



Green Economics for Viksit Bharat: Balancing Sustainability and Growth by 2047

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ABSTRACT

This research paper explores the concept of Green Economics within the context of India's vision for a Viksit Bharat (Developed India) by 2047. Green economics refers to an economic framework that seeks to integrate ecological sustainability with economic growth. The paper examines how India can leverage green economic strategies to meet its sustainable development goals (SDGs) while achieving its aspirations of becoming a developed nation. It addresses the importance of balancing growth with environmental preservation and proposes policies that could foster green innovation, sustainability in agriculture, industry, and urban development, and a transition to a low-carbon economy. The paper also discusses the role of technology, government policies, and social participation in this journey towards a sustainable and prosperous India by 2047.

Keywords: Green Economics, Viksit Bharat, Sustainable Development, Economic Growth, Policy Framework, Clean Technologies, Sustainability, 2047

INTRODUCTION

As India approaches its centenary year of independence in 2047, the vision of "Viksit Bharat" emphasizes holistic development, combining economic prosperity with sustainability. Green economics plays a pivotal role in ensuring growth aligns with ecological preservation. India's rapid industrialization and technological advancements have brought significant opportunities but also challenges like climate change and biodiversity loss. As a signatory to global agreements such as the Paris Accord and Sustainable Development Goals, India is committed to ambitious targets, including reducing carbon intensity and expanding renewable energy. Initiatives like the International Solar Alliance reinforce India's leadership in sustainability. Achieving "Viksit Bharat" demands high economic growth with a reduced ecological footprint, innovative policy frameworks, and active collaboration among

government, private sector, and civil society. This paper explores these aspects, offering a roadmap to balance growth with sustainability and position India as a global model for ecological and economic harmony.

2. Green Economics: Concepts and Relevance:

Green economics is an economic philosophy that emphasizes the interdependence of economic systems, social equity, and environmental sustainability. It seeks to shift the focus from traditional, growth-centric economic models to a framework that balances human well-being, ecological health, and economic prosperity. Rooted in the principles of resource conservation, equitable distribution, and intergenerational justice, green economics has gained prominence as nations grapple with the dual challenges of economic growth and environmental degradation.

2.1 Defining Green Economics:-

Green economics revolves around the idea of creating a regenerative economy—one that not only minimizes harm to the environment but actively works to restore ecological balance. Its core tenets include:

- Prioritizing renewable resources over finite ones.
- Reducing waste through circular economic models.
- Internalizing environmental costs into economic decisions.
- Promoting social inclusion and addressing inequalities exacerbated by traditional economic systems.

At its heart, green economics advocates for a holistic understanding of prosperity that transcends GDP and incorporates metrics such as well-being, ecological stability, and social equity.

2.2 Evolution of Green Economic Thought:-

The origins of green economics can be traced back to the environmental movements of the 20th century, which challenged the notion of infinite growth on a finite planet. Key milestones in the evolution of green economic thought include:

- **1960s-1970s:** The publication of works such as *Silent Spring* by Rachel Carson and *The Limits to Growth* by the Club of Rome highlighted the unsustainability of unchecked industrial growth.
- **1987:** The Brundtland Report introduced the concept of sustainable development, defining it as “development that meets the needs of the present

without compromising the ability of future generations to meet their own needs.”

- **1990s:** The emergence of ecological economics as a discipline, integrating insights from environmental science, sociology, and economics.
- **2000s-2020s:** Global recognition of the urgency to combat climate change, exemplified by the Kyoto Protocol, the Paris Agreement, and the United Nations’ Sustainable Development Goals (SDGs).

These milestones underline the growing realization that economic systems must align with ecological limits to ensure long-term viability.

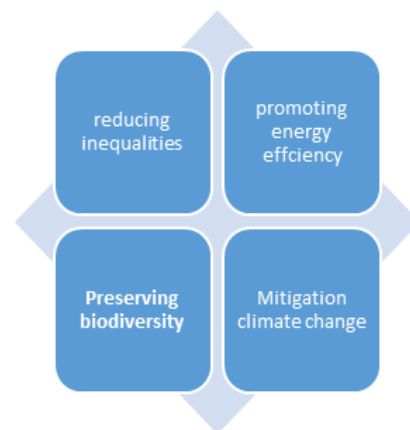
2.3 Principles of Green Economics:-

Key principles underpinning green economics include:



2.4 The Global Relevance of Green Economics:-

The relevance of green economics has grown in light of escalating environmental crises such as climate change, deforestation, biodiversity loss, and pollution. Green economic policies address these challenges by:



2.5 The Indian Context:-

India’s adoption of green economic principles is both a necessity and an opportunity. With its abundant natural resources, large workforce, and vibrant entrepreneurial ecosystem, India is uniquely positioned to lead the global transition to green economics. Key areas of focus include:

- Expanding renewable energy capacity
- Promoting sustainable urbanization.
- Encouraging sustainable agriculture

By embedding green economics into its development strategies, India can chart a path toward sustainable prosperity that not only benefits its citizens but also contributes to global environmental stability.

3. India's Current Economic and Environmental Landscape

India, as the world's fifth-largest economy by nominal GDP and a major global player in trade, industry, and innovation, stands at a critical juncture. The nation's impressive economic growth over the past few decades has lifted millions out of poverty, spurred urbanization, and positioned India as a hub for technological advancement.

3.1 India's Economic Growth Trends:-

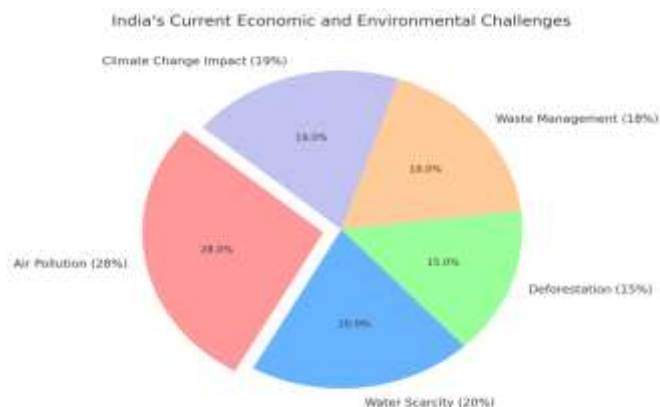
India's economy has experienced robust growth, driven by industrialization, digital transformation, and a burgeoning services sector. Key indicators of economic performance include:

- **GDP Growth:** India's GDP grew at an average annual rate of approximately 6-7% over the last two decades, with projections suggesting sustained growth in the coming decades.
- **Demographic Dividend:** With over 65% of its population under the age of 35, India enjoys a demographic advantage that supports economic productivity and innovation.
- **Urbanization:** Rapid urbanization has led to the expansion of cities, contributing significantly to GDP while increasing energy demand and resource consumption.
- **Industrial Expansion:** Sectors like manufacturing, construction, and IT services have propelled India's economic development.

Despite these achievements, economic disparities persist, with wealth concentrated among a few and significant portions of the population still engaged in informal and low-paying jobs. Furthermore, reliance on resource-intensive industries has compounded environmental challenges.

3.2 India's Environmental Challenges:-

India faces a range of environmental challenges, many of which are direct consequences of its economic development model:



3.3 Energy Mix and Dependence on Fossil Fuels :-

India's growing energy needs are largely met by fossil fuels, particularly coal, oil, and natural gas. Key statistics include:

- Coal Dependency
- Renewable Energy Growth
- Electrification

3.4 Urbanization and Its Ecological Footprint:-

India's urban population is projected to grow from 35% in 2021 to over 50% by 2047.

- Urban Heat Islands
- Transportation Emissions
- Infrastructure Stress

3.5 Agriculture and Rural Challenges:-

Agriculture remains the backbone of India's economy, employing nearly 50% of the workforce. However, it faces significant sustainability challenges:

- Soil Degradation
- Water Use
- Climate Impact

3.6 India's Policy Landscape for Sustainability:-

The Indian government has introduced several policies and initiatives to address environmental challenges and promote sustainable development:

- **National Action Plan on Climate Change (NAPCC):** Launched in 2008, the NAPCC includes eight missions focused on areas such as solar energy, energy

efficiency, sustainable agriculture, and water conservation.

- **Renewable Energy Initiatives:** Programs like the National Solar Mission aim to increase India's renewable energy capacity, targeting 500 GW by 2030.
- **Afforestation Efforts:** The Green India Mission seeks to increase forest cover and restore degraded ecosystems.
- **Electric Mobility Push:** The Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme incentivizes electric vehicle adoption.

3.7 Opportunities for Green Growth:-

Despite these challenges, India is uniquely positioned to lead the global green economy for several reasons:

- Abundant Natural Resources
- Technological Innovation
- Entrepreneurial Spirit
- Global Leadership

4. The Vision of Viksit Bharat by 2047:-

The vision of a *Viksit Bharat* (Developed India) by 2047 is deeply embedded in the aspirations of the nation's leadership, its people, and its future generations. In this section, we will explore the multifaceted aspects of what a "Viksit Bharat" would entail, focusing on economic development, social inclusion, and, crucially, environmental sustainability. Green economics plays an essential role in shaping this vision, balancing growth with ecological stewardship.

4.1 Goals for a Developed India :-

India's 2047 vision integrates economic growth, inclusivity, and environmental sustainability:

1. **Economic Growth:** Achieve \$5 trillion economy by 2025, \$10 trillion by 2035; transition to sustainable industrial and service sectors; ensure inclusive development in rural areas, healthcare, education, and employment.
2. **Environmental Sustainability:** Target net-zero carbon emissions by 2070; implement circular economy principles; conserve biodiversity through protected areas and sustainable agriculture.
3. **Technological Advancements:** Focus on green technologies for renewable energy, sustainable

agriculture, clean transport, and smart, eco-friendly urban planning.

4.2 Role of Green Economics in Achieving Viksit Bharat :-

Green economics is vital for realizing India's vision of Viksit Bharat by promoting sustainability alongside economic growth:

1. **Decoupling Growth from Environmental Harm:** Advocates for economic development through renewable energy, sustainable farming, and green urbanization to protect resources.
2. **Driving Innovation:** Encourages innovation in renewable energy, electric vehicles, and agriculture, fostering new markets and lowering carbon footprints.
3. **Circular Economy:** Implements reuse, reduce, and recycle strategies to tackle resource depletion and waste management.
4. **Green Jobs:** Generates employment in renewable energy, waste management, and sustainable agriculture, supported by workforce upskilling.

This approach combines economic efficiency, resource conservation, and job creation to drive India's sustainable development.

4.3 Challenges in Achieving Viksit Bharat 2047:

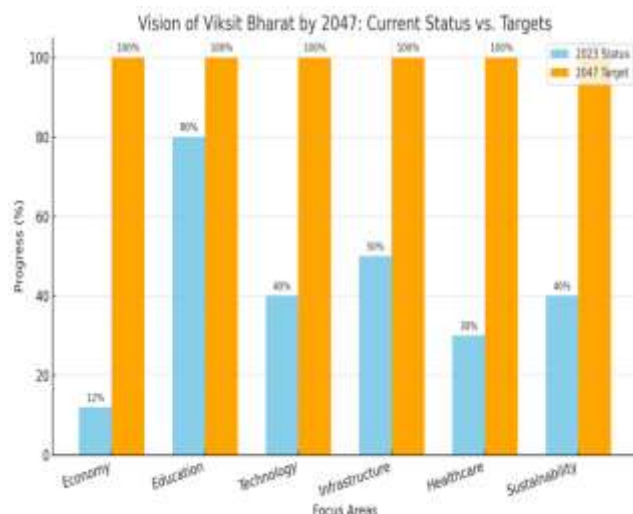
1. **Political and Policy Stability:** Long-term goals require consistent policies and effective law enforcement.
2. **Financial Constraints:** Significant investments in green technology demand domestic and international funding.
3. **Infrastructure Gaps:** More advancements are needed in renewable energy, transportation, and waste management systems.

India must address these challenges to achieve sustainable growth and global climate goals.

In conclusion, achieving a *Viksit Bharat* by 2047 involves building a robust economic structure that is resilient to environmental challenges. Green economics is central to this vision, offering solutions that promote sustainability, innovation, and inclusive growth. By focusing on decoupling growth from environmental harm and fostering green technologies, India can emerge as a global leader in sustainable development.

Table: Key Targets for Viksit Bharat 2047:-

Focus Area	Current Status (2023)	Target for 2047
Economy	\$3.7 trillion GDP	\$30 trillion GDP
Education	80% literacy rate	100% literacy and global ranking
Technology	Emerging in AI and Space	Global leader in AI, Space, Green Tech
Infrastructure	50% urbanization	100% smart cities and robust transport
Healthcare	1 doctor per 1,511 people	1 doctor per 800 people
Sustainability	40% renewable energy contribution	80% renewable energy contribution



5. Policy Frameworks for Green Economics:-

The policy landscape plays a pivotal role in steering a nation's economic trajectory toward sustainability. For India to realize its aspirations of "Viksit Bharat" (Developed India) by 2047, the integration of green economic principles into policy frameworks is essential. Green economics promotes an economic system that fosters growth while maintaining ecological balance, addressing climate change, and ensuring resource conservation.

5.1 Existing Policies and Their Impact:

India has established various frameworks balancing development with sustainability:

- National Action Plan on Climate Change (NAPCC):** Launched in 2008, it includes eight missions targeting areas like solar energy, energy efficiency, and sustainable agriculture. The solar mission has notably positioned India as a renewable energy leader.
- Renewable Energy Initiatives:** Targets include 500 GW non-fossil fuel capacity by 2030, supported by policies like the FAME Scheme and Ujjwala Yojana.
- State-Level Green Policies:** States like Gujarat and Tamil Nadu lead in renewable energy, while Kerala focuses on sustainable tourism and agroforestry.
- Green Taxation and Subsidy Systems:** Incentives like EV subsidies, tax credits for solar installations, and carbon taxes promote green adoption.
- Environmental Clearances and Regulation:** Acts like the Environment Protection Act and Air Pollution Act regulate economic activities' environmental impacts, overseen by the MoEFCC.

5.2 Proposed Policy Framework for Green Economics in India:

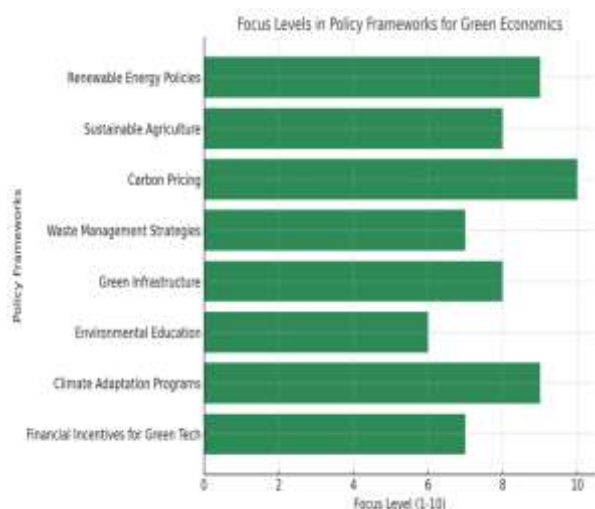
To achieve "Viksit Bharat" by 2047, the following strategies are proposed:

- National Green Growth Strategy (NGGS):** Focus on resource efficiency, renewable energy transition, circular economy, and sustainable agriculture and water management.
- Green Tax Reforms:** Introduce carbon taxes and environmental taxation to promote green technologies and reduce pollution.
- Green Finance and Investment:** Encourage green bonds, public-private partnerships, and stronger Environmental Impact Assessments (EIAs).
- Urban Sustainability:** Prioritize smart cities, renewable energy integration, waste management, and expanding sustainable public transport networks like electric buses and metro rails.
- Education and Research:** Invest in education, research, and training to foster sustainable practices and green innovation.
- Community-Based Initiatives:** Empower rural communities to manage natural resources and create sustainable livelihoods.

To ensure the realization of a green and prosperous "Viksit Bharat" by 2047, it is imperative that India refines its policy frameworks to embed sustainability at the core of its economic agenda. This will require strong

Table: Policy Frameworks for Green Economics

Framework/Policy Area	Description	Focus Level (1-10)
Renewable Energy Policies	Incentives and regulations to promote the adoption of renewable energy sources.	9
Sustainable Agriculture	Practices and subsidies supporting eco-friendly farming techniques.	8
Carbon Pricing	Taxes or trading systems to internalize carbon emissions' environmental cost.	10
Waste Management Strategies	Policies for recycling, waste reduction, and circular economies.	7
Green Infrastructure	Investments in eco-friendly public infrastructure and urban planning.	8
Environmental Education	Initiatives to raise awareness and train people in sustainable practices.	6
Climate Adaptation Programs	Policies addressing climate change resilience in communities and industries.	9
Financial Incentives for Green Tech	Subsidies and tax breaks for green innovation and businesses.	7



leadership, inter-sectoral coordination, long-term vision, and the active participation of all stakeholders—government, industry, civil society, and citizens. Through integrated policy reforms, India can achieve both rapid economic growth and ecological sustainability, setting a global example for green economic transformation.

6. Successful Green Economic Models:-

6.1. Introduction to Green Economic Models:

Green economics emphasizes the integration of environmental sustainability with economic growth. Several countries and regions around the world have implemented successful models where economic growth was achieved without compromising environmental health. These models can provide valuable lessons for India as it strives to develop sustainably by 2047.

6.2. Indian Case Studies of Green Economic Models:-

6.2.1 Tamil Nadu: Renewable Energy Leader

Tamil Nadu excels in wind energy (7,000 MW capacity, 40% of India's total) and solar initiatives. Strong policies and investments, including subsidies and tax benefits, have made it a model for other states. It demonstrates scalable renewable energy solutions for nationwide adoption.

6.2.2 Sikkim: Organic Farming Pioneer

Sikkim, India's first fully organic state, integrates sustainable agriculture with economic growth through organic certification, eco-tourism, and increased farmer income. It highlights the potential of organic farming and sustainable land management for rural development.

6.2.3 Andhra Pradesh: Renewable Energy Integration

Andhra Pradesh leverages hybrid solar-wind projects and grid modernization to optimize renewable energy use. It also invests in green industries like electric vehicles. This model exemplifies balanced energy mixes and infrastructure upgrades for green economic progress.

6.3 Key Takeaways for India's Green Economic Future:

- **Government Leadership:** Strong policies, incentives, and regulatory frameworks are essential for a green transition.
- **Private Sector Role:** Public-private partnerships are crucial for financing and scaling green technologies.
- **Community Movements:** Grassroots initiatives in agriculture and waste management empower local communities to achieve sustainability goals.
- **Technological Innovation:** Investments in renewables, EVs, and green industries can drive economic growth and environmental sustainability.

By integrating these successful models into India's development strategy, the country can effectively balance sustainability with economic growth, paving the way for a prosperous and green Viksit Bharat by 2047.

7. Technological Innovations Driving Green Growth :-

Green technologies offer the potential to transform industries, create jobs, and contribute significantly to addressing global environmental challenges, such as climate change, resource depletion, and pollution.

7.1 Smart Grids and Energy Storage:

The deployment of **smart grids** and **energy storage systems** is essential for enabling the transition to renewable energy. A smart grid utilizes digital communication technology to monitor and manage electricity distribution efficiently. It allows for better integration of renewable energy sources, reduces transmission losses, and optimizes energy usage.

7.2 Sustainable Agriculture Technologies:

Agriculture is a critical sector for India's economy, but it is also one of the most resource-intensive and environmentally damaging sectors. Technological innovations in agriculture can increase productivity while reducing the environmental footprint, particularly in water and chemical usage. Eg; Precision Agriculture, Vertical Farming, Drones and AI

7.3 Green Transportation Technologies:

Transportation is one of the largest contributors to air pollution and greenhouse gas emissions globally. India's rapidly growing urban population and increasing vehicle ownership make the transition to green transportation technologies even more critical. Innovations in electric vehicles (EVs), alternative fuels, and public transportation systems can help reduce emissions and promote sustainability.

7.4 Circular Economy Technologies:

The circular economy concept aims to minimize waste and make the most of available resources by reusing, recycling, and repurposing materials. Technological innovations play a vital role in supporting the transition to a circular economy. Eg: Waste-to-Energy Technologies, Recycling Technologies, Product Life Extension

7.5 AI, IoT, and Big Data for Sustainable Development

- **AI in Sustainability:** AI optimizes processes, predicts trends, and supports climate modeling, energy management, and resource optimization for sustainable decisions.
- **IoT for Efficiency:** IoT sensors enhance resource monitoring in cities, buildings, and infrastructure, reducing pollution and improving sustainability through real-time data.
- **Big Data:** Enables environmental monitoring by analyzing satellite and sensor data to address deforestation, pollution, and biodiversity challenges, driving effective policymaking.

Technological innovations are at the heart of India's transition to a green economy. From renewable energy solutions to sustainable agriculture and transportation technologies, India has the potential to leapfrog traditional models of growth and embrace a future defined by sustainability. Leveraging these innovations will be key to balancing economic growth with environmental protection, ensuring a prosperous and sustainable India by 2047.

8. Role of Stakeholders: Government, Private Sector, and Civil Society:-

To achieve "Viksit Bharat" by 2047, collaboration between key stakeholders is essential:

1. **Government:**
 - Creates policies and regulations to enable sustainable practices.
 - Provides incentives for green initiatives while regulating harmful practices.
2. **Private Sector:**
 - Drives economic growth through innovation in clean technologies and sustainable investments.
 - Adopts green business practices to support the green economy.
3. **Civil Society:**
 - Advocates for sustainability, holding the government and private sector accountable.
 - Engages in grassroots initiatives and influences policy.

In this context, collaboration across sectors not only accelerates the transition to a green economy but also builds a broad base of support for sustainability initiatives. Effective collaboration will require open communication, shared goals, and mutual trust between

stakeholders, all of which are fundamental to the success of a green economy in India by 2047.

9. Measuring Progress: Green Indicators:-

Green indicators are essential tools that help policymakers, businesses, and the general public track the performance of green economic initiatives, as well as pinpoint areas that need improvement.

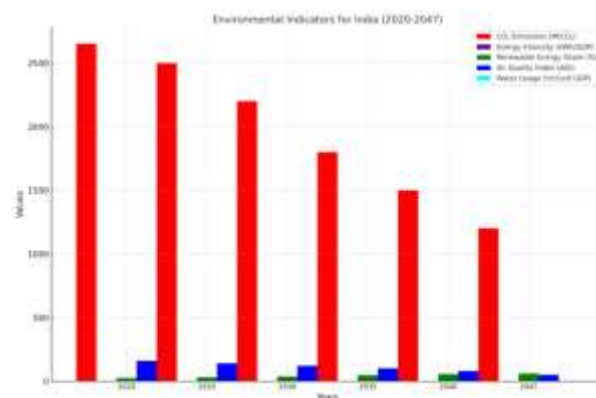
9.1.1 Environmental Indicators

Table 1: Environmental Indicators for India (2020-2047)

Indicator	2020	2025	2030	2035	2040	2047
CO ₂ Emissions (in MtCO ₂)	2,650	2,500	2,200	1,800	1,500	1,200
Energy Intensity (kWh per GDP)	0.80	0.75	0.70	0.65	0.60	0.50
Share of Renewable Energy (%)	24	30	35	45	55	60
Air Quality Index (AQI)	160	140	120	100	80	50
Water Usage (m ³ per unit GDP)	1.5	1.4	1.3	1.2	1.0	0.8

9.1 Key Green Indicators

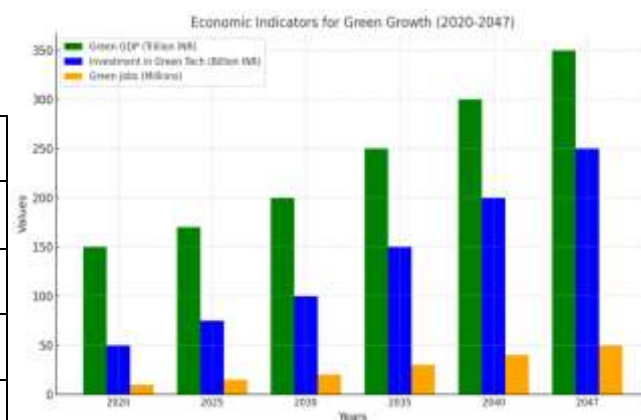
The key green indicators for tracking the balance between sustainability and economic growth can be categorized into **environmental, economic, and social** dimensions. Each of these indicators provides valuable insights into different aspects of India's progress toward a green economy.



9.1.2 Economic Indicators:-

Table 2: Economic Indicators for Green Growth (2020-2047)

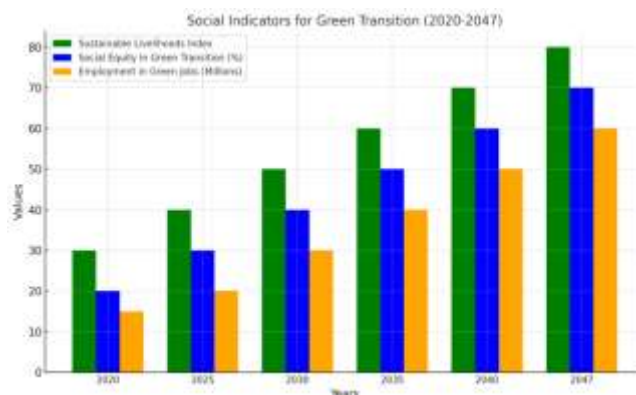
Indicator	2020	2025	2030	2035	2040	2047
Green GDP (in trillion INR)	150	170	200	250	300	350
Investment in Green Technologies	50	75	100	150	200	250
Circular Economy Index	25%	35%	45%	55%	65%	75%
Green Jobs Created (millions)	10	15	20	30	40	50



9.1.3 Social Indicators:

Table 3: Social Indicators for Green Transition (2020-2047)

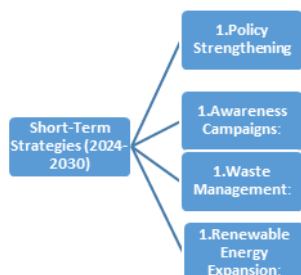
Indicator	2020	2025	2030	2035	2040	2047
Sustainable Livelihoods Index	30	40	50	60	70	80
Social Equity in Green Transition (%)	20	30	40	50	60	70
Employment in Green Jobs (millions)	15	20	30	40	50	60



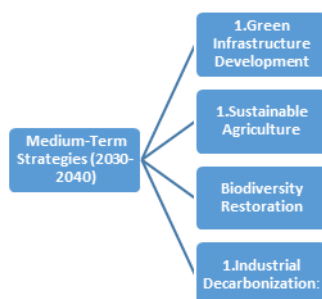
10. Strategic Recommendations:-

Achieving a balance between sustainability and economic growth for a "Viksit Bharat" by 2047 requires a comprehensive and multi-faceted strategy. Below are key actionable steps categorized into short-term, medium-term, and long-term initiatives, complemented by a pie chart illustrating the distribution of focus across key sectors.

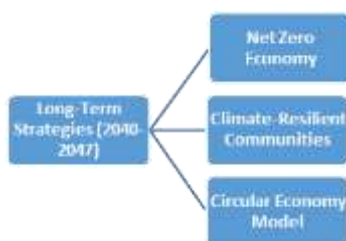
10.1 Short-Term Strategies (2024-2030)



10.2 Medium-Term Strategies (2030-2040):-



10.3 Long-Term Strategies (2040-2047):-

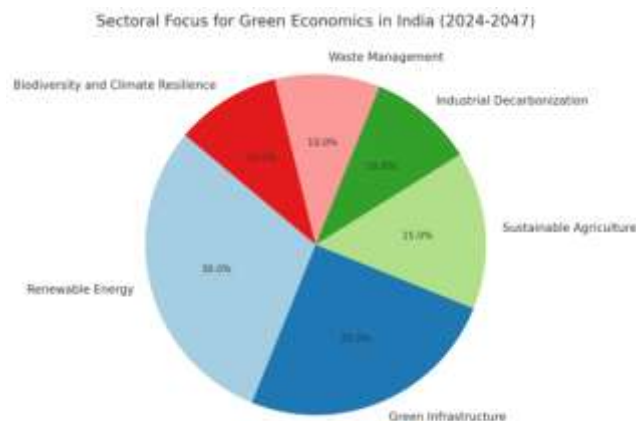


10.4 Sectoral Focus Breakdown:-

To ensure effective implementation, India must allocate resources across key sectors. Below is a pie chart representing the recommended focus distribution:

1. Renewable Energy – 30%
2. Green Infrastructure – 25%

3. Sustainable Agriculture – 15%
4. Industrial Decarbonization – 10%
5. Waste Management – 10%
6. Biodiversity and Climate Resilience – 10%



CONCLUSION

India's journey toward becoming a developed nation by 2047 demands a harmonious balance between economic growth and sustainability. Green economics serves as a guiding framework for integrating environmental conservation into development strategies. Leveraging its young workforce, renewable energy resources, and technological capabilities, India is well-positioned to lead global sustainability efforts. Key actions include strengthening environmental policies, investing in renewable energy, promoting eco-friendly agriculture, and fostering community engagement. By adopting measurable green indicators and transparent policies, India can monitor progress and adapt strategies effectively. This collective effort will enable India to achieve its 2047 vision while serving as a global leader in sustainable and inclusive development. India's 2047 vision requires balancing economic growth and sustainability through green economics. Key actions include stronger policies, renewable energy investments, eco-friendly agriculture, and community engagement. Leveraging its strengths, India can lead in global sustainability and ensure inclusive, measurable progress toward "Viksit Bharat 2047."

Conflict of Interest: The author declares no conflict of interest in relation to this research.

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