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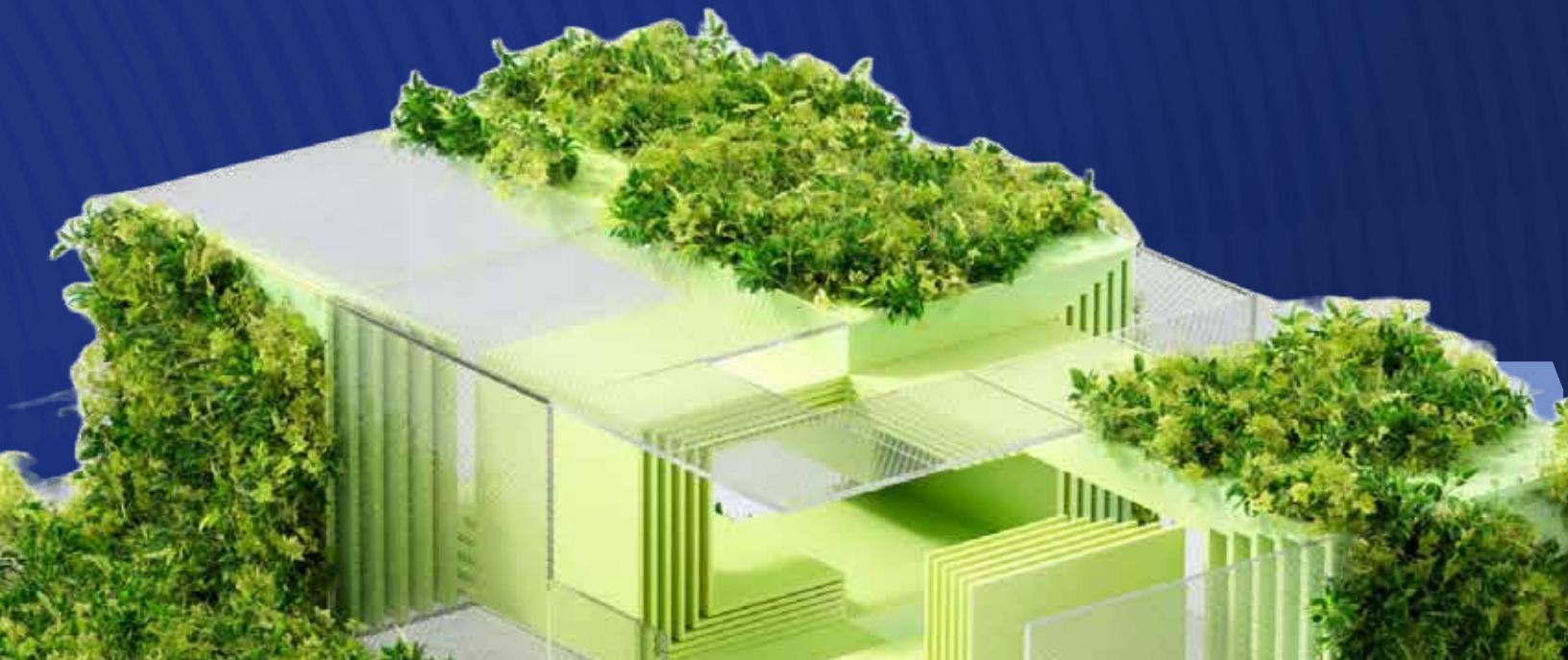
Growing Influence Of Green Technology And Sustainable Solutions.



Green technology and envirotech are elements of innovative green supply and value chain processes. The progress in green Technology is directed towards sustainable performance without changing our traditional ideas of technology practices. The approach to environmental, eco-technology, and green technology belongs to the cluster that addresses the gap between the conventional method and the ecological reliability of the environment. Environmental concerns and technology management have gradually surfaced as green technology. The core and indispensable element of green technology is sustainability. The green approach towards utilization and production comprises deriving pleasure from the present standard of living without destroying future standards.

Concept of Green Technology

Green Technology (GT) is an environmental healing technology that reduces environmental damage created by products and technologies for people's convenience. Green technologies are clean, eco-friendly, and sustainable, which will not make a footprint for various processes/applications. Green technologies support the use of natural organic resources and avoid the production of green gasses. They consume fewer resources and do not support increasing the universe's entropy. Green technologies do not support any kind of environmental degradation. They support the automation of every process and hence avoid human intervention. Since they do not support environmental degradation and contribute to creating a footprint, they are sustainable, improve the lifestyle of the people and contribute to human comfort. The primary technologies used in the present day, like Aircraft technology, Automobile technology, Biotechnology, Computer technology, Telecommunication technology, Internet technology, Renewable energy technology, Atomic and nuclear technology, Nanotechnology, Space technology, etc., can be made green using the principle of green technology. Sustainable cities need sustainable technology for construction, maintenance, and further growth. Sustainable construction entails the utilization of recycled materials, the integration of green roofs for effective stormwater management, the establishment of zero-energy structures, and the adoption of natural ventilation systems. Regarding sustainable infrastructure, practices encompass sustainable urban drainage systems, low-irrigation landscaping, and harnessing renewable energy sources like sewage-derived biogas. And Sustainable Transport Systems.

Combining the above mentioned viewpoints, green technology is any innovation, production process or procedure that promotes energy efficiency and environmental sustainability.

Sustainable development

Sustainable development, as a comprehensive approach to balancing human needs with environmental preservation, depends on three interconnected pillars. These pillars form the bedrock upon which a harmonious coexistence can be achieved between society, the economy, and the environment. Each pillar contributes to a holistic framework that guides decision-making and actions towards a more equitable and sustainable future.

1: Environmental sustainability is the ability to preserve and protect the natural environment over time through appropriate practices and policies, meeting present needs without compromising the availability of resources in the future.

2: Social sustainability: Social sustainability aims to create inclusive societies, reduce inequality, and ensure long-term well-being for all people while preserving social cohesion and justice.

3: Economic sustainability is the approach whereby economic activities are conducted in such a way as to preserve and promote long-term economic well-being. In practice, it aims to balance economic growth, resource efficiency, social equity and financial stability.

Categories of Green Technologies

The following categories mainly pertain to promoting ecological sustainability and fostering beneficial societal effects.

1. Mitigating Greenhouse Gas Emission: Since the Industrial Revolution, over 2,000 gigatons of carbon dioxide have been released into the atmosphere. The buildup of CO2 and other greenhouse gases is responsible for climate impacts such as wildfires, intense heat, and rising sea levels. It is imperative that we rapidly reduce emissions to tackle the issue of climate change. Necessary. There are several technologies for reducing greenhouse gas emissions, which include.

- **Energy Efficiency:** Improving the efficiency of appliances, buildings, and industrial processes reduces energy consumption and emissions.
- **Carbon Capture and Storage (CCS):** This method captures carbon dioxide emissions from industrial processes or power generation plants and securely stores them underground.
- **Bioenergy with Carbon Capture and Storage (BECCS):** Synergizes bioenergy (from plants) with Carbon Capture Storage to remove carbon dioxide from the atmosphere. Electrification: Shifting from fossil fuels to electric power in transportation and heating reduces direct emissions.
- **Hydrogen Economy:** Producing and using hydrogen as a clean energy carrier can reduce emissions if produced from renewable sources.
- **Afforestation and Reforestation:** Planting trees to absorb carbon dioxide from the atmosphere.

2. Renewable Energy Production: Renewable energy alludes to energy sources that undergo natural replenishment and have minimal environmental impact. These sources provide a cleaner alternative to fossil fuels and help reduce greenhouse gas emissions. Primary sources of renewable energy include:

Solar Energy: Among all energy resources, solar energy is the most plentiful and accessible, even during overcast conditions. The pace at which the Earth captures solar energy surpasses humanity's energy consumption rate by 10,000. Solar innovations yield warmth, cooling, organic illumination, power, and fuels for diverse uses. These technologies convert sunlight into electric energy using photovoltaic panels or mirrors concentrating solar rays. The manufacturing expense of solar panels has experienced a sharp decline over the past decade, rendering them budget-friendly and frequently the most economical electricity option. Solar panels maintain a lifespan of approximately 30 years and are available in various hues.

Wind Energy: Wind energy captures the dynamic force of moving air by utilizing expansive wind turbines positioned on land (onshore) or bodies of sea- or freshwater (offshore).to generate electricity. While wind energy has been harnessed for centuries, onshore and offshore wind technologies have advanced in recent years to optimize electricity generation with taller turbines and larger rotor diameters.

Hydroelectric Power: The power of water descending from elevated regions is tapped to create electricity via hydroelectric power. It is generated from reservoirs and rivers. Reservoir-based hydro plants use stored reservoir water, energy.

Bioenergy: Bioenergy arises from diverse organic substances, termed biomass, encompassing wood, charcoal, dung, and other fertilizers for heat and power generation, as well as crops for liquid biofuels. The energy produced by combusting biomass does emit greenhouse gases, albeit at reduced levels compared to the combustion of fossil fuels like coal, oil, or gas. Nevertheless, the use of bioenergy should be restricted to specific applications due to the potential negative environmental consequences associated with extensive growth in forest and bioenergy plantations, leading to deforestation and alterations in land use.

3. Waste Management and Recycling: With modern technology, industries and households can adopt a zero-waste lifestyle by separating recyclable waste from non-recyclable ones. The unsorted waste can be divided into a fraction for recycling and another for fuel. The primary output is in liquid form, as nutrients from the waste dissolve and contribute to biogas production. Additionally, there are emerging recycling techniques that offer solutions to the issue of plastic waste. For example, chemical recycling uses chemical processes to break plastic waste into valuable chemical constituents. These elements can be transformed into fuel or used to create plastic products for future use. Effective waste management and recycling practices contribute to a cleaner and improved environment.

4. Water purification: Over the years, there have been massive cases of water wastage in various states. While natural processes recycle water, innovative green technologies can accelerate this for a sustainable future. Surface and groundwater face the risk of overuse, potentially surpassing supply demands. According to the United Nations Water Agency (UN Water), over 80% of society's wastewater goes to the ecosystem without reusing or treating it. Water purification advances like microbial fuel cells, membrane filtration, natural treatment systems, and biological treatment aim to render water drinkable and mitigate pollutants in rivers and seas.

Some Innovations at the Renewable Resources Centre

Smokeless Charcoal from Agro-forestry Wastes: A wood charcoal kiln produces smokeless charcoal from simple dry wastes like leaves, grass, and crop residues. This eco-friendly solution addresses waste management while providing an alternative to traditional charcoal production methods.

Waterless Urine Diversion and Composting Toilet: They have the technology to implement a composting toilet system that utilizes urine diversion and waterless technology. This novel approach minimizes water usage, improves waste composting efficiency, and advances sanitation practices.

Biogas Utilization at the Household Level: To promote biogas as a household energy source, the RRC advocates adopting biogas-based technologies, including lamps, electricity generators, and cooking solutions. This sustainable energy option harnesses organic waste to generate clean and renewable biogas.

Resource Recovery and Effective Utilization: RRC prioritizes resource recovery through initiatives such as creating organic fertilizer and plastic pellets from waste materials and producing bricks using nylon waste. By maximizing the potential of discarded resources, the centre contributes to circular

economy principles and reduces environmental impact

Criteria for Selection of Green Technologies

Green technology encompasses the wisdom of safeguarding the natural environment and resources while minimizing human intervention. Nevertheless, universally embracing all available technologies without accounting for country-specific advantages and limitations is neither feasible nor necessary. The selection of tools and techniques as appropriate technology is essential in helping communities decide their future. In essence, suitable technology seeks innovations that foster fair income distribution, human advancement, and ecological excellence. The suggested criteria encompass the following.

1. System Independence: The technological device can do the required job alone. Whether the technology will require relatively more capital or labour will be analyzed to check the system independence of the technology.

2. Image of Modernity: People should perceive themselves as modern by adopting technology. The message is people's realization that technological devices can elevate the user's social status and need a basic human need. The image of modernity requires that the social status of people who adopt it either increases or remains unchanged.

3. Individual Technology vs Collective Technology: The careful assessment of the technology is based on a group approach and becomes more systems-dependent. A society geared towards individual or single-family units will need more systems-independent technology. Collective technologies are more easily adopted as collective action reduces transaction costs.

4. Cost of Technology: Affordability of the technology is an essential indicator for their broader use since cost is the primary factor in encouraging or discouraging the application of appropriate technology in developing economies.

5. Risk Factor: It is important to find out how smoothly technology works in the local production system and system that explains to what degree the technology system is dependent or independent. This indicates the need for understanding the internal and external risks. Although risk analysis is necessary before applying new technology, it is almost impossible to remove all risks.

6. Evolutionary Capacity of Technology: If the chosen device is static, it will relatively reflect the short-lived solutions to a much larger problem. The technology, which supports the continuation of development by enhancing the capability to expand, can be expected to adapt and transform over time.

7. Single-Purpose and Multi-Purpose Technology: In contrast to single-purpose technology, multi-purpose technologies are the ones that furnish a variety of applications.

Recommendations

The recommendations are grouped into three action areas:

I. Generating new sources of revenues to fund green technologies.

II. Intensifying dialogue on existing national green policies

III. Spurring new international cooperation on green technologies.

1. Generate novel revenue streams to finance green technological initiatives:

Green technologies are not yet price-competitive with fossil-fuel technologies. Governments must help with cutting-edge clean technologies and create the framework conditions that enable renewable-energy companies to bring their products to the market. Hence, a vital task of any government must be to generate new sources of private and public revenues. Governments incentivize additional private investment in clean-technology research and projects where possible.

2. Intensify dialogue on existing national green policies:

Individual countries could profit from other countries' experiences. We should replicate best practices while avoiding mistaken paths .At the centre of the discussion should be the following topics:

I. Extend public procurement of clean technology. Large-scale government purchases and deployments of green technologies will reduce the public sector's carbon footprint and spur private investment.
II. Lead the way by cutting taxes on green products and sending a strong message to countries. Once the public budget allows for such a measure, more tax deduction incentives for green services and products should be given.

3. Spur new international cooperation on green technologies:

Considering the various international communiques, the following steps should be taken to create a more effective framework for international clean technology cooperation:

I. Create a Clean Tech Investment Forum: The online forum would serve as a one-stop hub with an efficient search system connecting public money, private investors, and clean tech businesses/entrepreneurs at one's fingertips.

II. Harmonize green technology standards, codes, and contractual principles: Supranational harmonization of standards is vital in enabling the uptake of eco-innovation and clean technologies and facilitating their dissemination in global markets. Regulations and standards are often more effective than direct government funding.

III. Create a best-practices expert panel on green technologies: An international panel comprising stakeholders and proficient experts to delineate and counsel on optimal practices. The committee should account for diverse regional, geographical, and socioeconomic nuances across countries and sub-regions to exemplify effective policy frameworks that stimulate green technology adoption.

IV. Improve the knowledge-sharing ability of multi-industry, multi-technology clean, tech research centres: No centralization of research should be pursued; instead, a bundling of expertise from leading universities and institutes to enhance cooperation between regional research centres.

V. Define legitimate forms of public "green" aid and reduce environmentally harmful subsidies: Uniform definitions of legitimate green objectives for state aid will help avoid judicial challenges. Various countries should take the initiative to ensure that public spending achieves climate goals without running afoul of state-aid rules and trading agreements.

VI. Open and sustain the markets for green technologies through better trade policy: To facilitate the expansion of the cleanest technologies, trade barriers for proven clean technologies should be lifted; this also entails stopping direct subsidies. Or hidden subsidies to manufacturers.

Conclusion

Green technology is gaining global traction, with China spearheading investments and Nigeria witnessing a surge in sustainability-focused start-ups. This burgeoning market presents worldwide opportunities for businesses and investors committed to ecological well-being. A promising domain within green tech is renewable energy. The nexus of AI and green tech holds promise in addressing pressing environmental issues while enhancing productivity, efficiency, and sustainability.

Africa stands at the precipice of a transformative era in green technology, poised to leverage its vast potential for positive change. With a green tech footprint characterized by significant renewable energy potential, energy efficiency prospects, waste management challenges, and pressing water conservation needs, the continent faces both imperatives and opportunities.

"As the African Development Bank (2023) notes, Renewable energy, with its impressive capacity of over 170,000 terawatt-hours per year, outstripping current energy demands, offers Africa a pathway to a sustainable energy future. Addressing an estimated energy efficiency gap of 20% to 40% promises substantial energy savings through enhanced practices. The staggering annual waste production of 2 billion tons, largely unrecycled, necessitates dedicated waste management infrastructure for resource recovery and environmental preservation. Furthermore, proactive water conservation strate

gies are indispensable, with over 600 million individuals lacking access to safe drinking water.

In pursuing these solutions, Africa has undertaken commendable initiatives, including investment in renewable energy projects, advocacy for energy efficiency measures, development of waste management systems, and implementing of water conservation efforts.

There are several ways that Africa can continue to leverage green tech to its advantage. These include:

- **Generating more clean energy:** Africa can use its abundant renewable energy resources to generate more clean energy, which will help to reduce its reliance on fossil fuels and improve air quality.
- **Creating jobs:** The green tech sector is a significant job creator, and Africa can tap into this potential to create jobs and boost economic growth.
- **Improving infrastructure:** Green tech can improve Africa's infrastructure, such as its power grid and transportation system. This will make it easier for people and goods to move around and also help reduce greenhouse gas emissions.
- **Protecting the environment:** Green tech can be used to protect Africa's environment, such as by reducing deforestation and water pollution. This will help to preserve the continent's natural resources for future generations.

Individually, we can contribute by embracing eco-conscious lifestyles, leveraging solar power and minimizing carbon footprints. By doing so, we play a role in preserving our planet and fostering a healthier world.

Africa's strategic positioning makes it a prospective green tech leader, and these ventures can contribute significantly to sustainable development. Our collective action can propel Africa into a leadership role within the green tech movement, positively impacting our environment and society.

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