

Renewable Energy Market in India – an Overview



Management

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ABSTRACT

The potential of renewable energy sources is enormous as they can in principle meet many times the world's energy demand. Renewable energy sources such as biomass, wind, solar, hydropower, and geothermal can provide sustainable energy services, based on the use of routinely available, indigenous resources. A transition to renewable-based energy systems is looking increasingly likely as their costs decline while the price of oil and gas continue to fluctuate. It is becoming clear that future growth in the energy sector will be primarily in the new regime of renewable energy. Because of these developments market opportunity now exists to both innovate and to take advantage of emerging markets to promote renewable energy technologies, with the additional assistance of government. This paper gives an overview of the renewable energies in India while evaluating the current status, major achievements and future market opportunities of renewable energy in India.

1.1 INTRODUCTION

The potential of renewable energy sources is enormous as they can in principle meet many times the world's energy demand. Renewable energy sources such as biomass, wind, solar, hydropower, and geothermal can provide sustainable energy services, based on the use of routinely available, indigenous resources. A transition to renewable-based energy systems is looking increasingly likely as the costs of solar and wind power systems have dropped substantially in the past 30 years, and continue to decline, while the price of oil and gas continue to fluctuate. In fact, fossil fuel and renewable energy prices, social and environmental costs are heading in opposite directions. It is becoming clear that future growth in the energy sector is primarily in the new regime of renewable, and to some extent natural gas-based systems, and not in conventional oil and coal sources. Financial markets are awakening to the future growth potential of renewable and other new energy technologies, and this is a likely harbinger of the economic reality of truly competitive renewable energy systems. Renewable energy sources currently supply somewhere between 15 percent and 20 percent of world's total energy demand. New renewable energy sources (solar energy, wind energy, modern bio-energy, geothermal energy, and small hydropower) are currently contributing about two percent. A number of scenario studies have investigated the potential contribution of renewable to global energy supplies, indicating that in the second half of the 21st century their contribution might range from the present figure of nearly 20 percent to more than 50 percent with the right policies in place.

1.2 ROLE OF RENEWABLE ENERGY RESOURCES IN INDIA

India is the fourth largest energy consumer in the world after the United States, China, and Russia. In recent years, India's energy consumption has been increasing at a relatively fast rate due to population growth and economic development. Rapid urbanization and improving standards of living for millions of Indian households, the demand is likely to grow significantly. In order to sustain the production, industries have opted for inefficient diesel -fuelled back-up power. India's energy planning, which is based on the twin objectives of high economic growth and providing electricity to all, is failing to meet either. The domestic power demand of India was 918 billion units in 2012. It is expected that at 9.8% annual growth the demand will reach 1,640 billion units by 2020. At this pace, India will require 390 GW in the next eight years which is almost double its current installed capacity of 210 giga watts (GW). There is growing en-

ergy inequity between rural and urban areas and also between the developed and developing states. There are millions who are yet to be benefited from electricity in rural India. The scarcity of electricity in rural areas in comparison to urban areas seems to be biased in de-livery through the centralized system. While the urban-rural difference in energy supply could be reduced through renewable energy, it is more complex to overcome the widening gap between developed and not so developed states.

1.3 COMPREHENSIVE VIEW ON RENEWABLE ENERGY MARKET POTENTIAL

- **Solar Energy Market Potential:** Using solar power to produce electricity is not the same as using solar to produce heat. Solar thermal principles are applied to produce hot fluids or air and photovoltaic principles are used to produce electricity. A solar cell is a semi-conductor device designed to turn solar irradiance into electricity. The solar power on the surface of earth is 10^{16} W. The total worldwide power demand of all needs of civilization is 10^{13} W. Therefore, the sun gives us 1000 times more power than we need. If we can use 5% of this energy, it will be 50 times what the world will require. Among the various renewable energy resources, solar energy potential is the highest in the country. The National Solar Mission targeting 20,000 MW grid solar Power, 2,000 MW of off-grid capacity including 20 million solar lighting systems and 20 million square meters solar thermal collector area by 2022 is under implementation.
- **Wind Energy:** Wind energy is one of the most promising alternative energy technologies of the future. During recent years, the amount of energy produced by wind driven turbines has increased rapidly due to considerable advancement in turbine technologies, making wind power economically compatible with conventional sources of energy. The use of wind power in India has been gaining importance with rapid installation in the last few years. Wind energy makes up the majority about 68 percent of the total renewable energy capacity installed in India. Initial estimates from Centre for Wind Energy Technology suggest that wind energy potential at 80 metres height (with 2 percent land availability) would be over 100 GW.
- **Hydro Power Potential:** Hydro projects in India, which are under 25 MW in capacity, are classified as "small hydropower" and considered as a "renewable" energy source. SHP is by far the oldest renewable energy technology used to generate electricity in India.

- **Biomass Renewable Energy Potential:** Biomass is a renewable energy resource derived from the carbonaceous waste of various human and natural activities. Biomass takes carbon out of the atmosphere while it is growing, and returns it as it is burned. If it is managed on a sustainable basis, biomass is harvested as part of a constantly replenished crop. Municipal solid wastes, animal and poultry wastes are also referred to as biomass as they are biodegradable in nature.

1.4 MARKET RELATED BARRIERS IN DEVELOPMENT OF RENEWABLE ENERGY

The current structure of subsidies in the power sector is such that subsidies are effectively being provided to conventional fossil fuel resources. These give conventional fuels an unfair advantage over RE, thereby giving the impression that the difference between the price of conventional power and RE based power is too high.

1.4.1 Market for RE

The market for RE projects/products in India can be classified into four segments: Government market: where the government buys the output of the projects as a consumer, often providing budgetary support for it. Government driven market: where the government pursues the use of RE in establishments outside its control for social reasons, often providing budgetary support or fiscal incentives for the same. For example, the government promotes the use of solar applications in schools, malls and hospitals. Loan market: where people take loans to finance RE based applications since self-financing is limited. Cash market: where High Income Individuals can buy RE based applications for meeting personal energy needs India is currently at an initial stage of the first two segments. The GOI is not focusing on promoting the third and fourth categories of RE, which may offer high potential for RE based applications.

1.4.2 Inadequate Market Prices

The price of RE power is determined on a cost-plus basis with the objective of ensuring cost recovery for RE projects. Pricing does not reflect environmental costs, thereby masking the striking environmental advantages of the new and cleaner energy options. As a corollary, it can be said that undertaking life cycle assessment costs of fossil fuels and RETs would serve to reduce the gap between the prices of fossil fuel based power and RE power.

1.4.3 Transmission Network

Availability of evacuation infrastructure and grid integration are amongst the biggest problems affecting the development of RE projects, particularly SHP projects or wind projects that are located at remote locations with limited or no evacuation infrastructure. Though states are required to provide the infrastructure for evacuation of power from RE projects, in practice it is the RE developer who has to provide for such infrastructure. This has an impact on the cost of the project.

1.4.4 High Equipment Costs

It is generally believed that volumes and advancement in technology would drive down capital costs. However, this is not always true. Several examples exist to this end - the automobile sector being, perhaps, the best example. Similarly, it has been observed that the capital cost of even the commercially deployed RETs has not declined over the years, despite increasing capacity. On the contrary, it has been observed that developers or equipment providers have been quoting increasing capital costs over the last few years.

1.5 CONCLUSIONS

The anticipated energy deficit in India during 2013-14 is 6.7%. To diminish the gap between demand and supply of energy we need to generate more power. India has plenty of renewable energy potential to bridge the gap between demand and supply. Renewables are expensive relative to traditional forms of energy. But the playing field isn't level. There isn't yet a cost of carbon for fossil fuels. There are other areas where renewable energy is put at a competitive disadvantage. Traditional energy industries get much more substantial government support, in the form of \$10 billion in annual tax incentives, or in the case of the nuclear industry, insurance. Solar appears "expensive", yet its costs for 30 years are known, while the costs of providing peak power from conventional sources is high and future costs are unknown. Political support for renewables is uncertain. To put most simply, the obstacles to great adoption of renewable energy and energy efficiency in India relate mostly to improper market signals and to poor regulation. The good news is that policies can be put in place to address these market failures, and in so doing can quickly unleash human and financial capital.

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