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### BARRIERS IN FLOURISHING OF SUSTAINABLE ENERGY RESOURCES IN INDIA

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**Abstract:** India has set out on the path of harnessing renewable energy (RE) sources than never before. The reasons are many and are not hard to find within the chronic shortage of power, matters of energy security and environmental concerns. However, RE capacity addition and development of the sector suffers on account of a number of constraints, overlaps and gaps prevalent in the current policy and regulatory environment. There is therefore a need to review the existing environment for development of RE and propose a new approach to the development of this sector. With this objective, this paper examines the current status of RE development in India and the existing environment for such development.

RE technologies (RETs) in India can be divided into two categories: (i) near commercial and commercial technologies such as wind, small hydro power (SHP), solar PV, biomass and co-generation (COGEN) that have matured and are being deployed or are close to deployment, and (ii) emerging technologies such as solar thermal and biofuels that will need time to mature. The latter will also have to undergo pilots before commercial deployment. This paper focuses on the RETs that fall in the first category. The paper also restricts itself to grid-connected RE.

**Keywords:** Barriers, Solar Power, Wind Power, Hydro Power, Bio Mass Power.



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## INTRODUCTION

India is the fifth largest energy generating country in the world and is the first country in the world to setup a ministry of non-conventional energy resource in early 1980. India's harnessing of renewable energy strategy is going up in the renewable energy in India.

As of September 30, 2016 cumulative grid tied renewable energy capacity (excluding large hydro power) reached about 44.24GW. 61% of renewable power came from the wind, while solar contributed 19%. Large hydro installed capacity was 43.11GW as of September 30, 2016 and is administered separately by the ministry of power and not included in the MNRE targets.

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## CURRENT STATUS OF RENEWABLE ENERGY DEVELOPMENT IN INDIA

India was the first country in world to set up a ministry of non-conventional energy resources in early 1980s. As of September 30, 2016 India's cumulative grid interaction or grid tied renewable energy capacity (excluding hydro power) reached about 44.24 GW. 61% of the renewable power came from wind, while solar contributed nearly 19%. Large hydro installed capacity was 43.11 GW as of September 30, 2016 and it is administered separately by the ministry of power and not included under MNRE targets.

MNRE or Ministry of New and Renewable Energy was established as the Ministry of Non-conventional Energy sector in 1992 and it adopted its current name in October 2006.

Renewable energy yet contributes a small sector in Indian power sector. It is clear that wind energy makes up the largest proportion and followed by solar power. It has also overtaken the installed nuclear power capacity by nearly a factor of two. MNRE started laying actionable plans for renewable energy to make a quantum jump in its growth.

MNRE renewable electricity targets have been up scaled to grow from just under 43 GW in April 2016 to 175 GW by the year 2022, including 100 GW from solar power, 60 GW from wind power, 10 GW from bio power and 5 GW from small hydro power. The ambitious targets would see India quickly becoming one of the leading green energy producers in the world and

surpassing numerous developed countries. The government intends to achieve 40% cumulative electric power capacity from non-fossil fuel sources by 2030.

### Grid connected renewable electricity

**Table 1: Installed Grid Interactive Renewable Power Capacity in India as of November 30, 2016 (MNRE)**

Source	Total Installed Capacity (MW)	2022 Target (MW)
Wind Power	28419.40	60,000.00
Solar Power	8874.87	100,000.00
<u>Biomass Power</u> (Biomass & Gasification and Bagasse Cogeneration)	4932.33	*10,000.00
<u>Waste-to-Power</u>	114.08	
Small Hydro Power	4324.85	5,000.00
<b>Total</b>	<b>46,665.53</b>	<b>175,000.00</b>

\* The target is given for Bio Power which includes biomass power and waste to power generation.

Table 1 shows the fast and rapid pace for its development. Indian government is quite close in achieving its high targets. The wind power is more than half way there and solar power is 7% below their set targets but seeing the rapid growth the results will be positive. Bio energy is also half way towards its targets and small hydro power is already 85% done. Overall India was 24.5% towards meeting its final 2022 renewable power installed power capacity of 175 GW.

In more ways than one, 2014-15 has been a decisive leap forward for renewable energy in India. In his inaugural address to the 1st Renewable Energy Global Investor Meet & Expo (RE-INVEST 2015) organized by the Ministry of New and Renewable Energy (MNRE) during 15-17 February, 2015, Shri Narendra Modi, Prime Minister of India, has articulated the future of renewable as “moving from megawatt to gigawatt”. The RE-INVEST has laid a strong foundation for the penetration of renewable energy in India in the coming years.

The Indian Solar Loan Program, supported by the UNITED NATION ENERGY PROGRAMME has won the prestigious energy grid World award for Sustainability for helping to establish a consumer financing program for solar home power systems. Over the span of three years more than 16,000 solar home systems have been financed through 2,000 bank branches, particularly in rural areas of South India where the electricity grid does not yet extend.

Allied benefits of energy security are savings in foreign exchange on account of reduction in import of conventional fuels. Another off-shoot of any scale-up in RE investment and development would be more investment in RE manufacturing. This in turn would lead to savings in foreign exchange (from import of RE equipment), allow development of equipment manufacturing and ancillary industries specific to renewable energy technologies and generate employment.

## **BARRIERS TO RENEWABLE ENERGY DEVELOPMENT**

There is no single comprehensive policy statement for renewable energy in the country. A closer look at some of the financial incentives for renewable reveals a variety of reasons they sometimes worked against the development of renewable energy technologies. Plans and policies does not go hand in hand. Some of the common barriers are:

### **A. POLICY FRAMEWORK FOR RENEWABLE ENERGY:**

Policies are made up with every coming plan but with them their implementation lags. The policy framework at state level is no good. Wind power growth has hinged on the 80% accelerated tax depreciation that is provided by Government of India.

It has also seen that buyers take decision from investments in wind power projects at the last moment, the equipment suppliers in the country have evolved as the developers themselves.

### **B. INSTITUTIONAL BARRIERS:**

Lack of coordination and communication between various ministries, agencies, institutes and other stake holders delays and restrict the growth and development of RE in technology.

IREDA started accepting applications from wind projects under Generation Based Incentive scheme soon after the announcement of this scheme. However, the Government of India had rejected the applications that were made before the notification of the schemes through the gazettes and was considering only applications that were made after such notifications.

### **C. FINANCIAL BARRIERS:**

The viability of various technologies varies depending upon the location and context which is related to the technical input output parametric relationships. Extending these to financial results in using their opportunity costs poses a real challenge for the energy planner. Because of difficulties in calculating realistic costs and benefits of renewable energy projects, financial barriers act as a critical constraint to the dissemination of RETs in India.

Lack of adequate financial resources has been a chronic problem for commercialization of RETs. In the initial phase of development of any new technology institutional financing becomes particularly important in accelerating market linkages. The initial investment risk in renewable energy is greater since they are neither proven nor in high demand, making coverage of venture

risks an important aspect of financial arrangements. It is often argued that many times it is risk coverage rather than capital cost that is a limiting factor in rapid commercialization of RETs.

In India power tariffs are highly underpriced and subsidized, especially for the rural sector and in some notified industrial areas. While considering cost benefits of RETs such direct subsidy on cost of power and indirect subsidy by way of subsidy on freight and coal are never calculated and hence conventional power costs are always more attractive and affordable than RETs. Power tariffs need to be rationalized and subsidies (except where they directly benefit the very poor) need to be abolished completely which would make RETs viable. Another sore point is funding and financing of installation of RETs. Most banks and institutions have cumbersome procedures which discourage probable investors. These are capital intensive equipment's and procedures should be simplified with a single window application submission and disbursal with very low rates of interests to encourage investment. Even IREDA, set up specifically to fund RETs has a set of cumbersome procedures, like any other institution [5].

Government was offering a substantial amount as subsidy to encourage investment and this has led to the formation of a subsidy mindset amongst users. Now that the subsidy on some RETs has been abolished/reduced substantially, this mindset of expecting subsidy is again acting as a deterrent. Most people now prefer to "wait and see" until subsidy is announced. Another barrier to growth and popularization of renewables is that there is no university offering exclusive degree/diploma course in renewables. Even in schools and at homes environment and renewables are not given due importance or acceptance [6].

Unless there is a sea change in government policy and outlook, peoples' perception of renewables and of environment, RETs will not reach the grassroots level in the foreseeable near or distant future.

## CONCLUSION

1. Renewable energy sources have great potential in our country, so that investment projects can be developed to ensure a green energy production, necessary for a sustainable future.
2. Through this work, we tried to outline the barriers that tend to limit the development of renewable energy, without claiming that we have given them all. These are just some of the most common challenges when it comes to investment in RES projects. Grouping them into four categories is one chosen by the authors in the literature can be found several approaches.
3. The reported barriers can be eliminated through various policy measures in the energy sector and beyond. Identifying and removing them is important, since many of renewable energy sources are produced with low cost at small scale, on niches. For example, photovoltaic panels are still not effective in large-scale applications..

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