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Development of Green Energy Market in India

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Abstract :

India is about develop itself as one of the largest manufacturer in solar energy sector and is facing the fastest emerging leader in renewable energy. India has done many good achievements in this sector, including green hydrogen, which in turn gives a robust ecosystem. The country is the largest producers of wind energy and is having very high growth in solar energy sector, which is making India to be the global leader in the renewable energy sector. This research paper is going to describe and explain about the green energy market in India.

1.1 Introduction:

There are certain distinctions between renewable and green energy, which we shall discuss later, it frequently derives from these sources. The crucial aspect of these energy sources is that they do not damage the environment in ways like the atmospheric release of greenhouse gases. By 2028, the government hopes to have 500 GW of renewable energy installed. In comparison to the first eight months of FY21, the increase of renewable energy capacity was 8.2 GW in the first eight months of FY22. ICRA anticipates a 12.5 GW increase in renewable energy capacity in FY22 and a 16 GW increase in FY23. When compared to 2.63 GW in March 2014, the installed capacity of solar energy has expanded more than 18 times, reaching 49.3 GW by the end of 2021. India increased its solar power capacity by 7.4 GW in FY22 to December 2021, a 335 percent increase from 1.73 GW in FY21. With sales of 329,000 off-grid solar devices in the first half of 2021, off-grid solar electricity is expanding quickly in India. Northern India is anticipated to emerge as India's renewable energy powerhouse,with a potential capacity of 363 GW and laws that are geared toward the industry.

2 Objectives of the Study

- To forecast the upcoming trend and expansion of energy sector with the help of data, government policies and trends.
- To suggest policies and possibilities for India to achieve its target of contribution to install 500 GW of renewable energy capacity by 2028.

Research Methodology

The project is primarily based on the review of the industry from past data and forecasting the growth for the upcoming years with the help of current data and government policies. Both quantitative and qualitative data is used in the presented minor project report with detailed analysis, visualisation and forecasting of secondary data available in research papers, articles, and on the internet. Ministry of renewable energy presents with authentic and clear data, reports and policy formation of the industry in real-time. Collecting information and opinion on policies from professionals, professors and institutions.

Need and Scope of the Study

India can take advantage of solar energy's enormous potential because it has Sun for almost all year. Additionally, it offers enormous potential for the hydropower industry, which is being researched in many regions, particularly in the northeast. Prime Minister Mr. Narendra Modi pledged to raise India's renewable energy generating capacity to 500 GW and fulfill most of India's energy demands through renewable sources by the year 2030 during the COP-26 Summit in Glasgow in November 2021. To assess this target, we need to analyse the trends, policies and data relevant to it.

- The focus of the study is primarily on the past quantitative data and for future mostly qualitative data like policies formations and news.
- The data is limited to authentic government sources i.e. the Ministry of Renewable Energy, Niti Aayog, Ministry of Power etc.
- Over the past five years, India has implemented innovative strategies to accelerate its transition to clean energy and mobility 2028. Similarly, the Faster Adoption and Manufacturing of Electric Vehicles (FAME) II plan, according to NITI Aayog and Rocky Mountain Institute,

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promotes the adoption of 7,000 electric buses, 5 lakhs electric three-wheelers, 55,000 electric passenger vehicles, and 10 lakhs electric two-wheelers

The Growth of green energy so far

Since 2014, the renewable energy sector in India has seen investments totalling more than Rs. 5.2 lakh crore (US$ 70 billion). In terms of its investments and intentions for renewable energy in 2020, India was placed third internationally, according to the analytics companyBritish Business Energy.

Forthcoming view for the Industry

The government is actively supporting green energy and has already started a number of sizable sustainable power projects. By 2023, India will have 5,000 compressed biogas plants in operation. As the government concentrates on electric vehicles, green hydrogen, and the production of solar equipment, India's renewable energy sector is anticipated to grow in 2022 with a probable investment of US$ 15 billion this year. As more effective batteries are used to store power, the cost of solar energy is predicted to drop by 66 percent by 2040 compared to the current cost, making it possible for about 49 percent of all electricity to be produced by renewable sources. By using renewable energy sources. By 2029–2030, the Central Electricity Authority (CEA) predicts that the percentage of renewable energy generation would rise from 18 to 44 percent. Every state in India will have a "green city" that runs on renewable energy, according to the Indian government. The "green city" will make use of waste-to-energy facilities, solar parks on the city's outskirts, rooftop solar systems on every home, and public transportation that supports electric mobility.

People, Development, and Financial perspective.

This paper explores the history and future of India's renewable energy ecosystem from a people angle. According to Shri Nitin Gadkari, Minister for Road Transport & Highways, India will achieve the goal of producing 450 GW of reusable energy by 2030.The ongoing policy support from the government and multi-stakeholder cooperation. What does it mean for the working young of our People? This push for renewable energy will lead to job possibilities in both urban and rural locations. By 2030, the electricity sector has the potential to treble employment if aggressive decarbonization strategies are followed. The solar and wind energy industries will contribute the most jobs to this. A certain way to take advantage of India's demographic dividend is to go green. The overreliance on biofuels and oil products, however, prevents the mapping of primary energy use from genuinely pointing to such a change . This amply illustrates how rural India still relies on fossil fuels for the majority of its energy needs. This shows that India still has a long way to go until its whole energy sector is transformed.

Developing Angle

India is getting into clean transportation and is getting ready to introduce ropeways, cable cars, and funicular rail. The country now struggles with an unbalanced modal share, with only 17 percent of freight transport relying on rail and 71 percent on roads. As a result, there is a great chance to seize an improved, more affordable, and clean transportation system. India has the chance to change its heavy reliance on privately owned, conventional automobiles and pave the path for an electric, connected future of passenger mobility. Energy storage technology is crucial to the whole shift to renewable energy. India's energy storage industry is anticipated to reach 1 lakh crore across sectors by 2030, according to NITI Aayog and RMI. A few sizable gigawatt-scale, competitive export integrated battery and cell manufacturing factories are being put up in India as part of the National Mission on Transformative Mobility and Battery Storage, which was unveiled in March 2019. The Logistics Efficiency Enhancement Program, which the government has started, will improve infrastructure and information technology in order to have better infrastructure for renewable energy. The Indian government wants to create "Green cities" in each state in the nation, which will employ electric public transportation and solar rooftop systems to generate all of their own green energy. In summary, there is a lot more progress to come as India continues to modernise its infrastructure and include the necessary technologies to create a more sustainable ecology. The aforementioned statistic makes it evident that the nation's capacity for producing renewable energy has reached a new high, with around 18% of the overall capacity making up about 57,245 MW. A detailed breakdown of this installed capacity reveals that more than 50% of it is made up of wind energy, 20% of it is made up of solar energy, and the other 20% is made up of small hydro, biomass, and waste-to-energy sources. The most recent trend, however, indicates that solar energy is taking up more and more room in the renewable energy basket.

Finance Angle

There are additional benefits of using green energy. It also has a solid financial foundation.By 2040, renewable energy is anticipated to produce 49% of all electricity, according to IBEF. The yearly savings from switching to renewable energy over coal will be INR 54,000 crore. The International Renewable Energy Agency estimates that switching from costly coal power to renewable energy will save operators USD 32 billion annually and reduce carbon dioxide emissions by almost three billion tonnes (IRENA).There are benefits for everyone, thus the right legislative changes and financial incentives will pave the road for gradual adoption of renewable energy. While the initial technology and infrastructure setup may be costly, as economies of scale spread and usage increases, there will be more efficiency and lower costs across the chain. Recently, a range of investors have entered the renewable energy sector in India, despite the fact that bank financing

still dominates the country's renewable energy financing structure. They include development banks, private equity firms, institutional investors,and commercial banks. The presence of different investor categories in the market for renewable energy is shown in the table below (Table 1). The data shows that venture capital investors are the most recent investors in the market, supporting the equity component of the project-based financing model. The lack of international banks, however, stands out in contrast to their presence. According to a thorough analysis of bank and non-bank funding of renewable energy projects, many banks have invested around $2,570 million (Please refer to Table 2). About 20% of this has been committed, according to IDFC. The table also amply illustrates the fact that non-banking financial firms have made the majority of the pledges.

The Big Picture

This unprecedented transition to cleaner, more environmentally friendly energy is proceeding quickly. According to the Ministry of New and Renewable Energy (MNRE), India's green energy sector attracted foreign direct investment (FDI) of USD 7.27 billion from 2014–15 to June 2021, of which USD 797.21 million arrived during 2020–21 alone. India just declared at COP26 in Glasgow that it would eliminate all net carbon emissions by 2070. More than ever, there is a chance for the public and private sectors to work together to provide the necessary infrastructure and engage in technical power plays. The likelihood of employment is strong, and as the scale rises, financial repercussions are favourable. It is doubtful that we will see catastrophic overhauls like we did in 2020, despite the fact that COVID-19's incoming waves, particularly the most recent surge of Omicron, occasionally reinstate some level of uncertainty. Economic impetus will reappear when this wave peaks and then tapers off in the upcoming months. Green energy will keep pursuing its goal against a larger backdrop, and we should too. In order to partner in this green energy initiative, we must choose the appropriate initiatives and fields.

Applications of Green Energy

Future sustainable energy scenarios are anticipated to heavily rely on green energy technology. Energy demand will probably be the main determinant of the precise function of green technology and energy. Therefore, it will be feasible to generate green energy from renewable energy sources such as hydraulic, solar, wind, geothermal, wave, biomass, etc. in order to offset the energy need. Green energy and technology may be applied in a variety of application domains. Thus, it can be claimed that readily available green technology and energy sources can be beneficial.

a. promote environmental protection and sustainability, boost energy security,

b. encourage the creation of fresh, eco-friendly technology,

c. lessen soil, water, and air pollution, forest loss, sicknesses, and fatalities connected to energy use,

d. lessen or end disputes between nations over energy supplies, etc.

Green energy and related technologies are thus required to preserve global stability by minimising the negative impacts of the usage of fossil-based energy. As a result, the significance of green energy in addressing global issues and establishing a sustainable energy system should be emphasised. A transition to a green energy economy should also be encouraged, and developed nations in particular should increase their investments in green energy and technologies.

Status of Renewable Energy Sources

There are regional differences in the growth of the renewable energy sector. According to statistics on renewable share, the South zone dominates the leaderboard by a margin of 22.5 percent, followed by the Islands (12.9%), Western (12%), North (9%), Northeast (8.7%), and Eastern (1.4 percent). When compared to other renewable technologies, wind technology has more grid connections and is more widely accepted in India. End of March 2015 saw a total installation of grid-interactive renewable energy of 35.77GW, with little under 1.1GW coming from off-grid 3 and captive power capacity. Grid-connected wind makes up 23.44 GW of the total, with the next largest contributions coming from small hydro (4 GW), solar (3.7 GW), bagasse 4 cogeneration (3 GW), biomass (1.4 GW), and waste to energy (115MW). There are now roughly 4.8 million family biogas plants running under the heading of alternative renewable energy systems. Families in remote areas that might not have access to liquefied petroleum gas, electricity, or piped natural gas can cook their food using domestic biogas systems. To address the needs of household or business customers for hot water, about 8.9 million square metres (5 acres) of solar water heating collection areas have been erected.

In 2013–14, India exported other photocells worth $4.21 million and solar/photovoltaic cells for $282.58 million. According to the Directorate General of Foreign Trade (India), India bought solar/photovoltaic cells for $711.12 million and other photocells worth $39.72

million over the same time, resulting in a cumulative trade imbalance of $464 million. On the other side, in 2013–14, windmills, wind turbines, and engines produced a trade surplus of $3.58 million.A brief explanation of wind, solar, small hydro, and waste to energy is described in the following sections.

Conclusion:

Achieving net zero is not reducing the dangerous greenhouse gas emissions. India's energy emissions must benefit its citizens, and good policies can reduce the trade-offs between affordability, security and sustainability. Green hydrogen will be playing a major role to achieving the net zero and decarbonising the difficult sectors. India wants to become a global hub for the production of green hydrogen and its exports. India can definitly create 5 million ton of hydrogen

just by replacing grey hydrogen in the fertiliser sector. This 5 million tonnes will give the abatement of 28 million tonnes of CO_2. This proportion will be growing as we increase green hydrogen economy and will result in production of more than 400 million tons of CO_2 by 2050.

India is one of the biggest developing economy having more than 1.3 billion people. NITI Aayog and IEA will be working together to help India to grow and give a better quality of life to the citizens.

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