coal:** It explains how to use coal more sustainably by minimizing its negative environmental effects. Cleaner coal technologies, which include carbon capture and storage (CCS), gasification, flue gas desulfurization, coal blending, and screening and scrubbing, often address the air pollution caused by burning coal.
- **Cleaner Oil:** Oil exploration and extraction can benefit from the use of cleaner oil technology (such as the re-injection of gas, steam, or water to increase oil output and lower emissions of pollutants). These technologies, which include vapor recovery, wastewater sulfur removal, and oil tanker automated dehydrators, can also be used in the transportation and refining of oil.
- **Cleaner Gas:** Improved utilization of coal bed and coal mine methane (CBM/CMM), greenhouse gas reduction with low concentration methane, and support for natural gas combined-cycle (NGCC) operations are all made possible by cleaner gas technology.

4. Clean & Green Sectors

Green industries are those that use green investing strategies to attempt to reduce their impact on the environment. Additionally, companies that reduce environmental damage are referred to as "clean industries."

2. Literature Review:

The construction sector is the main source of excessive energy consumption, solid waste production, greenhouse gas emissions, and environmental harm. For future sustainability, it is crucial to follow a green route and encourage green development. It's a means of improving the surroundings. It lowers resource use while raising quality of life for people, the community, and the environment. The main issue is a lack of experience and specialization. Given how young the green business is, more work has to be done to encourage green adoption. Utilizing eco-friendly resources, such as recyclable, reusable, and low-energy items, might lessen the difficulties that exist today. Through the reduction of water, land, and energy resources, the operation of Green Buildings contributes to a healthy environment. The Life Cycle Assessment, efficient site and structure design,

efficient materials, improved indoor air quality, energy efficiency, water efficiency, and waste reduction are the seven primary components of green construction. Utilizing solar energy for solar water heating applications might lessen the negative environmental consequences associated with electricity consumption. Solar photovoltaic, wind energy, biomass, biofuel, biogas, micro and small hydropower, solar thermal, improved water mill, and geothermal energy are examples of viable green technology. There is a trend toward renewable energy technologies, such as photovoltaic cells, concentrated solar power, wave power, fuel cell energy, etc., because of population expansion and increasing energy demand (since fossil fuels are finite). If implemented with greater planning, these technologies might potentially All parties involved in the building industry—contractors, engineers, laborers, and so on—as well as external parties like the government and the general public, must contribute to the effort. BIM is helpful in calculating material energy usage and is also employed in the management of green building construction. Small steps toward a sustainable future are as crucial, such as increasing the number of landscape spaces and tree plantings on building grounds. Reduce your consumption of fossil fuels by using public transportation, avoiding plastic items, and many other ways. The green building rating systems GRIHA, TERI, and SVAGRIHA were created specifically for the Indian construction industry.

3. Methodology:

The goal of this study is to investigate, examine, and create green building construction approaches to protect the environment from pollution and rising global temperatures.

Additionally, it seeks to raise global understanding of the benefits and long-term financial savings associated with green buildings. Additionally, Methodology is organized as follows:

1. Overview
2. Review of literature
3. A thorough examination of the subject topic
4. To read through scholarly publications, research papers, and journals about the subject of study
5. Gathering information from big, medium, and small-scale building projects
6. Information gathering via online questionnaires
7. Learning innovative approaches and methods to advance the field of green construction

It is becoming increasingly clear that the pollution we produce is suffocating our world. However, there is a technique to significantly reduce this issue if one is willing. Pollution may be greatly decreased by actively utilizing green technologies. Because of this, both developed and some developing nations are currently using this kind of technology to shield the environment from harmful effects.

4. Scope

Human civilization is creating and utilizing a wide range of technology to assist daily activities. Technology adoption is low and has a negative impact on both human civilization and the environment. As a result, there is room for the use of innovative, ecologically friendly technology to support modern lifestyle activities on a daily basis. However, because of growing awareness and recent advancements in energy management research, new solutions are more effective and ecologically benign. We refer to these technologies as clean or green technologies. Energy efficiency, recycling, health and safety issues, renewable resources, and many other things are all part of green technology.

5. Conclusion

In the modern world, green technologies are essential. The eco-social environment's sustainability is being threatened by conventional technology; hence the development of green technologies is necessary. Even while clean technology adoption has certain drawbacks, in the long run, it will benefit us and the generations to come. Technology will also aid in resource conservation for us.

Education is therefore the simplest means of preserving social, environmental, and economic sustainability.

References

[1] Dao, V., Langella, I., & Carbo, J. (2011). From green to sustainability: Information Technology and an integrated sustainability framework. The Journal of Strategic Information Systems, 20(1), 63-79.

[2] Wu, H., Zhang, J., Ngo, H. H., Guo, W., Hu, Z., Liang, S., ... & Liu, H. (2015). A review on the sustainability of constructed wetlands for wastewater treatment: design and operation. Bioresource technology, 175, 594-601.

[3] Mohanty, A. K., Misra, M., & Drzal, L. T. (2002). Sustainable bio-composites from renewable resources: opportunities and challenges in the green materials world. Journal of Polymers and the Environment, 10, 19-26.

[4] Irimia-Vladu, M. (2014). "Green" electronics: biodegradable and biocompatible materials and devices for sustainable future. Chemical Society Reviews, 43(2), 588-610.

[5] Dangelico, R. M., & Pujari, D. (2010). Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. Journal of business ethics, 95, 471-486.

[6] Elzen, B., Geels, F. W., & Green, K. (Eds.). (2004). System innovation and the transition to sustainability: theory, evidence and policy. Edward Elgar Publishing.

[7] Kibert, C. J. (2016). Sustainable construction: green building design and delivery. John Wiley & Sons.

[8] Sheldon, R. A. (2014). Green and sustainable manufacture of chemicals from biomass: state of the art. Green Chemistry, 16(3), 950-963.

[9] Adams, B. (2008). Green development: Environment and sustainability in a developing world. Routledge.

[10] Clarke, C. J., Tu, W. C., Levers, O., Brohl, A., & Hallett, J. P. (2018). Green and sustainable solvents in chemical processes. Chemical reviews, 118(2), 747-800.

[11] Clark, J. H., & Macquarrie, D. J. (Eds.). (2008). Handbook of green chemistry and technology. John Wiley & Sons.

[12] Schiederig, T., Tietze, F., & Herstatt, C. (2012). Green innovation in technology and innovation management–an exploratory literature review. R&d Management, 42(2), 180-192.

[13] Getter, K. L., & Rowe, D. B. (2006). The role of extensive green roofs in sustainable development. HortScience, 41(5), 1276-1285.

[14] Clark, J. H., & Macquarrie, D. J. (Eds.). (2008). Handbook of green chemistry and technology. John Wiley & Sons.

[15] Aithal, P. S., & Aithal, S. (2016). Opportunities & Challenges for Green Technology in 21st Century

[16] Shaikh, Z. A. (2018). Towards Sustainable Development^: A Review of Green Technologies; Trends in Renewable Energy

[17] Korten, D., (1992). Environmentally Sustainable Development. World Policy Journal.

[18] Biac (2010). _Technology development and deployment to address green growth challenges ', Business and Industry Advisory Committee to the OECD, Paris.

[19] Williams, M., & Helm, A. (2011). Waste-to-energy success factors in Sweden and the United

[20] States. Analyzing the Transferability of the Swedish Waste-to-Energy Model to the United States.

[21] Davison, A. (2001). Technology and the contested meanings of sustainability. SUNY Press.

[22] Huesemann, M., & Huesemann, J. (2011). Techno-fix: Why technology won't save us or the environment. New Society Publishers.

[23] Simiran Kuwera, Sunil Agarwal and Rajkumar Kaushik, "Application of Optimization Techniques for Optimal Capacitor Placement and Sizing in Distribution System: A Review", *International Journal of Engineering Trends and Applications (IJETA)*, vol. 8, no. 5, Sep-Oct 2021.

[24] Guru Saran Chayal, Bharat Bhushan Jain and Rajkumar Kaushik, "A Detailed Study of Electrical Vehicle with Improved Applications: A Review", *International Journal of Engineering Trends and Applications (IJETA)*, vol. 8, no. 6, pp. 31, Nov-Dec 2021.

[25] T. Manglani, A. Vaishnav, A. S. Solanki and R. Kaushik, "Smart Agriculture Monitoring System Using Internet of Things (IoT)," *2022 International Conference on Electronics and Renewable Systems (ICEARS)*, Tuticorin, India, 2022, pp. 501-505.

[26] R. Kaushik *et al*., "Recognition of Islanding and Operational Events in Power System With Renewable Energy Penetration Using a Stockwell Transform-Based Method," in *IEEE Systems Journal*, vol. 16, no. 1, pp. 166-175, March 2022.

[27] G. Kumar and R. Sharma, "Analysis of software reliability growth model under two types of fault and warranty cost," 2017 2nd International Conference on System Reliability and Safety (ICSRS), Milan, Italy, 2017, pp. 465-468, doi: 10.1109/ICSRS.2017.8272866.

[28] Kumar, G., Kaushik, M. and Purohit, R. (2018) “Reliability analysis of software with three types of errors and imperfect debugging using Markov model,” International journal of computer applications in technology, 58(3), p. 241. doi: 10.1504/ijcat.2018.095763.