

The Challenges of India's Economy Shift from Economic Growth to Green Growth

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Abstract

The challenge of India's shift from economic growth to green growth is understanding the relevance of green financial initiatives in the context of green economic growth. After a thorough analysis of India's economy, it is found that green finance is helping to transform into a green economy. Gross domestic product, economic growth, green growth, green finance, green energy, poverty, and an environmentally friendly economy are the indicators of the study. We collected data from various types of journals, different websites, reports, and government information. The first and foremost thing India needs is enormous economic growth to be able to pull millions of people from below the poverty line. It may be able to upgrade the rank of GHI, HDI, and per capita income. For this reason, India's carbon emissions are likely to grow at the fastest pace in the world over the next two to three decades. Overall, at the end of 2022, India achieved 68% of its 175 GW renewable installed power capacity target for 2022. "Greenwashing" is also a big issue for India.

JEL Classification: O1, O2, O23, F13 and F51

Keywords: Gross Domestic Product, Economic Growth, Green Finance, and Green Energy

1. Introduction

"The Challenges of India's Economy Shift from Economic Growth to Green Growth", is to understand the relevance of green financial initiatives in the context of green economic growth. Nowadays, there is a buzz in the newspapers, public talk shows, conferences, and seminars, which raises the level of intensity and requires in-depth analysis of green finance to transform into a green economy. To understand the dynamics of green finance and its trend pattern, a proper analysis of the subject is vital. It is predicted that there won't be any glaciers left on Earth by 2050. The ice melting would lead to frequent floods, a notable sea level rise, etc. over the next 20 years (Kerr, 2013). It is also predicted that making the transition to a low-carbon, climate-resilient economy and, more broadly, to "green growth" will necessitate significant investment and, as a result, private sources of capital on a much larger scale than before, especially given the current state of government finances (Boissinot et al., 2016). In order to assist in the commercialization of novel technology and address carbon market shortcomings, government regulations are required.

The economic growth of any country is determined by the economic conditions that exist, which include the reduction of poverty and the generation of employment opportunities, which provide a direct deadline for economic growth. Above all, traditional methods have exploited the natural environment and faced drastic climate change, which has reduced their ability to curtail the needs of future generations. As a result, growth with sustainability has become considerable, and a large quantity of money is necessary to undertake economic reform programs.

Meaning of Economic Growth:

We have seen as time passes each nation has faced three developmental stages: 1) Economic Growth, 2) Economic Development, and 3) Green Growth.



"Economic growth is an increase in the production of economic goods and services, compared from one period of time to another," is the definition at Investopedia. Economic growth is, in a limited sense, an increase in national income per capita, and it entails an analysis of this process, particularly in quantitative terms, with a focus on the functional relationships between the endogenous variables; in a broader sense, it entails an increase in GDP, GNP, and NI, and thus of national wealth, including production capacity, expressed in both absolute and relative terms (Kuz'minov & Khokhlov, 2016).

The Meaning of Economic Development:

Economic development is a more comprehensive notion with qualitative components. Economic development entails both economic growth and gradual improvements in a few key factors that affect how well-off a population is, such as health and education (Clausen, 1985).

The Meaning of Green Growth:

Twenty years after the first Rio Summit, the world faces a dual challenge: extending economic opportunities for all in the context of a growing global population and tackling environmental constraints that, if left ignored, threaten our ability to embrace these chances. Green growth is where these two issues intersect, and it is about capitalizing on the possibilities to realize both simultaneously (Nazarova & Yuldasheva, 2023). According to the OECD Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. Development that is sustainable cannot be replaced by green growth. Instead, it offers a realistic and adaptable strategy for making demonstrable, concrete progress across its economic and environmental pillars while fully taking into consideration the social repercussions of greening economies' growth dynamics (**Official Website of Organization of Economic Cooperation and Development, n.d.**). The main goal of green growth plans is to make sure that natural resources can sustainably fulfill their full economic potential. This potential includes the ability to provide the basic necessities of life, such as clean water and air, as well as the robust biodiversity required to support food production and human health. Green growth policies consider the fact that natural resources are not infinitely replaceable (Kaushiva, 2016).

2. Review of Literature

2.1 Theoretical Perspective

From the theoretical perspective of the shifting from economic growth to green growth through financial development on the carbon emissions of developing countries, scholars have presented contradictory viewpoints. The following elements of financial development may contribute to a reduction in carbon emissions: (1) Businesses must regularly upgrade their manufacturing technology and equipment, which depends on proper financial backing, in order to lower production costs and improve the competitiveness of their products on the market. By efficiently reducing their financial constraints, a developed financial system might assist businesses in completing these projects, which would indirectly lower energy costs and lower carbon emissions. (2) In order to combat environmental degradation, governments typically implement a variety of eco-friendly initiatives, support a general industrial transition, and encourage the use of clean energy. The financial institutions could provide the necessary funding for the operation of these projects or programs based on the appropriate policy arrangement, which could help to strengthen the energy infrastructure and ultimately cut carbon emissions. (3) The companies that are listed on the stock market are often excellent companies that have a big impact on the national economy. They must regularly disclose information as required by the stock exchange, and the public and financial authorities are strictly in charge of monitoring them. This forces them to project a positive image by, for example, taking on the social responsibility of environmental conservation by using eco-friendly technologies that could cut down on carbon emissions. These could be referred to as the financial development's "negative effects" on carbon emissions (**Tamazian et al., 2009, Dasgupta et al., 1998**).

Others believe that financial development contributes to an increase in carbon emissions because of the subsequent factors: (1) A well-functioning financial system could efficiently address the issue of information asymmetry, expand financing channels, and allow businesses to obtain lending capital at significantly lower costs, enabling them to expand their production scale (by adding a new production line, renting more equipment, and hiring more workers, for example), which would significantly increase carbon emissions; (2) In addition, as the financial sector develops, more and better consumption credit services may be made available to consumers, facilitating their intertemporal spending and encouraging them to buy more goods like homes, cars, and other electric equipment. These would significantly encourage the growth of social consumption and boost carbon emissions. (3) The stock market typically serves as a key indicator of economic health. Strong stock market performance frequently signals rapid economic expansion and prosperity, which in turn greatly boosts consumer and business confidence and stimulates the production and consumption of goods, increasing energy use and carbon emissions. These are known as the "positive effects" of financial development on carbon

emissions (Chen et al., 2013). In this study, researchers show that economic progress and development are important, but they shouldn't come at the expense of the environment. Limited natural resources exist, so they are becoming harder to find as a result of their constant and careless use. Environmental contamination brought on by industrial emissions is another issue, though social inclusion and environmental management should go hand in hand with economic progress (Parvadavardini & Nagarajan 2014). The study covers current developments as well as potential prospects and difficulties in green finance in developing India. Green investing strives to enhance human welfare and social fairness while lowering environmental risks and enhancing ecological integrity. It also acknowledges the value of the environment and its natural capital. The government, the finance industry, the technology development industry, and the consumer groups all play different parts in the orchestra that is green growth. India today has the chance to develop in a way that lowers the costs of environmental deterioration, which in turn opens up a wide range of options for the country's financial sector (Parvadavardini & Nagarajan, 2014). The researcher investigates the challenges of green finance to achieve 175 GW of renewable energy by 2022, focusing primarily on renewable energy in India, and how this can impact the green growth of the Indian economy by analyzing various energy mix installed capacities and the compound annual growth rate of power generation capacity in India. Furthermore, the researcher focused on financing and lending agencies such as the National Clean Energy and Environment Fund, soft loans from IREDA, green banks, green bonds, and the Infrastructural Debt Fund. The researcher also studies how institutional and policy-level complications affect the renewable energy target and explains the most expensive destination for renewable energy investment (Shafique et al., 2018). In this study, the researcher attempts to ascertain the significance of green financing for economic growth, which directs the flow of finance from the public, private, and non-profit sectors. This researcher investigated the numerous green financing channels for contributions in India and proposed several solutions to overcome these barriers to financing green items on the market (Kabir, 2019). This study was conducted to analyze the current state of green funding in India and its influence on startups. For several years, India has been on a path towards green project finance, with considerable changes made to the country's financial industry to embrace environmentally friendly practices. Businesses are the motor of the economy, and implementing sustainable business practices is important to achieving carbon neutrality. With that said, affluent countries bear the major duty of aiding emerging economies such as India (Bhatnagar et al., 2022). This research study examines the impact of green finance and financial technologies on green growth. This research demonstrates that green finance has a major impact on finance structure, financial efficacy, and environmental quality protection development. Based on the findings, the current research paper makes policy recommendations to policymakers and the Government of India, such as strengthening the integration of fintech growth with green finance, developing a high-quality environmental disclosure outline to guide state governments in improving the effectiveness of green finance, and developing a long-term satisfactory protocol as an outside involvement proceeding to encourage green finance in the non-public sector (Nenavath & Mishra, 2023).

2.2 Empirical Research

Scholars have extensively researched the relationship between financial development and carbon emissions using various models and samples, but there is still no agreement among these studies. The empirical study generally takes three basic positions: financial development decreases carbon emissions, increases carbon emissions, and takes other perspectives.

2.2.1 Financial development reduces carbon emissions

Using panel data from 24 transition economies from 1993 to 2004 and a system generalized method of moments (GMM) estimate, investigate the connection between financial progress and environmental degradation. They come to the conclusion that financial development in transitional economies contributes to environmental transparency and can lower carbon emissions (Tamazian & Bhaskara Rao, 2010). It is discovered that financial development can reduce carbon emissions based on the time series data from South Africa for 1965–2008 and using the autoregressive distributed lag (ARDL) bounds testing approach for the cointegration and error correction method. This suggests that financial reforms can be introduced to help maintain or improve the environment (Shahbaz et al., 2013). Data was used from 12 Middle East and North African (MENA) nations for the years 1990–2011 and the simultaneous equation panel data model to investigate the relationship between financial development and carbon emissions. The findings indicate that more advanced financial systems may contribute more to energy conservation research and development, which can foster technical advancements and ultimately result in lower carbon emissions (Zhang et al., 2015). A system GMM model and time series data for 19 emerging economies from 1990 to 2013 to study the impact of financial development on carbon emissions. The empirical findings show that financial development has had a long-term negative influence on carbon emissions, which suggests that financial development could help to slow down environmental degradation (Saidi & Mbarek, 2016).

2.2.2 Financial development increases carbon emissions

Empirical techniques and a few financial development proxy variables have been used to argue that financial growth is one of the primary causes that contribute to rising carbon emissions in China. The study also finds that when compared to other indicators of financial development, the level of financial intermediation has the most notable impact on carbon

emissions (Zhang, 2011). Using a panel-pooled FMOLS model to analyze the relationship between financial development and carbon emissions in 23 selected European nations and come to the conclusion that financial development may ultimately lead to higher carbon emissions (Al-Mulali et al., 2020). With quarterly data from Q1 1985 to Q4 2014 and a derived comprehensive index of financial development based on bank and stock-market variables, have investigated the asymmetric impact of financial development on carbon emissions in Pakistan. The findings suggest that positive shocks from financial development in the banking sector may boost carbon emissions; this suggests a unidirectional causal relationship (Shahbaz & Mafizur Rahman, 2014).

2.2.3 Non-linear Relationship

The ARDL approach and an error correction-based Granger causality test to examine the relationship between financial development and carbon emissions in the United States from 1960 to 2010, and they conclude that, while financial development may affect output, it has no long-term effect on carbon emissions. Similarly, Charfeddine and Kahia discover that financial development has only a minor impact on carbon emissions using the panel vector autoregressive (PVAR) model and data from 24 MENA nations from 1980 to 2015 (Dogan & Turkekul, 2015). Using the Durbin-Hausman test and the common correlated effects (CCE) approach investigated the relationship between stock markets and carbon emissions in 23 developed and 20 emerging market countries from 1992 to 2011. They find that the influence of the stock market on carbon emissions differs between developed and emerging market countries. More specifically, the stock market indices have a favorable impact on emerging market countries while having a negative impact on developed countries' carbon emissions (Paramati et al., 2017).

2.3 Rationale Behind the Study

Every nation seeks to grow rapidly, and due to this, pollutant emissions are neglected thereby environmental pollution is getting worse, the world's temperature is rising with an average of 1.15°C as compared to the pre-industrial level (1850-1900), and the ecological environment in which we live is under a lot of stress. How would increasing the per capita income, raising the standard of living of individuals, uplifting from below the poverty level, creating job opportunities, improving health issues, and, at the same time reducing carbon emissions for the protection of the environment be big challenges for India. Even though this idea has a significant influence on people's daily decision-making and purchasing habits, the analysis of investment patterns and their implications for financial market volatility is due to the substantial direct and indirect influence that green finance has on investment and related decision-making. The study attempts to examine the attitude of uneducated investors, consumers, and entrepreneurs by making them aware of green growth and its challenges. India is the third-largest greenhouse gas emitter in the world. According to the Climate Change Performance Index 2023, India has been ranked 8th out of 63, thanks to its low emissions and the increasing use of renewable energy. According to the Ministry of Environment, Forest and Climate Change 2022, the Government of India has articulated and put across the concerns of developing countries at the 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Glasgow, United Kingdom (“Functional Linguistics Analysis of China Daily on Climate Change in Attitude Towards 26th United Nations Climate Change Conference (COP26),” 2022, (Home | the Official Website of Ministry of Environment, Forest and Climate Change, Government of India, 2022) Further, India presented the following five nectar elements (Panchamrit) of India’s climate action:

- ⇒ Reach 500 GW of non-fossil energy capacity by 2030.
- ⇒ 50 percent of its energy requirements will come from renewable energy by 2030.
- ⇒ Reduction of total projected carbon emissions by one billion metric tonnes from now to 2030.
- ⇒ Reduction of the carbon intensity of the economy by 45% by 2030, over 2005 levels.
- ⇒ Achieving the target of net zero emissions by 2070.

Major Takeaways from COP-27 (2022)	Role of India in COP-27
Lose and damage fund	Long- term low Emission Development Strategy (LT-LEDS)
AWARE (Action on Water Adaptation or Resilience)	In our LIFETIME campaign
Infrastructure Resilience Accelerator Fund (IRAF)	Leadership for Industry Transition (LeadIT) summit
Global shield plan	MoEFCC – UNDP Compendium

Technology Mechanism	BASIC Ministerial Meet
Global Offshore Wind Alliance (GOWA)	Mangrove Alliance Climate (MAC)

2.4 Objectives of the Study

The objective of this research is to analyze and identify the impediments, possibilities, and challenges that India faces as it transitions to more sustainable and environmentally friendly economic growth. This study attempts to assess the potential economic, social, and environmental benefits of such a shift while also shedding light on the policies, tactics, and best practices that can be used to support green growth in India. The study also intends to emphasize the important parties involved in promoting and supporting the transition to green growth, such as the government, civil society, the commercial sector, and international organizations.

3. Research Methodology

3.1 Research Design

This study employs a descriptive and cross-sectional research design. The study of green growth was undertaken because it is a crucial topic, particularly in the case of India. In this study, there was no use of statistics, techniques, and tools.

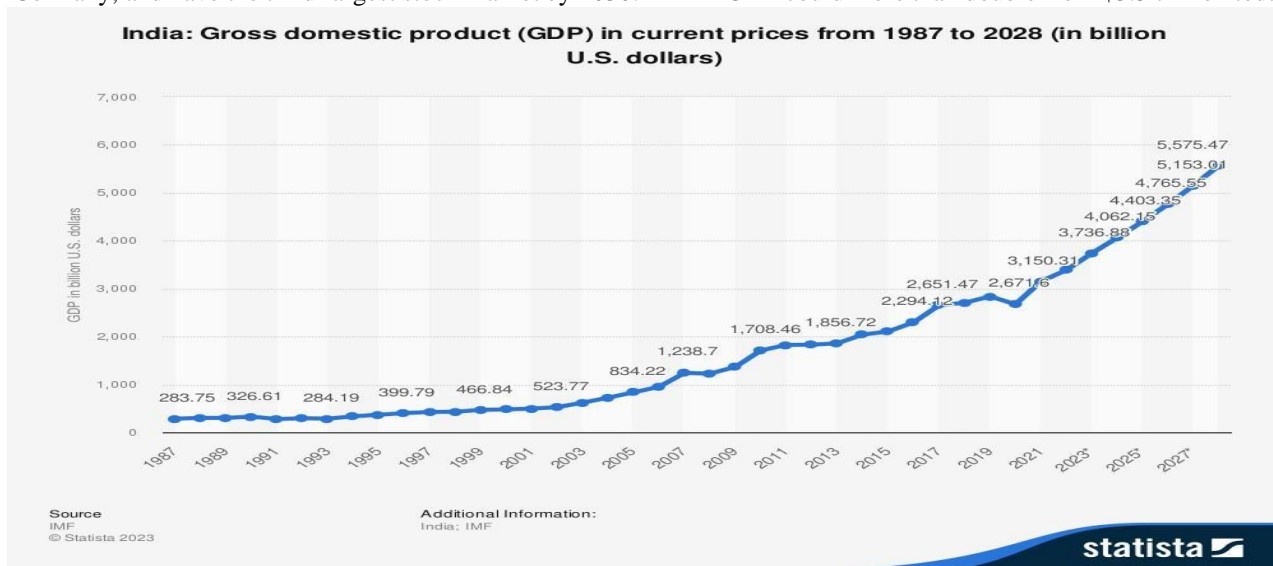
3.2 Data and Sources of Data Collection

To complete this research work, we have collected data through various types of journals, different websites, reports, world organizations, and government information such as the ministry, IMF, World Bank, etc. To come to the findings and conclusion, we looked over a variety of public government reports and academic studies. As a result, this review concentrates on a qualitative interpretation of each paper's findings.

4. Descriptive Analysis

4.1 Economic Growth in India

India is already the fastest-growing economy in the world, having clocked 5.5% average gross domestic product growth over the past decade. India is on track to become the world's third-largest economy by 2027, surpassing Japan and Germany, and have the third-largest stock market by 2030. India's GDP could more than double from \$3.5 trillion today



Source: IMF @ Statista

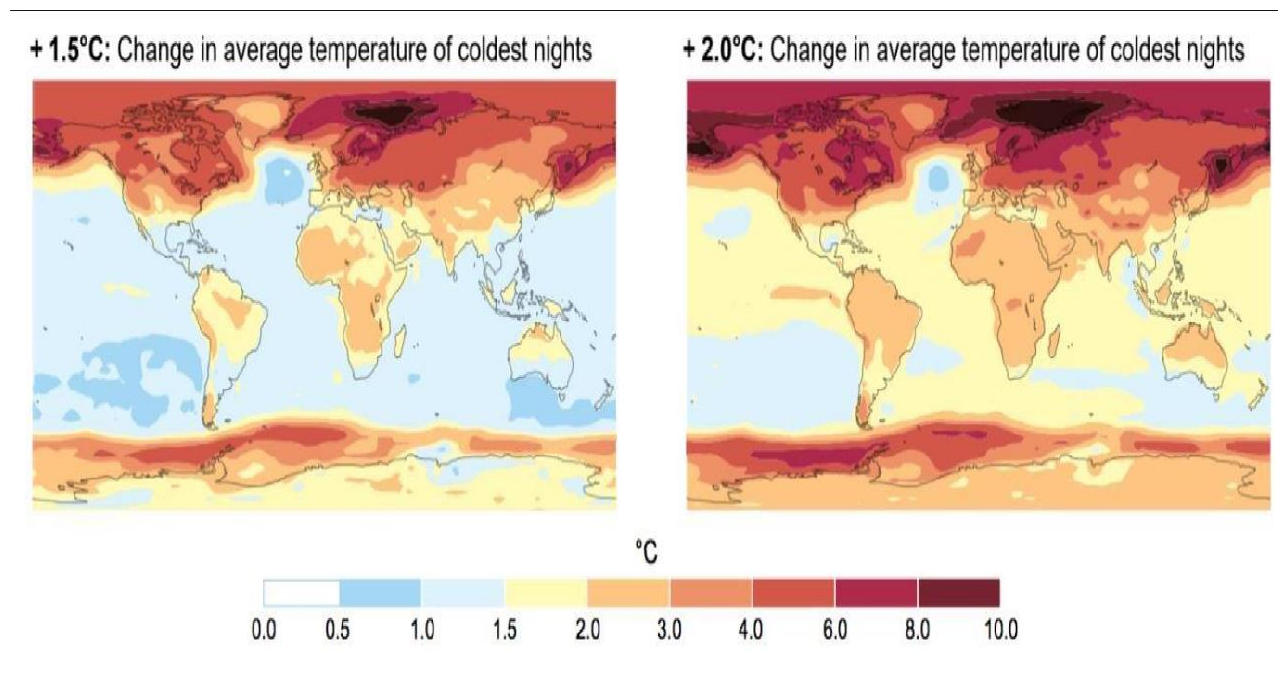
to surpass \$7.5 trillion by 2031. Its share of global exports could also double over that period, while the Bombay Stock Exchange could deliver 11% annual growth, reaching a market capitalization of \$10 trillion in the coming decade. By nominal GDP, it is the fifth-largest economy in the world, and by purchasing power parity (PPP), it is the third-largest. India ranked 139th by nominal GDP and 127th by nominal GDP (PPP) by per capita income, respectively (**International Monetary Fund - IMF, 2023**). In India, the COVID-19 pandemic has primarily had a disruptive effect on the economy. According to the Ministry of Statistics, India's growth decreased to 3.1% during the final quarter of the fiscal year 2020. According to the Chief Economic Advisor to the Government of India, the impact of the coronavirus epidemic on the Indian economy is the main cause of this decline. The World Bank claims that the current pandemic has "magnified pre-

existing risks to India's economic outlook" because India had been experiencing a pre-pandemic recession as well (Pratibha & Krishna, 2022).

4.2 The Green Growth of India

The idea of "green growth" and related ideas came forth as a result of the realization that, during the previous 250 years, economic progress has primarily come at the expense of the environment, which is a prerequisite for economic activity. One theme of Rio+20 is the green economy in the context of sustainable development and poverty eradication. Green growth can be seen as a way to pursue economic growth and development while preventing environmental degradation and as a means to achieve a green economy. Notably, the rate of growth in worldwide GHG emissions from 2000 to 2010 was greater (2.2% per year) than from 1970 to 2000 (1.3% per year), rising by 3.5 percent in 2010 and 2011 before dropping from 2012 to 2013 (1.8% per year) (Adamowicz, 2022).

Since roughly 1800, carbon dioxide emissions have been steadily rising on a global scale. Then, between 2014 and 2016, the world's CO₂ emissions remained largely constant, raising hopes that emissions were beginning to decline. Then, however, emissions started to increase once more in 2017, as well as in 2018 and 2019. Since 2010–11, the rate of growth in CO₂ emissions in 2018 was the highest (Tnani, 2018). Just to be clear, emissions are still increasing despite all the well-intentioned efforts and the signing of the Paris Agreement in 2016 to reduce CO₂ emissions. The Paris Agreement seeks to limit the increase in global temperatures this century to 2 degrees Celsius, or, if possible, 1.5 degrees. Significant adjustments will be needed. By 2100, if existing trends continue, the temperature will rise by 3.7 degrees Celsius. 2019 saw an increase in the average worldwide temperature of roughly 1.1 degrees Celsius compared to pre-industrial levels. And the temperature is rising. There is little chance of keeping increases to 2 degrees Celsius given current trends. Even three degrees will be difficult (Kraaijenbrink et al., 2017).



Source: Projected changes for average temperatures with 1.5C and 2C of global warming, compared to pre-industrial levels. Image: A Degree of Concern: Why Global Temperatures Matter, NAS

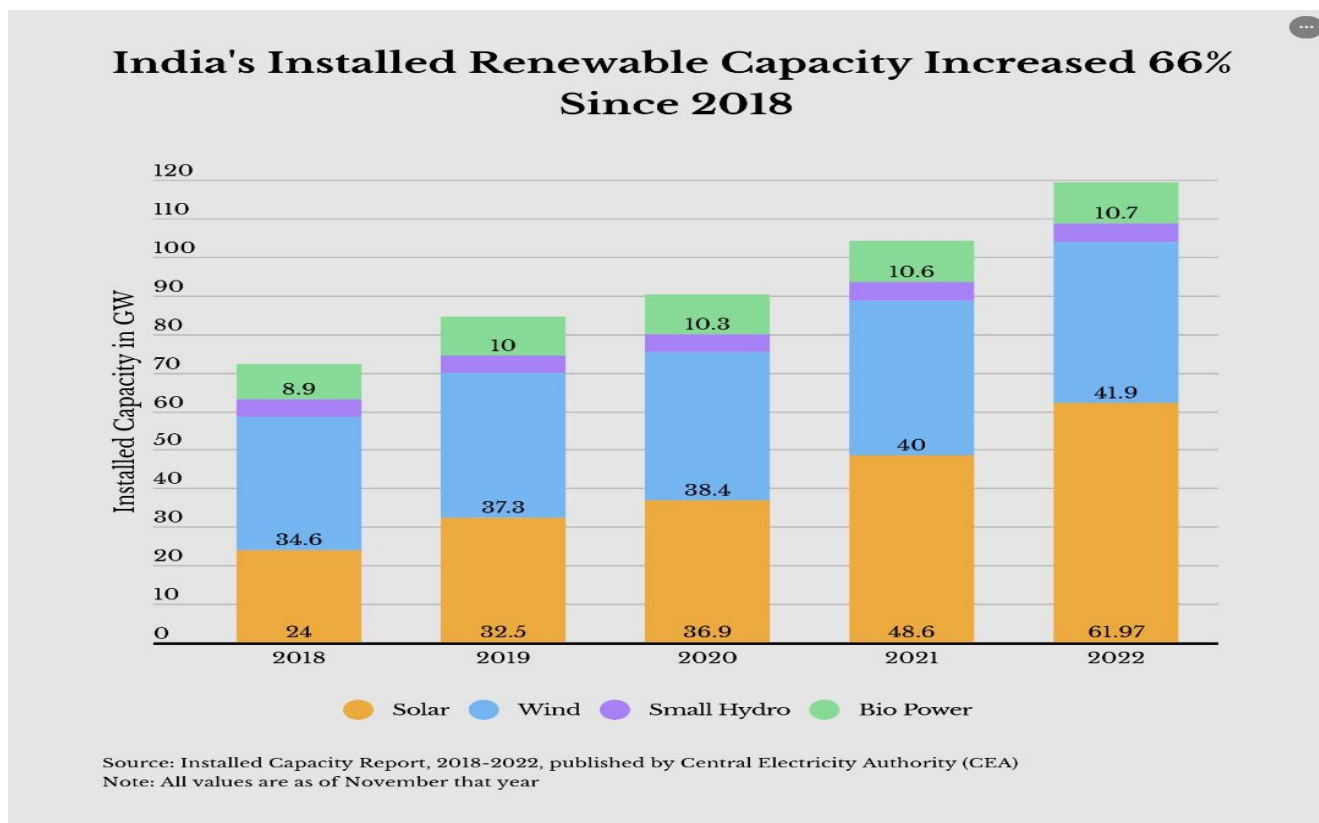
Even though India has benefited greatly from its recent rapid economic growth, the environment has suffered, exposing the population to acute air and water pollution and facing climate change; thereby, the effect of global warming is devastating. In order to prevent the cycle of environmental deterioration, resource depletion, and global warming, green growth techniques are required.

4.2.1 Green Growth in the Energy Sector

Green growth is one of the seven top priorities of the Union Budget 2023–24 for ushering in green industrial and economic transition, environmentally friendly agriculture, and sustainable energy in the country. India is the third-largest consumer of electricity worldwide. According to the REN21 Renewables 2022 Global Status Report, India ranks fourth globally

for installed renewable energy capacity (including large hydro), fourth for wind power capacity, and fourth for solar power capacity.

The goal was to install 175 gigawatts of renewable energy capacity in the nation by the year 2022, which was set in 2015. 100 gigawatts from solar energy, 60 gigawatts from wind energy, 10 gigawatts from bioenergy, and 5 gigawatts from small hydropower were included in this. By the end of 2022, India will have reached only 119 gigawatts. Out of this, 62% of the solar power goal (62 gigawatts of the projected 100 gigawatts), 70% of the wind power target (42 gigawatts of the 60 gigawatts), 107% of the bio-power target (10.7 gigawatts), and 98% of the small hydropower sector target (4.9 gigawatts) had been met.



Source: Central Electricity Authority

The early renewable energy objective excluded major hydropower projects (those with capacities greater than 25 megawatts). However, in 2019, India modified its definition of renewable energy, including large hydro. As of April 30, 2023, renewable energy sources, including large hydropower (46.85 GW), have a combined installed capacity of 172.52 GW.

Table of Renewable Energy installed as of 30.04.2023

Small Hydro power	Wind Power	Bio-Power	Solar Power	Total capacity
4.94 (GW)	42.86 (GW)	10.8 (GW)	67.07 (GW)	125.67 (GW)

Source: Author self-created from Central Electricity Authority

4.2.2 Green Growth Initiatives

⇒ **PM KUSUM:** The Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyan (PM-KUSUM) Scheme aims to

provide Indian farmers with energy security. By doing so, it is upholding India's Intended Nationally Determined Contributions (INDCs), which call for increasing the installed capacity of electric power from non-fossil fuel sources to 50% by 2030. The scheme was launched in 2019 with three components:

- Component-A: Setting up 10,000 MW of decentralized grid-connected renewable energy power plants on barren land.
- Component-B: Installation of 17.50 lakh stand-alone solar agriculture pumps. Component-C: Solarization of 10 lakh grid-connected agriculture pumps.

⇒ **Gobardhan Yojana:** India has the capacity to produce 1.5 lakh cubic meters of gas and 10 billion cubic meters of biogas from Gobar (cow dung), which together may make up to 8% of the country's total city gas supply. The Gobardhan Yojana, which was introduced in 2018, is a crucial part of India's biofuel plan. The Gobardhan Yojana, which the government has stated it plans to implement, will see the construction of 500 new waste-to-wealth facilities. The Department of Drinking Water and Sanitation, part of the Jal Shakti ministry, is responsible for implementing the Galvanizing Organic Bio-Agro Resources Dhan (GOBAR-DHAN) program as part of the Swachh Bharat Mission Gramin-Phase 2 initiative.

⇒ **India's vehicle scrapping policy:** This is an essential component of the green growth strategy since it makes room for a fleet of cleaner vehicles. The Vehicle Scrappage Policy, which went into effect on August 13, 2021, is a government-funded initiative to replace outdated automobiles on Indian roads with new and modern models. The new policy mandates that passenger vehicles and commercial vehicles older than 20 years must be demolished if they fail the fitness and emission tests. The goal of the policy is to lower emissions, provide employment possibilities, and increase demand for new cars. Our circular economy is given fresh life by the reuse, recycle, and recovery ideas.

⇒ **PM PRANAM:** Through the Prime Minister Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth (PRANAM), the government would encourage and provide support for one crore farmers to switch to natural farming. This program's primary goals are to lessen the usage of chemical fertilizers and encourage a balanced use of chemicals, encourage green development, and lessen the harmful effects on the environment.

⇒ **Green Credit Programme:** The Environment (Protection) Act will be used to notify the public of a Green Credit program designed to promote behavioral change. This would encourage ecologically responsible behavior on the part of businesses, people, and local organizations while also assisting in the mobilization of additional resources for such initiatives.

⇒ **MISHTI and Amrit Darohar:** MISHTI, or the "Mangrove Initiative for Shoreline Habitats and Tangible Incomes," is a collaboration between MGNREGA, the CAMPA Fund, and other funding sources that aims to plant mangroves wherever it is practical along the shoreline and in salt pan areas. In order to "encourage optimal use of wetlands and enhance biodiversity, carbon stock, eco-tourism opportunities, and income generation for local communities," Amrit Darohar is a new initiative that will be put into place over the course of the next three years.

⇒ **National Green Hydrogen Mission:** On January 4, 2023, the Union Cabinet gave its approval to the National Green Hydrogen Mission. India ranks third globally in terms of both hydrogen production and consumption. The National Green Hydrogen Mission's main goal is to establish India as the world's center for the production, use, and export of green hydrogen and its byproducts. To meet these goals, the mission will develop the capacity to manufacture five million metric tons (MMT) of green hydrogen annually by 2030, and with the expansion of export markets, that amount might rise to ten MMT annually. A total of Rs 19,744 crore will be spent initially on the Mission, with Rs 17,490 crore going toward the SIGHT program, Rs 1,466 crore going toward pilot projects, Rs 400 crore going toward research and development, and Rs 388 crore going toward other Mission components.

⇒ **Mission Innovation:** PM Modi introduced Mission Innovation (MI) and the International Solar Alliance at COP21 in 2015, when he received the 'Champions of Earth Award 2018.' by the United Nations. PM Modi coined the term 'Mission Innovation'. Mission Innovation (MI) is a worldwide project launched by 23 countries and the European Commission (on behalf of the European Union) to accelerate the Clean Energy Revolution and progress toward the Paris Agreement's targets and net zero pathways. India was a founding member of Mission Innovation. The first phase of Mission Innovation (MI) (2015-2020) was unveiled at COP21 on November 30, 2015. During the first phase of Mission Innovation, India led three MI Innovation Challenges, including Smart Grids, Off Grid Access to Electricity, and Sustainable Biofuels, and sponsored numerous workshops.

⇒ **India's G20 Priorities:**

1. Green Development, Climate Finance & LiFE: India's commitment to climate change, with a special emphasis on climate financing and technology, as well as enabling equitable energy transitions for poor countries. The LiFE movement was launched, which encourages environmentally conscious actions based on India's sustainable traditions.

2. Accelerated, Inclusive & Resilient Growth: Focus on sectors with the potential to drive structural transformation, such as assisting small and medium-sized firms in global commerce, promoting labor rights and welfare, closing the global skills gap, and developing inclusive agricultural value chains and food systems.

3. Accelerating Progress on SDGs: Recommitment to attaining the goals outlined in the 2030 Agenda for Sustainable Development, with a special emphasis on mitigating the effects of the COVID-19 pandemic.

4. Technological Transformation & Digital Public Infrastructure: Promoting a human-centric approach to technology and increasing knowledge sharing in areas such as digital public infrastructure, financial inclusion, and tech-enabled growth in agriculture and education.

5. Multilateral Institutions for the 21st Century: Efforts to reform multilateralism and build a more accountable, inclusive, and representative international system capable of meeting 21st-century issues.

6. Women-led Development: Emphasis on inclusive growth and development, with a focus on women's empowerment and representation, to enhance socioeconomic development and meet the SDGs.

4.3 Challenges of Green Growth

In order for India to meet its sustainable development goals, the economy should keep expanding. However, for a nation like India, where development is essential, the impact on the environment could be significant since it will severely restrict the availability of natural resources including land, water, minerals, and fossil fuels, which will increase the cost of energy and other commodities. The degree to which an economy "grows green" will depend on its capacity to gradually cut down on the number of resources needed to support economic growth that improves social fairness and generates job opportunities. Green growth might be crucial in balancing these demands. However, managing fiscal deficits and public debts is a major issue for determining national policy, which can make the technological shift necessary for green growth more challenging. The macroeconomic policy of India will continue to be heavily influenced by fiscal and trade balance factors. Therefore, it becomes crucial to comprehend and maximize the development advantages of green growth interventions across all important sectors, including things like income, energy availability, and commerce.

4.3.1 Financial Sector

- **Current and future levels of competitiveness:** Both activity-specific and country-specific constraints that have a negative impact on the attractiveness of such investments in terms of investment returns and risk management limit private investment in green growth in developing nations. The amount that private investment in green growth increases will depend on how appealing these investments are in comparison to other local and foreign opportunities. The governments may need to implement a number of public actions to make green investment prospects more alluring because international investors can search across different countries for opportunities (Thompson, 1995).
- **Market distortions and shortcomings:** The market price of energy will continue to be distorted by fossil fuel subsidies and the failure to internalize environmental externalities, making it difficult for investments in green energy to generate profitable returns for investors. The restricted availability of diverse green financing products and the marketplaces on which they can be exchanged only serve to exacerbate the situation.
- **Limited capital and limited awareness:** Small and medium-sized firms frequently have restricted liquidity and capital access, which makes it difficult for them to participate in the green financing market. Another major barrier to private investment is the current narrow time horizon of company strategy, which neglects the benefits of green industries that will only become apparent in the very distant future. The lack of professionals who comprehend the intricate connection between environmental concerns and financial markets only serves to exacerbate the situation.
- **Regulatory gaps:** The lack of an adequate regulatory and technical infrastructure to evaluate, assess, and analyze green business strategies and funding is another hurdle to the growth of green finance. When government plans are uncertain, the private sector is unwilling to invest. Uncertainty about project risk and profits is brought on by an unpredictable policy. A stable policy framework that offers direction, and certainty, and motivates investors to make long-term green investments is necessary.
- **Low Profitability of Green Businesses:** Because polluting businesses have lower costs and higher returns than green sectors, the private sector is more likely to invest in them. Additionally, because green investments are long-term in nature, investors find them less alluring.

- **The mechanism for evaluating the viability of green industries:** Investors like to fund ventures that have a good chance of making money. There is no established method for selecting green projects that can be funded economically. Due to the lack of consideration given to both positive and negative externalities when determining a project's viability, conventional initiatives appear to be more viable than green ones.

4.3.2 Energy Sector

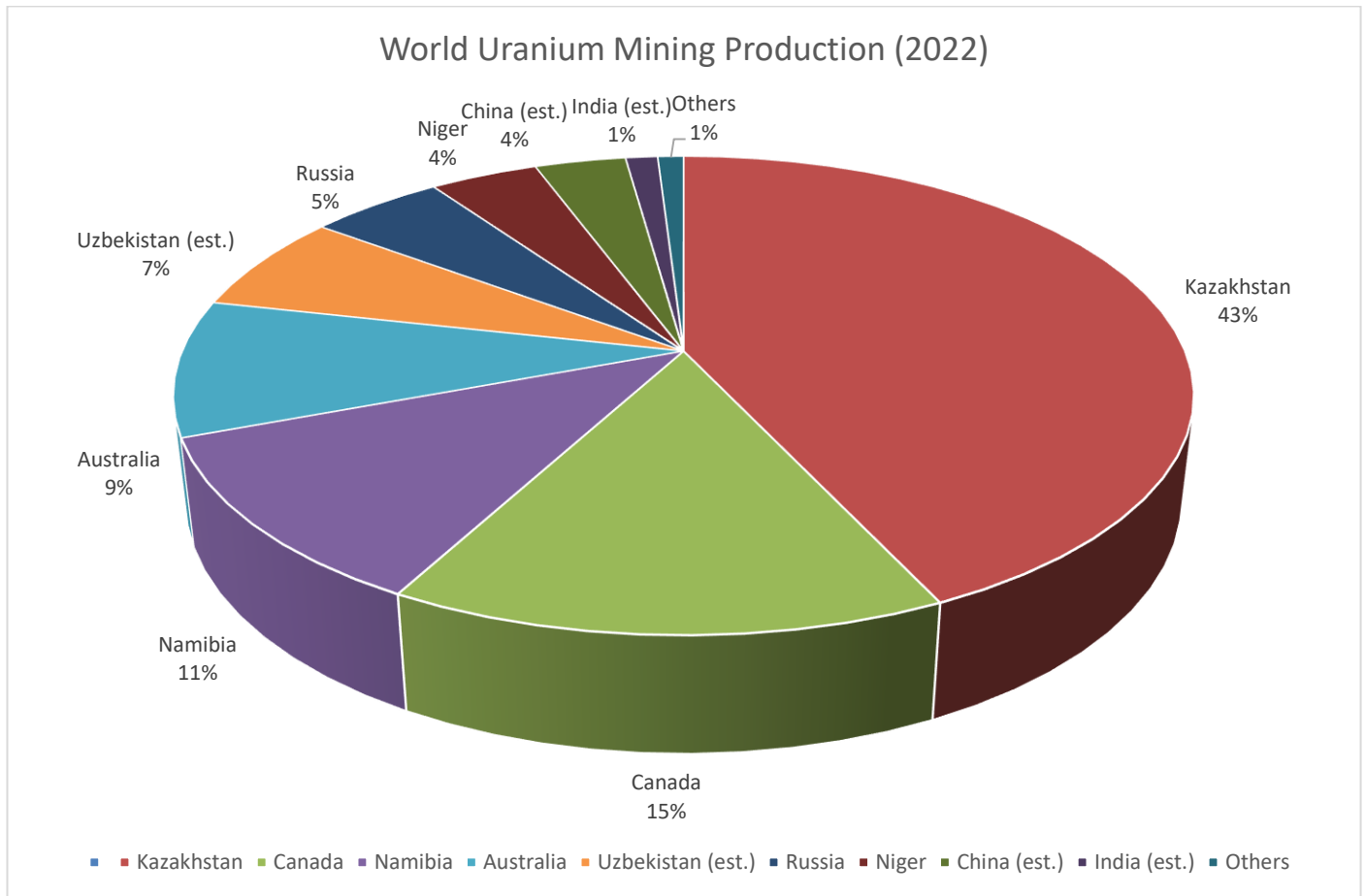
At the time of independence in 1947, the total power installed capacity was only 1362 MW (as compared to now 416.59 GW), out of which the share of total non-fossil fuel is 43%. The government has set an ambitious goal of installing 500 GW of renewable energy by 2030, including the installation of 280 GW of solar power and 140 GW of wind power, in order to usher in a green revolution in the nation. The earlier target, which was promised by the Modi government in 2015 from renewable sources excluding large hydropower (175 GW), had been achieved by 2022. Still, the target is not achieved. Only 125 GW are fulfilled right now.

Total Power Installed Capacity (As of 30.04.2023)

Fossil Fuel Energy	Non-Fossil Fuel Energy		Total
	Renewable Energy	Nuclear Energy	
237.27 (GW)	172.54 (GW)	6.78 (GW)	416.59 (GW)
57%	41.4%	1.6%	100%

Source: Author owns created from Central Electricity Authority (CEA)

- **High initial cost:** solar and wind energy require investments that are significantly higher as compared to coal-based power plants. The coal-based power plants require an initial expenditure of only roughly Rs. 4 crore per MW. With a capacity utilization of 25%, the wind-based power plant costs Rs. 6 crore per MW. The initial expenditure is around Rs. 18 crore per MW for a more effective capacity utilization of 80%. The required investment for solar power plants with a 15% capacity is Rs. 18 crores. Therefore, many choose to invest in coal-based power facilities due to the high cost.
- **Weather-dependent:** Renewable energy sources, such as solar, wind, and tide, are influenced by the weather. It becomes ineffective and impractical if the ideal weather conditions are not present.
- **Limited Domestic Resources:** India has limited domestic resources of uranium, which is the fuel for nuclear reactors. Uranium is used to produce non-fossil fuel-based energy, which contributes only 6.78 GW. India is not a member of the NSG (Nuclear Suppliers Group); as a result, the country has not been easily accessible to import a large amount of its uranium to fulfill its needs. China is not ready to allow India to join the NSG because India is not a member of the NPT (Non-Proliferation Treaty). China has stipulated that India can join the NSG only after signing the NPT. Only around 1% of world uranium mining is produced in India. Kazakhstan, Canada, and Namibia are first, second, and third place in uranium mining production respectively in the world.



Source: Author self-created from World Nuclear Association

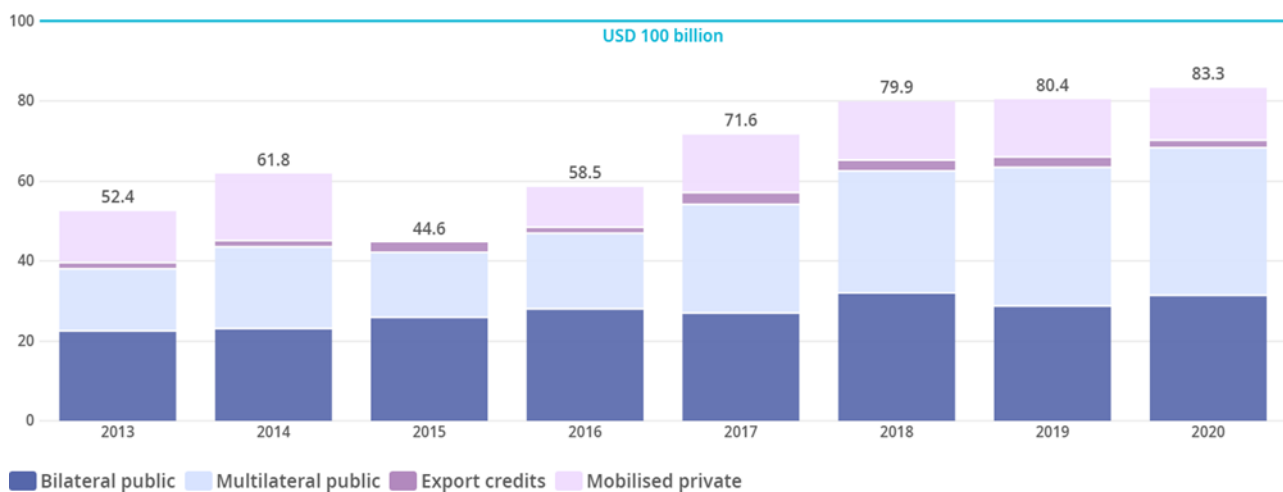
- **Use of larger space:** Most renewable energy plants take up a lot of room. This raises the issue of the expense of the enormous land area as well as other land acquisition issues. Furthermore, the distance between the renewable energy source and the grid raised both the cost and efficiency of renewable energy.
- **Repercussions of Hydro Plants:** The aquatic species' habitat is destroyed by the dams, and their migratory patterns are also hampered. Additionally, they lessen the movement of nutrients and sediments, which has an impact on the deltas and floodplains; therefore, it is a big challenge to maintain both things.

4.3.3 Social Sector

- **Lagging Climate Funding Contribution:** Developed nations agreed to work together to mobilize USD 100 billion annually by 2020 for climate action in developing countries, within the context of meaningful mitigation actions and transparency on implementation, at the UNFCCC's 15th Conference of Parties (COP15) in Copenhagen in 2009. The objective was formalized at COP16 in Cancun in 2010, and it was reaffirmed and extended until 2025 at COP21 in Paris in 2015. The OECD's "Aggregate Trends of Climate Finance Provided and Mobilised by Developed Countries in 2013-2020" report, which was published on July 29, 2022, provides an evaluation of the initial target year of the USD 100 billion goal. The chart shows that the commitment of 100 billion dollars has not been fulfilled yet by developed countries to developing countries. It suggests that by 2023, the USD 100 billion goal might be reached.

Climate finance for developing countries

Climate finance provided and mobilised by developed countries, in USD billions



Source: OECD (2022), Aggregate Trends of Climate Finance Provided and Mobilised by Developed Countries in 2013-2020.

- **Greenwashing:**

A marketing strategy called "greenwashing" is employed by businesses to trick customers into thinking that their goods and services are ecologically friendly. Companies employ this strategy to capitalize on consumer demand for more sustainable options and increased environmental awareness. Companies in India are increasingly making false and deceptive claims about the environmental advantages of their products, a practice known as "greenwashing." This term was first used in the 1960s when one of the most obvious examples of "greenwashing" was established by the hotel industry. To save the environment, they hung posters in hotel rooms asking guests to reuse their towels. The hotels profited from lower laundry costs. When firms make false promises about the environmental benefits of their products, consumers may get disillusioned and begin to mistrust the legitimacy of all environmental claims made by companies. As a result of their inability to distinguish between legitimate and fraudulent claims, consumers may become less inclined to make sustainable decisions; thereby, "greenwashing" is a big issue for India nowadays. The reason is that there are no particular rules in India that govern environmental claims made by businesses, so they are free to make false or misleading statements without consequence.

- **Poverty:**

Poverty continues to be both a cause and a result of resource degradation: agricultural yields on degraded lands are lower, and forests and grasslands are depleted as livelihood supplies dwindle. To survive, the impoverished are forced to mine and overuse the scant resources at their disposal, resulting in a downward spiral of poverty and environmental destruction. According to UNDP, India lifted 415 million people out of poverty in 15 years. The poverty rate is down to 16.4% in 2019–2021 from 55.1% in 2005–2006. Despite this, around 4.2% of the population still lives in severe poverty. India has the largest number of poor people (228.9 million) in the world, based on 2020. India's ranking in the Global Hunger Index (GHI) 2022 is 107th out of 121 countries, compared to 101 ranked out of 116 countries in 2021. The first and most important Sustainable Development Goal is to "End Poverty in All Its Forms Throughout the World" out of 17 goals. Many international reports frequently state that poverty is a factor in environmental deterioration. When their survival is in jeopardy, people in poverty have a tendency to squander all of the resources at their disposal due to a lack of appropriate resources and an incomplete understanding. However, we sometimes forget that the most vulnerable groups to the effects of environmental pollution, climate change, and global warming are the poor. Without eradicating poverty in India, we firmly believe that there cannot be an environmental solution or that we cannot pursue green growth.

- **Lack of Quality Education:**

"Quality Education" is the fourth goal of sustainable development out of 17. The United Nations initiated the Decade of Education for Sustainable Development (DESD) in 2005 with the goal of combining the principles, values, and practices that foster sustainable development. This necessitated incorporating relevant techniques into educational curricula. According to Article 51A(g) and 48A of the Constitution, it is the "fundamental duty of every citizen of India to protect and improve the natural environment, including forests, lakes, rivers, and wildlife." Aside from the National Policy on Education (1986) and the Programme of Action (1992), NEP-2020 commissions have emphasized the growing need to address environmental concerns. Broadly, three kinds of skill sets for green growth can be identified. The first is general

sustainability literacy, which takes the shape of soft skills, awareness, and action competence. The second class consists of occupation-specific science, technology, engineering, and mathematics (STEM) abilities, while the third set consists of leadership and management skills geared toward green transition. In spite of different initiatives taken by India, it is far behind in quality education, technical skills, and environmental awareness. Therefore, if India really wants to succeed in green growth, the government will first have to provide inclusive, quality education to all.

5. Findings

In April 2023, according to the IMF's list of the poorest countries, India's GDP per capita ranked 139th (nominal) and 127th (PPP). In accordance with the Human Development Report, India was ranked 132nd out of 191 countries in 2022. As found from the above data, the first and foremost thing India needs is enormous economic growth, thereby being able to pull millions of people from below the poverty line. It may also be able to upgrade the rank of GHI, HDI, and per capita income. For this reason, India's carbon emissions are likely to grow at the fastest pace in the world over the next two to three decades. Right now, most of the carbon technologies are either very expensive or unreliable; only afforestation would be able to prevent rising emissions of CO₂. There will be a need for around 10 trillion dollars of investment to fulfill the target of net zero emissions by 2070. Developed countries are mainly responsible for global warming and consequent climate change, so they should be born for this, but current policies and actions taken by developed countries are not able to meet the Paris Agreement that keeps below 1.5 degrees Celsius temperature a pre-industrial level. In 2009, developed countries were promised a climate finance contribution of 100 billion dollars every year to developing countries, but the promise has not been fulfilled. Overall, at the end of 2022, India was 68% of the way to fulfilling its 175 GW renewable installed power capacity target for 2022. Whereas public finance contributions are the most needed source of financing for these sustainable development activities, the Indian government is facing a massive financial deficit in the fiscal year, making it more difficult to meet this aim. India achieved 43% installed electric capacity from non-fossil fuel ahead of 2030. India is not a member of the NSG (Nuclear Suppliers Group). As a result, the country has not been easily able to import a larger amount of its uranium to fulfill the requirement for non-fossil fuel-based energy.

Nowadays, "greenwashing" is a big issue for India. The reason is that there are no particular rules in India that govern environmental claims made by businesses, so they are free to make false or misleading statements without consequence. According to Sushobhan Sensharma et al., 2022, 54% of the sample shows greenwashing behavior; most of these companies belong to the energy and manufacturing sectors of India.

India's gross enrolment ratio (GER) in higher education is 27.1%, which is among the lowest in the world despite having one of the largest educational networks globally. India spends only 4.6% of its GDP on education, against Kothari's (1964) recommended level of 6%. Almost, the rank of India's university is out of 200 in the world ranking. Overall, the quality of education is still questionable at the global level.

6. Recommendations and Discussions

Cities should have easier access to carbon financing. In order to ensure that these (and other) resources may be sent directly to cities, cities and central governments can collaborate to make better use of carbon-offsetting initiatives (such as the Clean Development Mechanism and the Joint Implementation). The use of a standardized emission inventory for cities should be one of the requirements for carbon finance.

The study's findings highlight the need for a sound policy framework for green growth to stimulate private-sector funding of activities for sustainable development. To overcome "greenwashing," the government should make proper laws and regulations.

The government should focus on attracting green investment. Polluting businesses have lower costs and higher returns than green sectors, so the private sector is more likely to invest in them. The government will have to conduct an awareness program about greening and various tax exemptions and subsidies it may provide for those projects.

Advise people to use renewable energy sources and energy-efficient technology. To encourage investment and reduce the risk and uncertainty associated with it, the financial system should be upgraded to allow for the diversification of green financial products, that is, the production of non-fossil fuel-based energy.

Investors should have access to more green financial products. Investors should have more options so they can invest more conveniently. As an illustration, consider green credit cards, bonds, loans, and equity.

The Indian Government should have tried to take the membership of the NSG. India should have focused on building

up international relations with every nation, so it would help to take the membership of an important international group. If India becomes a member of the NSG, it would be cheap to import uranium from abroad.

Try to reduce poverty. Poverty is a big challenge for India. It would be kept to a trade-off between economic growth and green growth; henceforth, per capita income will increase, and ultimately, green growth will also be achieved.

To provide quality education, the government of India will focus on providing inclusive quality education, skill development, and innovative technology for sustainable growth.

To build up the international pressure on developed countries: developed countries are more responsible for the incidence of such climate change; therefore, developing or least developed countries will make the international pressure to succeed towards green growth by providing financial help and sharing technology with developing countries.

Plantation of trees more and more: The government and each citizen of India will be focusing on maximum plantation of trees, thereby making the environment more friendly. In this IPL (2023) season, BCCI and Tata Group's initiative of planting 500 trees across India for each dot ball bowled in the four playoff matches. This type of initiative is good for promoting green growth and should be encouraged by the government.

7. Limitations of the Study

The first limitation of this study is that the dimension of green growth is immensely more comprehensive. This research study is confined to limited data and does not describe all the strategies and tools for shifting economic growth to green growth.

Secondly, this study used only secondary data, which were collected from different websites, research articles, and government information.

Thirdly, this is a theoretical research study. Therefore, no statistical methods or tools are employed.

Fourthly, the research study in the context of green finance and its impact on green growth is still in the nascent phase, so there is a chance of limited secondary data.

8. Conclusion

The main objective of this research is to analyze and identify the impediments, possibilities, and challenges that India faces as it converts the traditional economy into a green economy with more sustainable and environmentally friendly economic development. There are lots of challenges to transforming the traditional economy into a green economy. With the transformation into a green economy in the financial sector, the development of green initiatives faces numerous obstacles, including a lack of long-term funding, a variety of hazards, a low rate of return, a shortage of market actors with the necessary skills, a lack of market transparency, and a lack of awareness. In the energy sector, huge requirements for investment, weather dependency, a lack of domestic resources, and a lack of innovative technology are the main constraints. In the social sector, greenwashing, poverty, a lack of quality education, population growth, and financial contributions by developed countries are the main challenges to achieving green growth.

Presently, India's energy supply is unable to keep up with the nation's rapid economic expansion because there are ongoing power shortages and frequent blackouts. The Indian government is increasingly concentrating on initiatives for improving energy efficiency and green growth utilizing renewable sources in order to reduce import dependency in the fossil fuel-based energy industry. From recent trends, India is growing at the fastest pace in the world, but its per capita income is far below in comparison to developed nations, so it is obvious that the environmental aspects of the economy are likely to suffer from such rapid economic expansion. However, India has a need for enormous economic growth because it has challenges to lift millions of people out of extreme poverty, provide quality education, reduce inequality, increase per capita income, and upgrade the rank of HDI, GHI, and GER ratios in higher education. Without achieving these aspects, green growth seems like an onerous task. Now the concern is how the trade-off between economic growth and environmental degradation will be set. For this, India has set the five nectar elements (Panchamrit) of India's climate action targets for the 26th COP of the UNFCCC in 2021 in Glasgow.

India hosted the G20 presidency in September 2023, with the motto "Vasudhaiva Kutumbakam," which translates to "One Earth, One Family, One Future." Our journey to a planet safe for humans is one that no single nation can take on alone. This is a collective journey in which equality and climate justice will serve as guiding principles. "We hope that the fight against climate change will bring the entire world together as one family, and we also expect that this summit will be more beneficial to succeeding towards green growth." By the implementation of India's 'Lifestyle for Environment

Mission' (LiFE) project and promote Artificial Intelligence to achieve the UN Sustainable Development Goals. By signing the 'Green Development Pact,' the G-20 reiterated its commitment to sustainable and green growth.

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