



ROLE OF RENEWABLE RESOURCES IN INDIAN ENERGY SECTOR

Rathod Praveen Lal. MA, BED Department of Economics, Osmania University, Hyderabad.

ABSTRACT

India is a developing country and for its sustained economic growth the development of power infrastructure plays a significant role. India was the fourth-largest energy consumer in the world after China, U.S. and European Union in 2013. India facing inadequate supply of energy. Realizing the fact that conventional sources of energy in security plan has to be formulated for promotion of renewable sources of energy. Renewable energy sector in India has emerged as a significant player in the power generation capacity. It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs and an essential player for energy access. It has been realized that renewable energy has to play a much deeper role in achieving energy security in the years ahead and be an integral part of the energy planning process. This study aims to examine status of renewable energy sources in India. Objectives in this paper: To understand the Need for renewable resources in Indian energy sector. To discuss the recent Schemes and Programmes of Government of India related to renewable energy sector. This paper is mainly based on secondary data.

KEYWORDS : Renewable energy sources in India. Role of renewable energy sources In Indian energy sector. Recent Schemes and Programmes of Government of India.

Introduction:

India is a developing country and for its sustained economic growth the development of power infrastructure plays a significant role. Realizing the fact that conventional sources of energy in the country (and outside) has a limited potential to meet the well-conceived and timely initiated energy security plan has to be formulated for promotion of renewable sources of energy. Renewable energy sector in India has emerged as a significant player in the power generation capacity.

It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs and an essential player for energy access. It has been realized that renewable energy has to play a much deeper role in achieving energy security in the years ahead and be an integral part of the energy planning process. There has been a visible impact of renewable energy in the Indian energy scenario during the last few years. Apart from contributing about 12.96% in the national electricity installed capacity renewable energy based decentralized and distributed applications have benefited millions of people in Indian villages by meeting their cooking, lighting and other energy needs in an environment friendly manner. Renewable energy landscape in India has, during the last few years, witnessed tremendous changes in the policy frame work with accelerated and ambitious plans to increase the contribution of renewable energy.

Status of Renewable energy sources in India:

As of 30th April 2016 India's cumulative grid interactive or grid tied renewable energy capacity (excluding large hydro) reached about 42.85 GW, surpassing the installed capacity of large scale hydroelectric power in India for the first time in Indian history 63% of the renewable power came from wind, while solar contributed nearly 16%. 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, 60GW 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 govt. intends achieve 40% cumulative electric power capacity from non-fossil fuel sources by 2030.

Renewable energy sources under the responsibility of the ministry of new and renewable energy by April 2016, wind power was the leading source of renewable power with 26.9 GW installed capacity, almost two third of the total renewable power installed capacity.

Solar power with 6.8 GW installed capacity and biomass power with

4.8 GW accounting for 15.8% and 11.3% of the total renewable power installed capacity. Small hydro power accounted for 4.3 GW and waste-to-power accounted for just over 0.1 GW installed capacity. Total installed renewable power capacity in this category was just under 43 GW by April 2016. Renewable energy has the potential to re-energize India's economy by creating millions of new jobs, allowing the country to achieve energy independence, reduce its trade deficits and propel it forward as a "Green Nation". In short, renewable energy offers too many benefits for India to ignore, or delay its development.

India was the first country in the world to set up a ministry of non-conventional energy resources, in the early 1980s. India's overall installed capacity has reached 329.4 GW with renewable accounting for 57.472 GW as of 14 June 2017. 61% of the renewable power came from wind, while solar contributed nearly 19%. Large hydro installed capacity was 44.41 GW as of 28 February 2017 and is administrated separately by the Ministry of Power and not included in MNRE targets. From 2015 onwards the MNRE began laying down actionable plans for the renewable energy sector under its ambit to make a quantum jump, building on strong foundations already established in the country. 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,

In 1981, the Govt. of India established a Commission for Additional Sources of Energy (CASE) in the Dept. of Science & Technology (DST) with a mandate to promote R&D activities in the field of renewable energy sources. In 1992, CASE was merged with the newly created Dept. of Non-conventional Energy Sources (DNES). In 2002, it was changed as Ministry of New and Renewable Energy Sources (MNRE). The electricity Act-2003 contains several provisions to promote accelerated development of power generation from non-conventional sources (Ishan and pallav, 2009). We can imagine a time when we may not be able to use all the material comforts we are used to, because of an energy crisis? Thus the importance of energy, renewable energy sources (RES) along with energy conservation cannot be overstated.

Objectives:

To understand the Need for renewable resources in Indian energy sector.

To discuss the recent Schemes and Programmes of Government of India related to renewable energy sector.

Methodology:

This paper is mainly based on secondary data and information

which is collected from the concerned sources as per need of the paper. The relevant books and documents of various department and organizations, articles, papers and web-sites are used in this paper.

Need for renewable energy sources in Indian energy sector:

India is facing an acute energy scarcity which is hampering its industrial growth and economic progress. Setting up of new power plants is inevitably dependent on import of highly volatile fossil fuels. Thus it is essential to tackle the energy crisis through judicious utilization of abundant the renewable energy resources, such as biomass energy, solar energy, wind energy and geo thermal energy. Apart from augmenting the energy supply, renewable resources will help India in mitigating climate change. India is heavily dependent on fossil fuels for its energy needs. Most of the power generation is carried out by coal and mineral oil-based power plants which contribute heavily to greenhouse gases emission.

The average per capita consumption of energy in India is around 500w, which is much lower than that of developed countries like USA, Europe, Australia, Japan etc. However, this figure is expected to rise sharply due to high economic growth and rapid industrialization. Renewable energy is a vital link in industrialization and development of India. A transition from conventional energy systems to those based on renewable resources is necessary to meet the ever increasing demand for energy and to address environmental concerns.

The major part of our energy mix consists of fossil fuels. They are finite sources and have serious environmental consequences. In time of depleting resources and climate threats, the best way forward for India is to take the dual path of energy efficiency and renewable power generation like wind power generation and solar electricity generation. It is imperative to tap in to these huge renewable power sources and judiciously utilize the non-renewable resources, keeping energy conservation in mind.

To achieve this, the renewable energy programme is investing in supporting mechanisms that strengthen the call for clean and renewable energy policies through advocacy and awareness building and creating a supportive renewable energy implementation environment. Its activities are also aimed at helping compliance with evolving renewable energy deployment targets; and building supportive policy evidence through research around grid as well as off-grid business models. 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 1,646 billion units by 2020. At this pace, India will require 390GW in the next eight years which is almost double its current installed capacity of 210 GW. There is growing energy 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 delivery 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. For economic as well as environmental reasons India needs to shift to non-polluting renewable sources of energy to meet future demand for electricity. Renewable energy is the most attractive investment because it will provide long-term economic growth for India. Renewable energy also has the advantage of allowing decentralized distribution of energy particularly for meeting rural energy needs, and thereby empowering people at the grass roots level.

In addition, renewable energy has the potential to create many employment opportunities at all levels, especially in rural areas. An emphasis on presenting the real picture of massive renewable energy potential, it would be Green Energy Revolution in India. India's search for alternative fuel that would ensure sustainable development on the one hand and the energy security on the other

begin in 1970 itself. Further, the ever increasing energy cost and the demand supply gap have compelled the Indian industry to look at new and renewable sources of energy as an option thus India has an established policy to tap the potential for renewable energy sources, irrespective of capacity.

Renewable resources grow faster, started overtaking oil and gas and have become the largest source of energy in terms of their growth. It is assumed that India and china may account for nearly half of incremental energy demand by 2030. Middle East is also emerging as a new demand Centre for energy. Due to urbanization, the share of the world's energy consumed in cities grows to two-thirds by 2030.

Due to the problems associated with the use of fossil fuels, alternative sources of energy have become important and relevant in today's world. These sources, such as the sun and wind, can never be exhausted and are therefore called renewable. Also known as non-conventional sources of energy, they cause less emission and are available locally. Their use can significantly reduce chemical radioactive, and thermal pollution. They are viable sources of clean and limitless energy. Most of the renewable sources of energy are fairly non-polluting and considered clean that is why everybody is looking for an alternative energy source to improve economy, to meet energy demand, to mitigate pollution, etc., (Manwell et al, 2007). Thus renewable energy sources have the twin advantages of free availability and non-polluting nature. The surge of installation of renewable energy shows that it is becoming cost competitive and scalable, at a time when India is struggling to meet its targets for conventional power capacity. In 2011 India invested \$ 10.3 billion in renewable energy, creating 52% growth in the sector.

India is one of the largest expanded power sectors in the world. Due to the continuous increment in electricity demand day by day Indian power sector is interfacing some challenges to maintain the balance between the power generation and demand with suffering from supply constraints and shortages in power. For maintaining the ratio of generation and demand of power, moving from conventional sources to non-conventional sources is not only an option, it is a necessity.

Role of renewable energy sources In Indian energy sector:

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. It is of paramount importance to provide an economical as well as well managed substitute of electric energy to the society. The renewable energy can be the only solution for energy crisis in this new millennium. This type of energy can boost the socio-economy of the nation and can be safely managed at individual level by the society.

The renewable energy source is only solution for future energy crises, which is cheap and clean as compare to non-renewable energy sources. The economy of the nation can be improved by utilizing such easily managed energy sources. The main sources are solar, thermal, solar PV, wind, geothermal, ocean thermal, ocean wave, ocean tide, mini hydro, bio mass, chemical waste fuel etc.

Solar energy status:

India is one of the few countries with plenty of sunshine with an annual average insolation varying from 4-7 kWh per m²/day with 250-300 clear sunny days per year. Various types of solar thermal devices like solar water heaters, solar cookers, solar stills, solar dryers and so are available.

Wind energy status:

India ranks first in the developing world for installed wind capacity. With nearly 850 megawatts of wind capacity, it ranks fourth in the world after Germany, The United States, and Denmark. Most of this development occurred in 1995 and 1996, when capacity expanded

by an average of several hundred megawatts per year. With electricity demand pressing, the government favored wind projects because they had a short gestation period and no air emissions.

Biomass energy status:

The biogas plants have been developed in India during 1930s and 1940s. The design has been improved during 1950s. India has vast land based, aquatic, forest and rural, agricultural biomass resources of every type. It serves many purposes like: - energy supply, rural development, waste disposal, environment balance.

Geo thermal energy status:

Geo thermal energy is a proven resource for direct heat and power generation. The geothermal fields in India are in form of hot water springs (40 to 98°C) and shallow water receives temperatures are less than 160°C. The important hydro geothermal resources locations are

- Puya hydro-geothermal field, Jammu & Kashmir.
- West coast hydro-geothermal field, Maharashtra and Gujarat.
- Tattpani hydro-geothermal field, Madhya Pradesh.

India has about 340 hot spring localities spread over. Each of these has capability of being developing into center of value-added activities through the use of geothermal heat.

Ocean energy status:

Ocean thermal power plant is envisaged in Kulasekhara patnam, Marakkanam, Ponducherry, Cuddalore and Tamil Nadu. The Indian Govt. has proved in principals the construction of 100 MW off shore power plants based on ocean-thermal energy conversion technology in 1991.

Ocean tide energy:

The most tidal potential is in Gujarat and west Bengal, which is about 10,000MW, Kutch in Gujarat and Sunderban in West Bengal. Due to high capital cost and low continuous power output tidal power plant is not so popular in India presently.

Survey of other sites in Orissa, Tamil Nadu, Kerala, Karnataka, Maharashtra and Andaman-Nicobar etc. are in progress though by the non-convention renewable energy department projects.

Ocean wave energy:

Ocean wave energy conversion has gained attention during recent years. Favorable sites have been identified in Tamil Nadu, Kerala and Gujarat etc. India's first ocean wave energy pilot power plant (OWE) has been installed in Vizhinjam Harbour near Thiruvananthapuram, Kerala has been commissioned in 1991. It is rated 150 KW.

The Government of India through Ministry of New and Renewable Energy (MNRE) is playing a proactive role in promoting an adoption of renewable energy resources by offering various incentives such as generation based incentives (GBIs), capital and interest subsidies, viability gap funding (VGF), concessional finance, fiscal incentives etc.

The government has created a liberal environment for foreign investment in renewable energy projects. The establishment of a dedicated financial institution-The Indian Renewable Energy Development Agency (IREDA), makes for renewed impetus on the promotion, development and extension of financial assistance for renewable energy and energy efficiency conservation project.

India has the fifth largest power generation portfolio in the world and its current renewable energy contribution stands at 44.812 GW which includes 27.441 GW of wind power and 8.062 GW of solar power installed capacity in the country (As on 31.07.2016).

Fourth largest installed capacity of wind energy.

Third largest installed capacity of concentrated solar power (CSP).

Renewable energy contribution 14.7% of the total installed capacity in the country as on 31.07.2016.

Ambitious target of 175 GW of renewable power by 2022 which will include 100GW of solar power, 60 GW from wind power, 10 GW from biomass power and 5GW from small hydro power.

The target of national solar mission has been up-scaled to 100 GW from 20 GW of grid connected solar power by 2022, which creates a positive environment among investors keen to tap into India's renewable energy potential.

Recent Schemes and Programmes of Government of India:

The Ministry has already initiated various Programmes in the urban sector for promoting solar water heating systems in homes, hotels, hostels and industry; development of SPV system/devices in urban areas for demonstration and awareness creation; establishment of "Akshya Urja Shops" design for solar building and promoting urban and industrial waste/biomass to energy projects. Accordingly the Govt. of India has initiated several schemes to make the solar and wind energy development in the country a techno-commercially viable proposition.

The national Solar Mission was launched on the 11th January, 2010 by the prime minister. The mission has set the ambitious target of deploying 20,000MW of grid connected solar power by 2022 is aimed at reducing the cost of solar power generation in the country through (i) long term policy; (ii) large scale deployment goals; (iii) aggressive R & D; and (iv) domestic production of critical raw materials, components and production, as a result.

Scheme for setting up over 2,000 MW of grid-connected solar PV power projects with viability gap funding (VGF) under Batch III of phase II of the NSM.

Conversion of solar energy corporation of India (SECI) from section 8 company to section 3 company under the companies Act, 2013 (no. 18 of 2013) and to rename it as renewable energy corporation of India (RECI).

Creation of intra state transmission system in the states of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Rajasthan at an establishment cost of 8548.68 crore with Govt. of India contribution from National Clean Energy Fund(NCEF) of Rs. 3419.47 crore.

RBI has revised the guidelines for all scheduled commercial banks including renewable energy in the categories priority sector, in addition to existing categories making significant inroads for renewable energy in the priority sector lending, also bank loans for solar roof top home loan/home improvement loan with subsequent tax benefits.

Foreign Direct Investment (FDI) up to 100% is permitted under the automatic route for renewable energy generation and distribution projects subject to provisions of the Electricity Act.2003.

Conclusion:

Energy is one of the most important inputs in global economic activities. Energy, the capacity to do work, is the "life blood of modern economy" as every human being uses.

It in one form or the other each day and energy is the basic and indispensable input for economic development. The positive correlation between energy use and economic development has been well noted by economists and policy makers in both developed and developing countries (Abdalla, 1994). The ever-growing world population is expected to get doubled by the middle of this century and almost every country across the globe is aiming for positive economic growth. This intensifying economic development across the globe is coupled with increased demand for energy. Demand for energy in a growing economy stems from

diverse sectors such as agriculture, industry, commerce, transport and residential. The growth of world population and economic standard is increasing the consumption of energy. Since the amount of available fossil energy resources become scarce with time, development of new and renewable energy technologies and improvement of conventional technologies are needed to fill full the energy demand in future. India has been interacting with several developed and developing countries for cooperation in new and renewable energy sector. Bilateral and multilateral cooperation frame works have been established with 44 countries. India is blessed to have such a huge potential in renewable energy resources and the country should exploit this to the maximum extent so as to meet its on-going energy deficit issues and reduce its dependence on other countries to acquire fuels and other resources. India has the required capabilities of becoming self-sufficient in energy generation and can even attain world leadership in this sector.

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