Assessment of Renewable Energy Resources in India: Current Status, Challenges and Future Prospects

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***Abstract*—India's rapid economic growth, urbanization, and rising energy demand have intensified the need for sustainable and reliable energy alternatives. This study provides a comprehensive assessment of India's renewable energy resources including solar, wind, biomass, hydropower, and geothermal by analyzing their current status, technological advancements, policy framework, challenges, and future prospects. Using a descriptive and analytical research design supported by secondary data, geospatial analysis, trend evaluation, and stakeholder insights, the study reveals the substantial progress India has made through initiatives such as the National Solar Mission, Wind-Solar Hybrid Policy, Green Energy Corridor, and state-level regulatory interventions. Results indicate that India possesses abundant renewable potential, with wind energy exceeding 300 GW at 120m hub height and solar potential estimated at nearly 750 GW. Despite significant growth in installed capacity, rising investments, and enhanced forecasting and monitoring infrastructure, challenges persist in grid integration, land acquisition, storage limitations, and policy inconsistencies. The analysis underscores the need for stronger regulatory alignment, advanced storage technologies, decentralized systems, and increased R&D investment to bridge existing gaps. Overall, India stands at a pivotal juncture where strategic and sustained policy actions can position it as a global leader in clean energy, supporting long-term environmental sustainability, energy security, and economic development.**

***Index Terms*—Energy Security, Environmental Sustainability, Green Energy Corridor, National Solar Mission, Renewable Energy, Wind-Solar Hybrid Policy**

I. INTRODUCTION

1.1 Background and Context

India's population expansion, urbanization, and industrialization have all contributed to the country's continuous rise in energy consumption. In the past, the nation's energy demands were mostly met by fossil fuels, mainly coal, oil, and natural gas. However, there are a number of drawbacks to this dependence, such as volatile world markets, unpredictable geopolitical events, and environmental deterioration as a result of greenhouse gas emissions (India Energy Outlook 2021 – Analysis, 2021) [1].

India is confronted with significant environmental issues, such as water scarcity, air pollution, and climate change. This nation is among the top emitters of greenhouse gases in the world because it depends heavily on fossil fuels for industrial activities, transportation, and power generation. Cleaner and more sustainable energy sources must be used in order to address these environmental issues.

Renewable energy sources such as solar, wind, biomass, hydropower, and geothermal energy are abundant in India. The geographical diversity of the nation offers several chances to utilize these resources in various parts of the nation. For example, India is one of the best places to generate solar energy since it has year-round access to plenty of sunlight. Similar to this, wind energy projects have a lot of promise in coastal locations due to the strong winds that occur there. India also has a large amount of agricultural land, which makes it easier to produce fuels based on biomass (Dey et al., 2022a) [2].

II. OVERVIEW OF RENEWABLE ENERGY SOURCES

Renewable energy sources are derived from naturally replenishing resources that are virtually inexhaustible on human timescales. They offer a sustainable alternative to fossil fuels, which are finite and contribute significantly to environmental degradation and climate change.

A. Kumar et al., (2010) have discussed the potential of renewable energy sources and associate technologies as viable solutions to the persistent energy challenges faced by developing countries. They highlight that renewable sources such as wind, solar, geothermal, ocean, biomass energy, and fuel cell technology can play a significant role in mitigating India's energy shortage. Given the country's rapid economic growth, the energy demand is projected to be three to four times the current total consumption, necessitating an assured and sustainable energy supply. Renewable energy is positioned as a key option to meet this growing demand, currently contributing approximately 33% to India's primary energy consumption. The authors note India's increasing adoption of responsible renewable energy practices aimed at reducing carbon emissions, improving air quality, and securing a sustainable future. Over the past two and a half decades, there has been substantial progress in research, development, demonstration, production, and application of diverse renewable energy technologies across multiple sectors. The review further summarizes the availability, present status, significant achievements, and future potential of renewable energy in India, while also assessing the need for specific policy interventions to overcome existing barriers and enhance future deployment [4].

(Yenneti, 2016)highlighted the Government of India initiated the Jawaharlal Nehru National Solar Mission (JNNSM) in 2009 with an initial target of 20 GW of grid-connected solar capacity by 2022, later revised in May 2015 to an ambitious 100 GW. The reviewed work provides a comprehensive overview of the solar energy sector in India, including current installed capacity, historical growth trends, and the evolution of the industry. It further examines the technical and economic challenges hindering widespread solar adoption, alongside an analysis of governmental acts and regulatory frameworks designed to accelerate sectoral development. These policy measures are evaluated in terms of their effectiveness in meeting stated capacity goals. Finally, the review presents an outlook on India's future solar energy targets, offering insights into the country's trajectory towards large-scale renewable integration [5].

(P.S. Gowthaman et al., 2018)highlight the significant role of renewable energy sources and technologies in addressing the persistent energy challenges faced by developing countries, particularly India. The authors identify wind, solar, hydel, geothermal, tidal, biomass, and fuel cell technologies as viable solutions to bridge the nation's energy deficit. With India's energy demand projected to increase three to four times in the future, renewable resources are seen as key to meeting this growth sustainably. The paper notes India's progressive adoption of clean energy practices aimed at reducing carbon emissions, improving air quality, and ensuring environmental sustainability

Despite these advancements, the authors emphasize that over 40% of rural households remain without electricity, underscoring the limitations of traditional, centralized power generation, transmission, and distribution systems. These conventional models are increasingly expensive and inflexible in meeting diverse and growing demands. Gowthaman et al. advocate for a decentralized energy approach that capitalizes on the country's abundant renewable resources, thereby reducing dependency on fossil fuel imports that strain the trade deficit and harm the environment. They further point out that renewable energy investments offer long-term economic growth potential, with small hydropower emerging as a steadily expanding contributor to the sector[6].

(J et al., 2019)present a comprehensive analysis of the estimated potential, policy initiatives, progress, and future prospects of the wind energy sector in India. The study underscores India's abundant wind energy resources, with the National Institute of Wind Energy (NIWE) estimating a potential of 302 GW at 100 m hub height, based on data collected through over 800 LiDAR/SoDAR-equipped monitoring stations nationwide. As of 31 March 2020, India's cumulative installed wind capacity stood at 37.69 GW, representing only 12.47% of the estimated potential. This positions India fourth globally in total installed capacity; however, the relatively low utilization rate highlights the sector's slow growth trajectory. The review points out that accelerating wind power deployment is essential to achieving the national goal

of affordable and clean energy for all. Key recommendations include simplifying land acquisition procedures, expanding transmission infrastructure, increasing financial investment in the wind sector, and promoting hybrid renewable technologies to enhance capacity utilization and contribute to sustainable development [7].

(Kumar. J & Majid, 2020b)reviewed the multifaceted objectives underpinning the deployment of renewable energy in India, emphasizing its role in fostering economic development, enhancing energy security, improving access to energy, and mitigating climate change. The authors highlight that sustainable development can be achieved through the adoption of sustainable energy sources and by ensuring universal access to affordable, reliable, sustainable, and modern energy. According to the review, strong government support combined with favorable economic conditions has positioned India among the leading countries in the global renewable energy market. The government's implementation of targeted policies, incentive-driven programs, and liberal frameworks has been instrumental in attracting substantial foreign investment, thereby accelerating the nation's renewable energy growth. Furthermore, the authors note the sector's potential to generate significant domestic employment in the coming years. The paper consolidates information on major achievements, current and projected electricity generation capacities, investment and employment opportunities, as well as the challenges faced by the renewable sector. The review also identifies key obstacles hindering sectoral growth and offers recommendations aimed at policymakers, innovators, project developers, investors, industries, associated stakeholders, and the research community to strengthen India's renewable energy trajectory [8].

(Dey et al., 2022b) conducted an extensive review highlighting India's vast potential for generating clean energy from renewable energy sources (RES), particularly hydro, wind, and solar. The authors emphasize that India has recognized this potential and demonstrated a strong commitment to reducing its carbon footprint as a developing nation—an endeavor gaining global significance. The review primarily focuses on India's abundant solar energy resources, detailing their availability, status, strategies, perspectives, challenges, achievements, and prospects. Special attention is given to the Government of India's Jawaharlal Nehru National Solar Mission (JNNSM), launched in January 2010 under the National Action Plan on Climate Change (NAPCC–2008), which initially targeted the deployment of 22,000 MW of solar power through both grid-connected and off-grid plants. The study reports that as of August 2023, India's cumulative installed solar capacity has reached 63,000 MW—far surpassing the initial target—with an average annual growth rate of 18% over the past five years. The authors estimate the country's total solar potential at approximately 750 GW, signifying substantial untapped capacity. The review concludes by recommending policy and regulatory strengthening, enhanced private sector incentives, and increased R&D investment to unlock this potential. It further stresses that overcoming challenges in grid integration, storage solutions, and financing will be critical for the sector's sustainable growth [9].

(S. Kumar et al., 2023) emphasize that renewable energy represents a dependable solution and a critical pathway toward achieving sustainable green energy objectives. Green energy development, as outlined in the literature, involves strategies for the efficient utilization of natural resources to mitigate environmental degradation, reduce ecological risks, and limit greenhouse gas emissions. Given India's status as the world's third-largest energy consumer—and with rapid industrialization, urbanization, and economic growth driving substantial increases in future demand renewable alternatives are positioned as key to meeting these challenges. In their study, the authors conducted a bibliometric analysis of 792 publications on renewable energy in India indexed in the Scopus database between 1981 and 2024, aiming to map thematic evolution and identify emerging research priorities. The analysis revealed four principal research clusters: (1) BRICS and sustainable energy initiatives, (2) Renewable energy sources in the Indian context, (3) Renewable energy and sustainability, and (4) Alternatives to and barriers against renewable energy adoption. From a governance and policy perspective, the review underscores the need to address systemic barriers to accelerate the deployment and integration of renewable technologies in India [10].

(Raihan et al., 2024) conducted a comprehensive analysis of the status and prospects of renewable energies in India, highlighting the country's position as the third-largest producer of renewable energy

globally. The study emphasized that India's growing population and rapid economic development are driving an increasing energy demand, for which renewable energy has emerged as a viable alternative to fossil fuels, addressing both the energy crisis and environmental concerns. The authors reported that by 2023, renewable energy accounted for over 40% of India's total installed energy capacity, totaling approximately 169 GW, comprising 64 GW of solar power, 52 GW of hydropower, 42 GW of wind energy, and 11 GW of biofuels. Rajasthan was identified as the leading state in renewable energy potential, contributing nearly 20% of the nation's overall capacity. The paper explored the linkages between renewable energy development and several Sustainable Development Goals (SDGs), including poverty alleviation, gender equality, health improvement, and environmental protection. Furthermore, Asif Raihan et al. outlined the government's proactive policies, large-scale projects, and strategic initiatives to enhance renewable energy adoption. They also provided policy recommendations encompassing economic, social, and environmental dimensions, emphasizing the significance of strong regulatory frameworks, private sector investment, global cooperation, and public awareness campaigns. This work contributes a strategic and practical framework to the discourse on India's transition from fossil fuels to renewables, offering valuable insights for policymakers, researchers, and industry stakeholders concerned with energy transition and sustainability [11]

(Sikarwar et al., 2024) highlight that energy serves as a fundamental driver of both social and economic development, with scientific advancements across industrial, governmental, and municipal sectors contributing to a marked increase in global energy demand. They emphasize that the efficient utilization of renewable energy sources (RESs) has become imperative due to escalating energy demand, rising fuel prices, and the pressing need to mitigate greenhouse gas emissions. Addressing these challenges is essential for meeting the world's growing energy requirements while simultaneously combating climate change, both of which are recognized as critical global concerns. Their review provides a comprehensive synthesis of the development and progression of renewable and sustainable energy sources, detailing their classifications, characteristics, advantages, and limitations. The authors place particular focus on the status and prospective growth of RESs within the Indian context, noting that the expansion of this sector holds significant potential for fostering economic development and generating employment opportunities through the exploitation of renewable energy resources [12]

(Gururaghavendra & Prasad, 2024) emphasize the pivotal role of renewable energy in advancing India's sustainable growth. Renewable energy, sourced from naturally replenishing resources, offers a sustainable alternative to conventional fossil fuels. India, recognized as the third-largest consumer of energy globally, ranks fourth worldwide in installed renewable energy capacity, achieving 163 gigawatts. The southern region of the country contributes significantly, generating 50,282.92 megawatts—surpassing other regions in output. Among renewable sources, wind energy emerges as the predominant contributor to power generation. However, despite these advancements, India continues to face a substantial energy challenge due to its rapidly growing population exceeding 1.3 billion, leading to ever-increasing energy demands. Notably, the share of renewable energy in the nation's total power generation has risen markedly from 15.38% in 2015 to 20.49% in 2022. These trends collectively underscore the substantial impact of renewable energy on India's sustainable development trajectory [13].

(Ukoba et al., 2024) emphasize the importance of regional feasibility studies, incorporating variables such as solar resource distribution, land availability, technology choices, and local socio-economic contexts. They highlight solar power's potential to foster rural development, job creation, and income generation, thereby contributing to India's energy security and sustainable development goals. The authors conclude that overcoming adoption barriers through targeted strategies will be critical for realizing solar energy's role in India's long-term energy transition [14].

III. METHODOLOGY

3.1 Research Design

This study employs a descriptive, analytical, and exploratory research design to assess the status, potential, and challenges of renewable energy in India.

The methodology incorporates secondary data collection, geospatial analysis, trend analysis, policy evaluation, and stakeholder consultation to develop a comprehensive understanding of the renewable energy sector. The research is structured to:

1. Analyze the current production, growth trends, and role of renewable energy in India's overall energy mix.
2. Evaluate the potential of various renewable energy sources, including solar, wind, hydropower, biomass, and geothermal energy.
3. Identify challenges and opportunities in the renewable energy sector and propose policy recommendations to enhance its adoption and sustainability.

A combination of quantitative and qualitative methods is adopted to ensure a holistic assessment, drawing on statistical data, geospatial mapping, case studies, and expert opinions.

3.2 Data Collection Methods

3.2.1 Secondary Data Collection

To assess the status and potential of renewable energy, secondary data is collected from government reports, international agencies, research papers, and policy documents. The key data sources include:

- Ministry of New and Renewable Energy (MNRE) – Reports on installed capacity, policy frameworks, and investment trends [15].
- Central Electricity Authority (CEA) – Data on electricity generation, grid integration, and transmission infrastructure (Home Page - Central Electricity Authority, n.d.) [16].
- National Institute of Wind Energy (NIWE) – Wind resource assessments and feasibility studies.
- Solar Radiation Resource Assessment (SRRA) – Solar energy potential mapping across India.
- International Renewable Energy Agency (IRENA) & International Energy Agency (IEA) – Global comparisons, best practices, and benchmarking data.
- Published academic literature and industry reports to analyze past trends, challenges, and advancements in renewable energy technologies.

The secondary data analysis allows for a historical assessment of renewable energy growth and a comparative analysis of India's progress against global benchmarks.

3.2.2 Renewable Energy Potential Assessment

To estimate the untapped potential of renewable energy, geospatial analysis and technological feasibility studies are conducted:

❖ Solar Energy:

- GIS and Remote Sensing Data from MNRE and NASA's solar radiation database to assess high solar insolation regions.
- Evaluation of advancements in solar PV efficiency, concentrated solar power (CSP), and battery storage.
- Land availability and rooftop solar feasibility assessment using urban and rural land-use maps.

❖ Wind Energy:

- Wind resource mapping using NIWE datasets and wind speed simulations.
- State-wise analysis of wind corridors, particularly in Gujarat, Tamil Nadu, and Maharashtra.
- Technological assessment of onshore vs. offshore wind farms.

❖ Hydropower:

- Hydrological data analysis from the Central Water Commission (CWC) to assess small and large hydropower potential.
- GIS-based mapping of river basins suitable for hydroelectric projects.

❖ Biomass Energy:

- Assessment of biomass availability using agricultural residue production data.
- Technological feasibility of biogas plants, biomass gasification, and waste-to-energy conversion.

❖ Geothermal Energy:

- Analysis of geothermal hotspots using geological surveys and subsurface temperature mapping.
- Feasibility assessment of geothermal power plants in Himalayan and western volcanic provinces.

3.2.3 Policy and Regulatory Analysis

A comprehensive review of existing renewable energy policies is conducted to identify strengths, weaknesses, and areas for improvement. This involves:

❖ Review of key policy frameworks, including:

- National Solar Mission

- National Wind Energy Mission
- Renewable Purchase Obligation (RPO)
- Green Energy Corridor Project
- State-wise renewable energy policies

❖ Comparative Policy Analysis: Benchmarking India's renewable energy policies with global leaders like Germany, China, and the USA.

❖ Regulatory Gap Analysis: Identifying policy barriers and regulatory constraints affecting investment, grid integration, and scalability.

3.2.4 Stakeholder Consultation

To gather qualitative insights, interviews and surveys are conducted with key stakeholders, including:

- Government Officials (MNRE, CEA, State Energy Departments) to understand policy effectiveness.
- Industry Experts and Investors to assess financial and technological challenges.
- Local Communities to evaluate social and environmental impacts of renewable energy projects.
- Academia and Research Institutions for technical feasibility insights.

3.2.5 Economic and Environmental Feasibility Analysis

- Cost-Benefit Analysis: Evaluating the economic feasibility of renewable energy expansion, considering investment costs, operational expenses, and long-term returns.
- Environmental Impact Assessment: Analyzing the ecological footprint of large-scale renewable energy projects.

3.3 Data Analysis Techniques

3.3.1 Trend and Comparative Analysis

- Historical growth trends in renewable energy are analyzed using time-series data from MNRE and CEA.
- Comparison of India's renewable energy targets with actual progress and international benchmarks.

3.3.2 SWOT Analysis

A Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is conducted to assess India's renewable energy sector, focusing on:

- Strengths: Abundant resources, government support, falling costs.
- Weaknesses: Intermittency, grid infrastructure, policy inconsistencies.
- Opportunities: Emerging technologies, global investments, energy security.
- Threats: Land acquisition issues, financing challenges, regulatory uncertainties.

3.3.3 Scenario Planning and Policy Recommendations

❖ Scenario modeling is conducted to project future renewable energy growth under different policy interventions.

❖ Strategic policy recommendations are developed focusing on:

- Strengthening financial incentives and investment models.
- Enhancing grid infrastructure and storage solutions.
- Promoting research and development in emerging renewable technologies.

IV. RESULT

Table 1: Ministry of New and Renewable Energy (MNRE)

Year	Key Policies Implemented
2016-17	National Solar Mission Expansion
2017-18	Wind-Solar Hybrid Policy
2018-19	Renewable Purchase Obligation (RPO) Updates
2019-20	Solar Park Development Scheme
2020-21	Green Hydrogen Policy Introduction
2021-22	PM-KUSUM Scheme Expansion
2022-23	Grid Integration Plan for Renewables
2023-24	National Green Energy Corridor Expansion

Table 2: Central Electricity Authority (CEA)

Year	Projection Description
2027–32	₹4.91 trillion investment, 366 GW peak demand, 900 GW capacity
2030	Target: 500 GW non-fossil fuel-based capacity
Oct 2022	409 GW installed (166 GW renewable), 537 GW RE integration plan

Table 3: National Institute of Wind Energy (NIWE)

Year	Activity/Study	Details
2015	Wind Potential Estimation at 100m Height	Estimated 302 GW wind potential at 100m height assuming 2% land availability
2015	Skoch Order-of-Merit Award	Awarded for 'Wind Power Forecasting by NIWE - Vortex'
2017	Centre for Excellence in VG Forecasting Established	Established lab for variable generation forecasting
2018	National Award for eGovernance	Golden Award for citizen-centric wind forecasting for Tamil Nadu
2019	Indian Wind Potential Map at 120m Height	Updated map for 120m hub height wind turbines
2019	International Conference on Wind and Solar Resource Assessment	Hosted conference on wind and solar resource assessment
2022	Wind Monitoring Stations	Established 915 wind monitoring stations across India
2025	Completion of Met-Ocean Measurements in Gulf of Mannar	Measurement campaign in Gulf of Mannar scheduled for completion by Feb 2025

Table 4: Solar Radiation Resource Assessment (SRRA)

Initiative	Number of SRRA Stations	Special Notes
Maharashtra (MEDA)	15	First independent initiative with investment-grade solar radiation data

Table 5: International Renewable Energy Agency (IRENA) & International Energy Agency (IEA)

Year	Total Capacity (GW)	Annual Increase (GW)	Notable Highlights
2015	1985	152	Record growth; renewables surpass coal in installed capacity
2021	2800	153	Renewables cover over 60% of the increase in world electricity generation
2024	4448	585	15.1% growth; 92.5% of new electricity from renewables
2025			Projected 35% share of global electricity generation

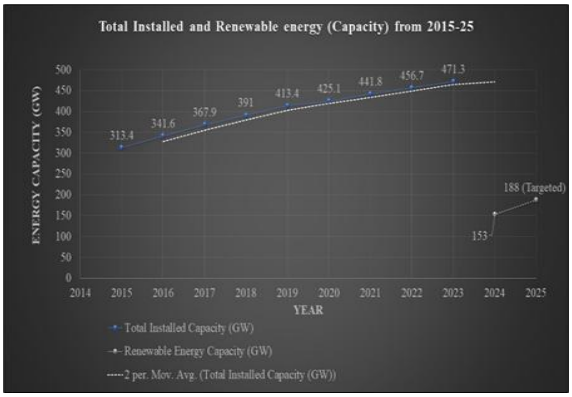

Figure 1: Total Installed and Renewable energy (Capacity) from 2015-25

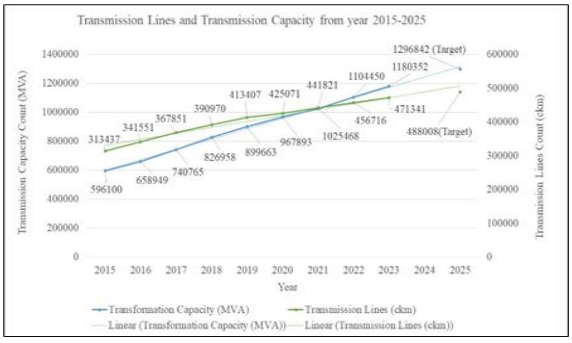

Figure 2: Transmission Lines and Transmission Capacity from year 2015-25

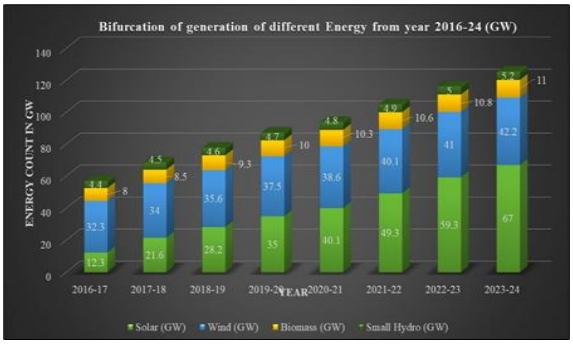

Figure 3: Bifurcation of Generation of different Energy from year 2016-24

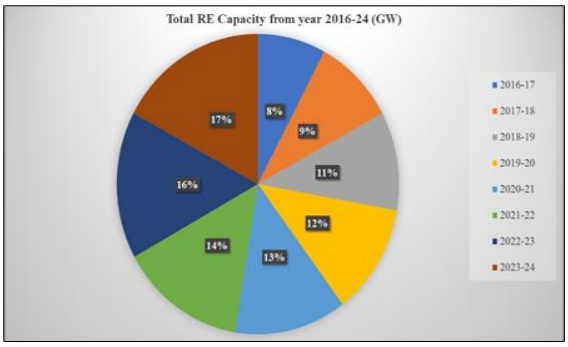

Figure 4: Total RE Capacity from year 2016-24

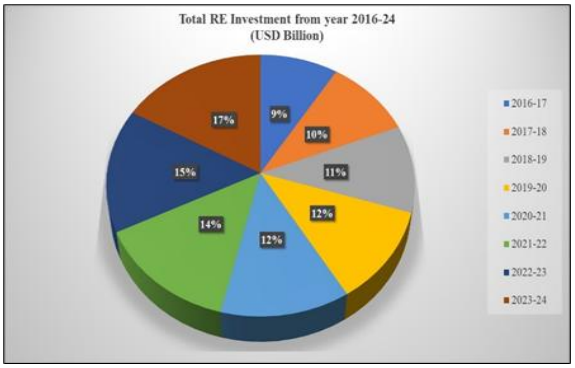

Figure 5: Total RE Investment from year 2016-24

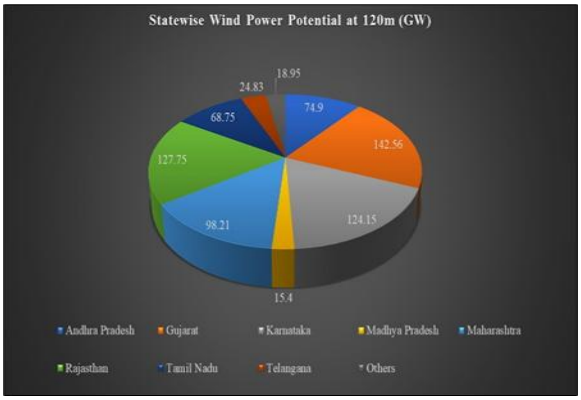

Figure 6: Statewise Wind Power Potential at 120m

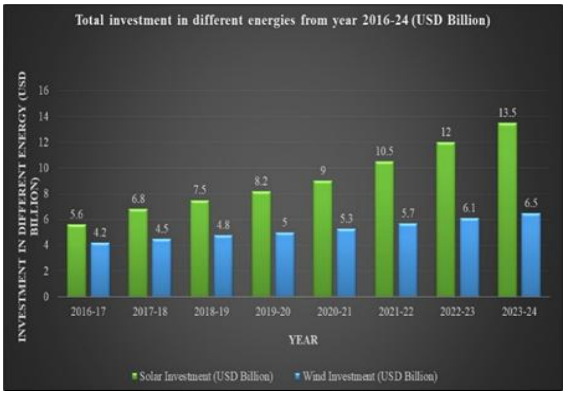

Figure 7: Total Investment in different energies from year 2016-24

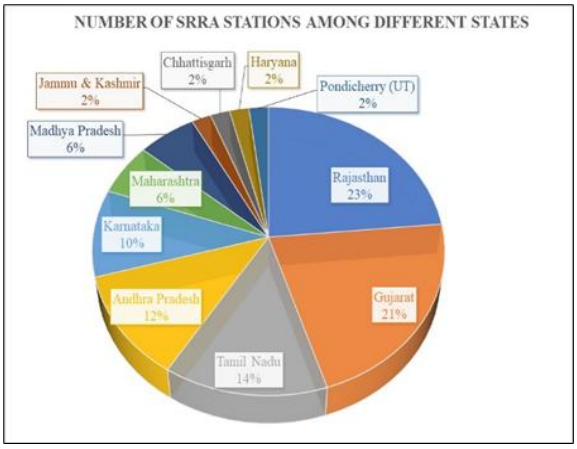

Figure 8: Number of Stations among different states

V. DISCUSSION

The document highlights a multi-dimensional analysis of India's renewable energy sector, emphasizing both quantitative capacity expansion and qualitative policy evolution. Over the past decade, India has witnessed an exponential increase in renewable energy installations, driven by enabling policies, technological innovation, and international cooperation.

The timeline of key policy initiatives (Table 1) reflects a progressive shift in the government's approach—from promoting individual technologies (like solar and wind) to integrated strategies (like wind-solar hybrids, green hydrogen, and grid modernization). These policy efforts are directly correlated with the observed growth in installed renewable capacity (Figure 1), which surged notably between 2016 and 2024.

Wind energy potential has been thoroughly reassessed, with updates to the wind potential map at 120m height and the expansion of wind monitoring infrastructure (Table 3, Figure 6). These developments indicate India's readiness to expand both onshore and offshore wind projects. States like Tamil Nadu, Gujarat, and Maharashtra show high wind viability, supported by real-time forecasting systems developed by NIWE.

Solar energy development, mapped through SRRA stations (Table 4), shows targeted regional data collection and analysis, aiding in the planning of large-scale solar parks and rooftop installations. The increase in solar radiation data availability has improved investment-grade decision-making, allowing for localized solar infrastructure development.

The investment figures (Figures 5 & 7) demonstrate growing financial confidence in renewables, with capital inflows rising significantly, especially after 2020. This trend aligns with global energy investment patterns (Table 5), where renewable sources increasingly dominate new energy generation capacity. India's renewable capacity expansion is consistent with international benchmarks, showing that India is not only meeting but sometimes exceeding global growth averages. Energy mix diversification (Figure 3) also illustrates a gradual but clear movement away from fossil fuel dependence. The growth in non-fossil installed capacity (409 GW by Oct 2022, of which 166 GW is renewable) supports the 2030 target of 500 GW non-fossil capacity (Table 2).

However, several challenges persist:

- Grid integration and intermittency issues remain a barrier to consistent renewable energy supply.
- Land use conflicts and environmental concerns over large-scale installations need strategic management.
- Policy uncertainty and inconsistent implementation at the state level affect private sector participation.

Despite these challenges, SWOT and trend analyses indicate strong opportunities for hybrid systems, AI-driven smart grids, and storage solutions to address intermittency. Enhanced stakeholder engagement, particularly with local communities and state governments, will be crucial for long-term success.

VI. CONCLUSION

The study concludes that India has made significant strides in renewable energy development, underpinned by strong policy frameworks, abundant natural resources, and falling technology costs. With a clear vision towards achieving energy security, environmental sustainability, and global climate commitments, India is on track to become a global leader in renewable energy deployment. A consistent upward trend in renewable capacity, aligned with national and international targets. Effective implementation of integrated policies like the National Solar Mission and Wind-Solar Hybrid Policy. Substantial untapped potential in wind (over 300 GW at 120m) and solar, backed by robust geospatial and meteorological data. Increased investor confidence and international collaboration, reflected in rising capital investments and technology transfers.

To sustain and accelerate this momentum, India must enhance grid infrastructure and develop decentralized storage technologies. Streamline state and central policy harmonization. Strengthen financial mechanisms and public-private partnerships. Promote R&D in advanced technologies (like green hydrogen, floating solar, and offshore wind).

In conclusion, India stands at a pivotal point where renewable energy can redefine its economic, environmental, and geopolitical trajectory. Strategic implementation of research-backed policies will be key to transforming potential into long-term sustainability.

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Author Contribution

RJ: Conceived the Idea, Data Collection, Data Curation, Data Analysis, Methodology, Writing & Editing of the Manuscript, RD: Data Curation, Data Analysis, Editing and Revision of the Manuscript, FC: Data Analysis, Formal Analysis, DJ: Supervision, Data Analysis, Writing & Editing.

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Conflict of Interest

All the authors read the final manuscript and declare no conflict of interest and approve for the publication.

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