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A study of Renewable Energy Policies and Regulatory Framework on Environment Protection

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Abstract- India is a nation currently; the country is undergoing significant economic progress while the changing economy is thrusting on surplus electrical power. Every year, the grid could further slowdown population growth, economic growth and the demand for electricity. Consequently, it is vital to intensify the installed power. India currently faces enormous challenges to meet its energy requirements, and current energy arrangements are inherently unsustainable. India has to sustain its economic development rate of 8,2 percent and satisfy its citizens' basic energy needs to expand energy supplies by three to four times and increase its capacity to generate power by between five and six times compared to 2003-04 levels, in order to eliminate poverty. Furthermore, the current capacity of around one lake and fifty thousand MW in India must reach almost Euit Lakhs MW by 2031. Meeting the energy sector challenges is essential for the financial development of India and ensuring the country's energy security. Conventional energy sources are limited and insufficient to meet current energy requirements; it is therefore cautious to develop all alternatives available. While significant growth in the deployment of renewable energy has been apparent in the past decade and renewable power generation has been rapidly increasing, current figures are not sufficient to address energy security problems, energy reliance on fossil fuels, environmental protection issues and social equity. Even after the huge potential is realized, India has been given an abundance of renewable resources, while renewables still account for only 17 per cent of the country's total installed capacity. At the same time, sufficient importance must be attached to energy efficiency and conservation. In particular, measures shall be taken to enhance efficiency, transmission and distribution of electricity. A supportive policy and regulatory environment is necessary in order to encourage green growth, because a competent legislative framework has always been the main promoter of technological change in a country.

Keywords- Renewable Energy, Policies, Framework, Environment Protection, transmission

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1. INTRODUCTION

Moreover, a doubling of renewable energy levels by 2030 could, by now, reduce carbon emissions by 50 percent to below 2°C and prevent a catastrophic climate change. The average global temperature rise will be below 2°C. Renewable energy sector growth has exceeded all expectations in the past ten years. Global installed capacity and renewable energy production have grown significantly in that increasing number of countries worldwide choose a supportive regulatory environment to boost the renewable energy sector's development [8]. By 2015, some 164 nations worldwide had renewable energy targets, of which nearly 59 countries had legally binding objectives, with approximately 145 already implementing policies for supporting renewable energy. Today, Germany's commitments to a sustainable renewables economy, China's growth in the renewable industry, as well as Denmark's commitment to 100 percent of renewable energy sources by 2050 are inspiring other countries around the world to seek a renewable energy-based future. In addition, renewable energy is a central part of India's energy plans and regulations, especially since climate change mitigation became important in international policy making [9]. India is changing strongly its energy policies and strategies to support renewable energy technologies in order to support green growth in the country. The aggressive objective of reaching 175GW of renewable energy capacity was set in India by 2022. In 2017, renewable energy accounts for about 17% of the total capacity installed in the country, nearly null in 1985. In renewable energy installed capacity, India ranks sixth worldwide. In addition, capacity addition of 72,400 MW was planned at national level by end of the 13th Plan 2022. A dynamic national purchase obligation target is set in the 2008 National Climate

Change Action Plan to boost the nation's deployment of renewable energy [10].

This development in India is the result of the international platform initiatives in which India became part of and made international obligations such as domestic duties through local laws and policies under Art 253 and Art 51C of the Indian constitution. In addition, India has also taken part in agreements with other nations. Enabling policies and framework governance creates stable and predictable investment environments, helps to overcome obstacles and ensures predictable project income streams. The case studies further show the efficiency and success of government policies shaping renewable energy growth in India as a part of the governance of rural India and renewables as well as of the energy security program in India. The analysis of effective government policies and initiatives in various countries, particularly the way in which renewable energy has been regulated, will also help to outline the future renewable energy expansion policies for India [11]. Dedicated targets for renewable energy and efficient policies must be developed to promote market behaviour, as well as government strong commitments. The theoretical literature suggests, in order overcoming the externalities and barrier to growth of renewable energy in a country, government intervention to frame effective regulations and to implement environmental and energy policies.

2. RENEWABLE ENERGY: GLOBAL OVERVIEW

Worldwide, the use of renewable energy is growing at a significant rate. Roughly 8% of growth and renewable capacity were reported in 2018. Around 61% of all new renewable energy facilities originated in Asia, compared to 8.4% in Africa. One-third of the world's power capacity now includes the renewable energy sector. The total capacity to generate renewable energy worldwide was more than 2300 Giga Watt in 2018, when more than 1100 Gigawatt in overall capacity came from Hydropower. The next major renewable resources with over 1000 Giga Watt RE power were Wind and Solar Power. In 2018, approximately 170 Giga watts were added to renewable capacity.

The renewable energy capacity that has been newly installed set new records in 2016 and a further 160 Giga Watt, including large hydropower plants, was worldwide added. The added capacity has grown to almost 9 percent worldwide, thus bringing the total RE installed capacity to almost 2.017 GW by 2016, including large hydromass. The increase in capacity is considered to be the highest growth in a year to date. The Solar PV held its major stake of 47% in newly installed renewable energy, while the wind stood at 34% and the hydropower stood at 15.5%. It is therefore obvious that in 2016, renewables represented approximately 62 per cent of net energy supplies worldwide.

As far as renewable energies are concerned, Figure 1 shows the top six nations in 2016. China has a capacity installed of about 252 Gigawatts of renewable power, while the US and Germany have respectively 148 and 90 Gigawatts.

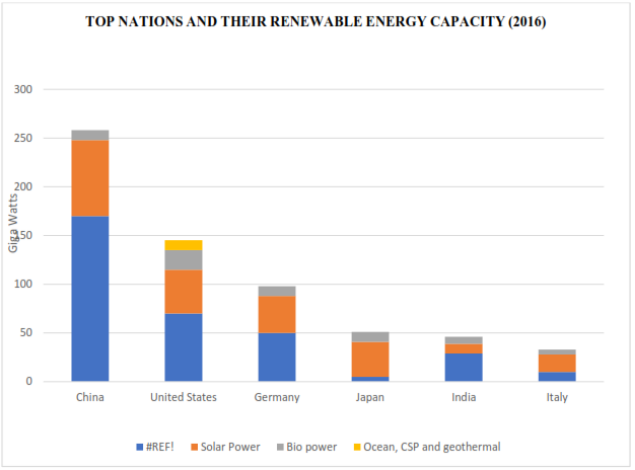

Figure 1: Top Nations and their renewable energy capacity (2016)

The figure above shows clearly that China occupies first place in the RE sector followed by the US in the second place, followed by Germany in the third. While India ranks fifth among the top six countries, it ranks fourth in terms of installed wind power. Table 1 shows the cumulative installed capacity ranking of countries by the end of 2016.

Table 1: Country Wise Cumulative Installed Capacity (2016)

Energy Sources	1		2		3		4		5		World
Installed Capacity		GW		GW		GW		GW		GW	GW
Geothermal	US	3.6	Philippines	1.9	Indonesia	1.6	New Zealand	1.0	Mexico	0.9	13.5
Hydropower	China	305	Brazil	97	US	80	Canada	79	Russia	48	1096
Solar PV	China	77.4	Japan	42.8	Germany	41.3	US	40.9	Italy	19.3	303
Wind	China	168.7	US	82.1	Germany	49.5	India	**28.7**	Spain	23.1	487
Bio- Power	US	-	China	-	Germany	-	Brazil	-	Japan	-	-

Hence, Table 1 shows the ranking of countries as per total installed capacity till end 2016 and certainly, it can be seen that China is the leader in the RE sector, while India ranks at fourth place in regard to cumulative installed capacity of wind. While USA is also leading in the renewable installed capacity

whereas Germany is at third position in Solar, Wind and Bio Energy renewable installed capacities.

3. POTENTIAL, TARGETS & ACHIEVEMENTS OF RENEWABLE ENERGY IN INDIA

India has huge potential for Renewable Energy sources and realizing this potential to the fullest will be helpful in increasing the total installed Energy Capacity thereby satisfying the existing Energy requirements of the country. This section provides insight towards the potential of our Country in generating Energy from Renewable sources including the achieved potential and the future targets set by the Government of India in recent times.

1. Potential of Renewable Energy in India

In the last few years renewables have clearly had an impact on the Indian society. India has also greatly changed its policy structure for renewables. In two main sectors, Solar and Wind Energy, the biggest plans for growth and development can also be seen with the aim of enhancing their role in the overall energy contribution. Only because of the main focus of the government of India among other 40 nations on the nation's promotion of renewable energy. The approximate renewable energy potential of different sources in India is approximately 910 GW, MNRE studies show. Solar energy has a maximum potential of around 750 GW in India, compared to 102 GW in wind power after solar. Although Small Hydro & Bioenergy's potential is not that large and accounts for only 20 GW or 25 GW.

2. Renewable Targets and Achievements

The Government of India has aimed to achieve the target of 175 GW of renewable installed capacity by year 2022, the source wise target has been has been explained in the figure 2 below.

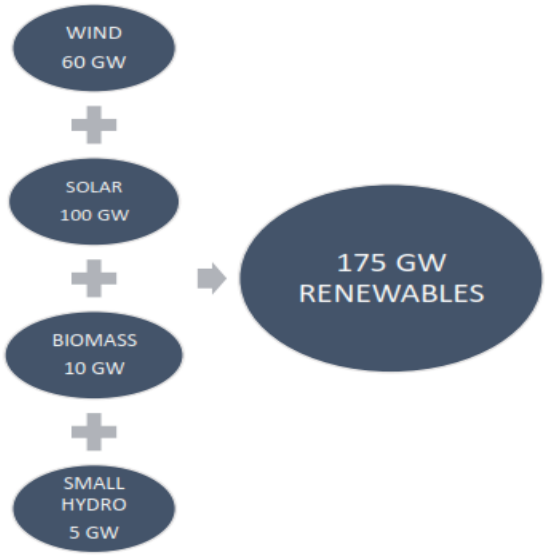

Figure 2 Target of 175 GW of Renewable Installed Capacity By 2022

Thus, it is clear from the figure that the target was aimed to achieve:

a) Wind- 60GW,

b) Solar- 100 GW,

c) Biomass- 10 GW, and

d) Small Hydro- 5 GW.

Out of 100 GW of Solar Energy, the 40 GW is estimated to come from Solar Roof Top Plants whereas remaining i.e. 60 GW is targeted to be achieved through grid connected medium and large solar projects.

3.1 Comparing Renewable Energy Potential with Future Targets

Figure 3 shows the renewable energies potential in relation to the 2022 RE target. The figure shows that the solar energy potential is 750 GW, with 100 GW as the target. The target is 60 GW for wind energy and the potential is 302 GW. The bio-energy and small hydro potential are 25 GW, 20 GW, and the target is 10GW and 5GW. This shows that the government's targets for 2022 are considerably small, in addition to such a huge potential for renewable sources in India. Aggressive targets should therefore be aimed at achieving a rapid green growth in India.

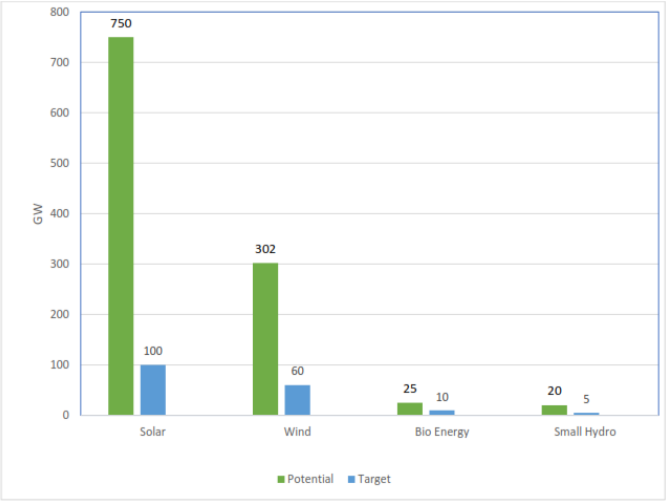

Figure 3: Renewables Potential Vs. 2022 Target (GW)

3.2 Renewable Energy Capacity Addition Targets till 2022

The wise year and the source of wise government expansion targets for renewable sources are described in Table 2. The table shows that in 2015

only 35 GW was achieved with renewable capacity, compared to 175 GW with renewable installed capacity as a target for 2022. In achieving the goal, about 20% of the total renewable energy capacity is achieved and more than 20% of the country's electricity demand from renewable energy sources will be satisfied. Further the nation will be able to generate around 320 Billion Units of electricity which mean:

a) Solar- 162 Billion Units,

b) Wind- 112 Billion Units,

c) Biomass- 38 Billion Units, and

d) SHP- 15 Billion Units.

Table 2: Year wise Renewable Energy Capacity Addition Targets till 2022

Cumulative installed capacity	Rooftop Solar	Ground-Mounted Solar	Solar	Wind	Small Hydro	Biomass	Total
Year	(GW)	(GW)	(GW)	(GW)	(GW)	(GW)	(GW)
2014-15			3	24	4.1	4.4	35.5
2015-16	0.2	1.8	2	3.2	0.14	0	5.3
2016-17	4.8	7.2	12	3.6	0.14	0.9	16.7
2017-18	5	10	15	4.1	0.14	0.9	20.2
2018-19	6	10	16	4.7	0.14	0.9	21.8
2019-20	7	10	17	5.4	0.14	0.9	23.5
2020-21	8	9.5	17.5	6.1	0.14	0.9	24.7
2021-22	9	8.5	17.5	8.9	0.14	0.9	27.5
Total	**40**	**60**	**100**	**60**	**5.08**	**9.98**	**175**

3.3 Accomplished Targets for period 2012 to 2017

Table 3 provides the targets set by the Government for the period of 2012 to 2017. It is observed that the government was successful in achieving the desired targets for the specified period. But as stated earlier the intended targets are not enough to support the projected Green Energy Revolution in the country.

Table 3: Accomplished Targets for period 2012 to 2017

12th PLAN PERIOD (2012-2017)	
TOTAL CAPACITY TARGET= 30 GW	TOTAL TARGET ACHIEVED= 32.7 GW
Solar = 10 GW	Solar = 11.4 GW
Wind = 15 GW	Wind = 15 GW
Other Sources = 5 GW	Bio-Power = 5.3 GW
	SHP = 1 GW

Thus, although the overall capacity objectives were 30 GW, the overall goal achieved exceeds this target and the goal of 32,7 GW is achieved during the period from 2012 to 2017, it is clear from the above table. It should be noted that 11,4 GW of solar energy is obtained, and 15 GW, 5,3 GW and 1 GW of wind, bio-power and SHP are achieved.

4. SCOPE OF RENEWABLE ENERGY PENETRATION IN HEAVY INDUSTRIES

Energy-intensive are heavy industries such as cement, pulp and paper, steel, chemical and petrochemical. Cost of electricity and fuel are needed during processes at almost 50% of production costs. According to the report on 'renewable energy in industrial use' submitted by the United Nations Industrial Development Organization (UNIDO), industrial production will increase by four by 2050. Improved energy efficiency, renewable energy and CO2 capture and storage systems must make a significant contribution to controlling greenhouse gas emissions. In those industries today, renewable energy unfortunately plays a very small role. A Report of the International Renewable Energy Agency (IRENA, in Spanish) states that there is a need for penetration of renewables into on-site power generation and energy decarburization, given that wind, solar photovoltaic (PV), concentrated solar energy (CSP) and certain biomass technology cost for renewable electricity generation have decreased. From the Indian perspective there is a huge chance to install wind and solar power generation units for cement plants in India according to the Confederation of Indian Industries (CII), because most of these plants have enormous hot and dry spaces with them. No detailed analysis is available to show how renewable energies penetrate heavy industrial units to reduce pollutant emissions and the possibility of replacing petroleum diesel with other less polluting or less costly fuel such as bio-diesel. There is also no analysis of the feasibility in the litter.

4.1 Hybrid Renewable Energy Systems

The literature survey shows that renewable energies are today a must in the power industry, because it is a clean technology, and that there is much less of it used for that. Furthermore, it is found that there is a huge scope for the penetration of power through renewable sources in production units. There are various renewable technologies available for electricity generation, but the use of solar and wind systems in local energy production are a promising source of electricity (Dursun et al. 2013). Depending on one technology, the system will now be over-sized and the initial costs will increase (Sen R. et al., 2014). The system size can be increased, but the system costs can be increased by the size of the system components, whereas the size could lead to power failure (Bajpai P. et al., 2012). Hybrid energy systems also tend to be more reliable and less costly than individual renewable energy systems for electricity (Hiendro et al., 2013). Thus, the preferential consideration of hybrid renewable energy systems (HRES). HRES combines 2 or more renewable complementary sources such as wind and solar and one or more conventional sources such as a diesel generator (Belmili H. et al., 2014). A hybrid system as shown in Fig. 4 could generally be integrated. Diesel fuel is used to enhance the

reliability of power supply in hybrid system combinations. But emissions from such systems are another issue that needs to be tackled to ensure that the environment is clean and green. For this reason, the parameters for optimization, in addition to reliability, must also be considered for the combination of diesel generator with renewable sources.

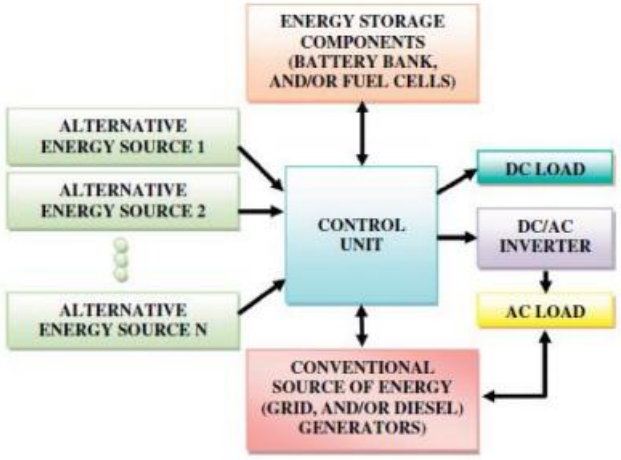

Fig. 4 General hybrid energy system architecture

5. CONCLUSION

Renewable energies, often called clean power, come from persistently regenerated natural sources or methods. Although we often believe that renewable resources are an important new energy source, we are surprised that we have long used the power of nature. There has been considerable global expansion in the recent past of the renewable energy sector. Two main drivers of worldwide renewable energy use have been energy efficiency, energy insecurity, dependence on fossil fuels, and carbon emissions. The transition to sustainable non-conventional and renewable sources, such as the winds, solar, hydroelectric power, bioenergy and nuclear, is evident from conventional sources such as coal, oil, natural gas and lignite. Similarly, the challenges of increasing domestic energy consumption, increasing coal demand, significant import dependence have made renewable energy, an important element of India's energy scheme. The most prominent wind energy technology in the world has been the fourth largest installed capacity in the world. In 2016 the global installed capacity of renewable energy was around 2.017 GW, which represented 30% of the installed power, including large hydrocarbons. India, the world's third-largest producer of energy, has total installed capacity of 326,832,55 MW in 2017, and renewable energy accounts for some 17% of total installed capacity. Even if the huge potential is realized, renewable energy is still a small fraction of the installed capacity that accounts for 17% of the total installed capacity; India has over 150,000 MW of exploitable renewables. While the generation of electricity from renewable sources is rising rapidly and a substantial increase in the use of renewable energy has been evident since the last decade, the current figures are not yet sufficient to address energy safety issues, fossil fuel energy dependency, environmental protection issues and social equity.

REFERENCES

1. Buticchi G. Barater D. Concari C. &Franceschini G. (2016).'Singlephase series active power filter with transformer-coupled matrix converter', IET Power Electronics, vol. 9, no. 6, pp. 1279-1289.
2. Carlos DS. Ferreira V. Borges LE. & Lambert G. (2007). 'Optimizing the series active filters under unbalanced conditions acting in the neutral current', Proceedings on IEEE/IAS Conference, pp. 943-948.
3. Cavalcanti MC. Azevedo GMS.Amaral BA. &Neves FAS.(2005). 'A photovoltaic generation system with unified power quality conditioner function', Industrial Electronics Society, IECON 2005. 31st Annual Conference of IEEE, pp. 750-755.
4. Chandani M. Chovatia1 Narayan P. & Gupta PN. (2012). 'Harmonic mitigation using shunt active filter at utility end in grid connected to renewable source of energy', International Journal of Emerging Technology and Advanced Engineering, vol. 2, no. 8, pp. 230-235.
5. Chang C. Wu C. & Chen H. (2009).'Developing a Project Evaluation and Testing Model to Assess Stable Photovoltaic Slicing Machine', Journal of Testing and Evaluation, vol. 37, no. 3.
6. Chaoui A. JeanPaul G. FatehKrim& Gerard C. (2007).'PI Controlled Three-phase Shunt Active Power Filter for Power Quality Improvement', Electric Power Components and Systems, vol. 35, no. 12, pp. 1331-1344.
7. Corasaniti VFA. Barbieri MB. Arnera PL. Valla MI. (2009). 'Hybrid Power Filter to Enhance Power Quality in a Medium-Voltage Distribution Network', IEEE Transactions on Industrial Electronics, vol. 56, no. 8, pp. 2885-2893.
8. Dasgupta S. Sahoo SK. Panda SK. &Amaratunga G. (2011).'SinglePhase Inverter-Control Techniques for Interfacing Renewable Energy Sources With Microgrid-Part II: Series-Connected Inverter Topology to Mitigate Voltage-Related Problems Along With Active Power Flow Control,' IEEE Transaction on Power Electronics, vol. 26, no. 3, pp. 732-746.
9. Dhanapal S. & Anita R. (2016).'Voltage and Frequency Control of Stand Alone Self-Excited Induction Generator Using Photovoltaic System Based STATCOM', Journal of Circuit Systems Computers, vol. 25, no. 4, pp. 1650031 (24 pages).

10. Du X. Zhou L. & Tai HM. (2011). 'Average Current Control of a Series-Type Single-Phase PFC With Hybrid Modulation', IEEE Transactions on Power Electronics, vol. 26, no. 9, pp. 2381-2385.

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