# The Energy Sector in India and The Need For A Renewable Energy Law

Shanmughadas K.G.
Assistant Professor
Post Graduate & Research Department of Commerce
Sacred Heart College , Thevara

***Abstract:*** A strong power sector with its sustainable development is a must for the economic growth of any country. In India, the national electricity policy envisages "power for all by 2012". At present India is facing acute energy shortage. Consumption of electric power in India is only 704 KWH/year per-capita, as against the global average of 9090 KWH/year per capital. Many studies have shown that excessive dependence on fossil fuels will result in their ultimate depletion in the near future. Therefore, India needs to seek energy autonomy by developing its Renewable Energy Sector. This article focuses on India's power sector, the various aspects of Renewable Energy Sector and the need for a comprehensive renewable energy law for the country.

**Index Terms**: **sustainable development, energy autonomy, renewable energy**

## I. INTRODUCTION

Amidst continuing turmoil in many developed international economies, Indian economy continues to be not only resilient, but growing at an average of about 8% per annum for more than 5 years. Infrastructure spending is one of the key enablers of this growth of which the power sector constitutes about 1/3rd. The national electricity policy envisages "power for all by 2012" and per capita availability of electrical power to be increased to over 1000 units by the end of the eleventh plan (2007-2012). However, India is facing an acute energy shortage which is hampering the industrial growth and economic progress. Presently most of the power generation is carried out by coal and mineral based power plants which contribute heavily to green house emission. There is an urgent need for transmission from thermal based energy system to renewable energy resources to minimize the reliance on depleting reserves of fossil fuel and to combat climate change.

There have been numerous calls for a 'Green New Deal' to ride out the recession and move towards sustainable economic growth. The U.N General Secretary Ban Ki Moon issued a title called 'Let's Go Green'. The United Nations Environment Programme commissioned a study on the subject and came up with a plan of action for the G-20 countries. Countries like Greece, Portugal recently enacted renewable energy laws to catalyze the green energy sector for continued growth and employment generation. China, which enacted such law in 2006, is the emerging as a leader in clean energy development. It is well known that sustainable energy is the foundation on which sustainable development will have to be built. India is heavily dependent on imported fossil fuels to meet its energy needs. Many scientific studies have shown that production of fossil fuels like oil, gas and coal will peak in the near future. The result would be supply and price volatility and ultimate depletion of these fossil fuels. Therefore, India needs a shift from conventional energy system to non-conventional resources to meet the ever increasing demand for energy and also to achieve the sustained environmental protection.

## II. RENEWABLE ENERGY/GREEN POWER

Renewable source of energy means that this source is not exhaustible by its use in producing electricity or heat (steam) or mechanical energy. Thus renewable energy includes resources that rely on fuel sources that restore themselves over short periods of time and do not diminish. Such fuel sources include the sun, wind, moving water, organic plant and waste material (biomass), and the earth's heat (geothermal).

Green power is a subset of renewable energy and represents those renewable energy resources and technologies that provide the highest environmental benefit. Green power is defined as electricity produced from solar, wind, geothermal, biogas, biomass, and low-impact small hydroelectric sources. Customers often buy green power to avoid environmental impacts and its greenhouse gas reduction benefits. Green power sources produce electricity with an environmental profile superior to conventional power technologies and produce no anthropogenic (human caused) greenhouse gas emissions

## III. TYPES OF RENEWABLE ENERGY

**Biofuel**: Biofuels include fuels derived from biomass conversion, as well as solid biomass, liquid fuels and various biogases. Biofuels are gaining increased public and scientific attention, driven by factors such as oil price spikes, the need for increased energy security, concern over greenhouse gas emissions from fossil fuels, and support from government subsidies. According to the International Energy Agency, biofuels have the potential to meet more than a quarter of world demand for transportation fuels by 2050.

**Biomass**: It is a renewable energy source and is a biological material from living, or recently living organisms. As an energy source, biomass can either be used directly to generate electricity with steam turbines & gasifiers, or converted into other energy products such as biofuel or other industrial chemicals.

**Geothermal energy:** It is thermal energy generated and stored in the Earth. Earth's geothermal energy originates from the original formation of the planet (20%) and from radioactive decay of minerals (80%). From hot springs, geothermal energy has been used for bathing since Paleolithic times and for space heating since ancient Roman times, but it is now better known for electricity generation. Worldwide, about 10,715 megawatts (MW) of geothermal power is online in 24 countries.

**Hydroelectricity:** Hydroelectricity is the term referring to electricity generated by hydropower; the production of electrical power through the use of the gravitational force of falling or flowing water. It is the most widely used form of renewable energy. Hydroelectricity accounts to 20% of the world's electricity, and accounted for about 88% of electricity from renewable sources.

**Solar energy:** Solar energy, radiant light and heat from the sun, has been harnessed by humans since ancient times using a range of ever-evolving technologies. Only a minuscule fraction of the available solar energy is used. To harvest the solar energy, the most common way is to use solar panels. The Jawaharlal Nehru National Solar mission is a major initiative in this field by Indian Government as India is a tropical country, which is receiving sunshine for longer time/day and with great intensity.

**Tidal power**: Tidal power also called tidal energy is a form of hydropower that converts the energy of tides into useful forms of power - mainly electricity. Although not yet widely used, tidal power has potential for future electricity generation. Tides are more predictable than wind energy and solar power. Among sources of renewable energy, tidal power has traditionally suffered from relatively high cost and limited availability of sites with sufficiently high tidal ranges or flow velocities, thus constricting its total availability. The world's first large-scale tidal power plant (the Rance Tidal Power Station) became operational in 1966.

**Wave power** : It is the transport of energy by ocean surface waves, and the capture of that energy to do useful work: for example, electricity generation, water desalination, or the pumping of water (into reservoirs). Machinery able to exploit wave power is generally known as a wave energy converter (WEC).Wave power generation is not currently a widely employed commercial technology. In 2008, the first experimental wave farm was opened in Portugal, at the Aguçadoura Wave Park.

**Wind power :** It is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity(A large wind farm may consist of several hundred individual wind turbines which are connected to the electric power transmission network), windmills for mechanical power, wind pumps for water pumping or drainage. The total amount of economically extractable power available from the wind is considerably more than present human power use from all sources. In India Suzlon and Tata Power are exploring the potential of setting up offshore wind farms, a technology platform that is yet to emerge in India .

These renewables offer a direct means to attain energy autonomy. They are foreign exchange neutrals. Renewable energy dependents on natural resources and will never become extinct. Renewable energy produces little or no waste products such as carbon dioxide or other chemical pollutants and has minimal impact on the environment.The issue relating to their integration, high initial costs and investments required can be easily be tackled through innovative legislative, policy and financial mechanisms. The sector is also employment intensive and could generate millions of jobs. Renewable energy is the fastest growing sector in the world today.

## IV. POWER SECTOR IN INDIA

The Indian power sector is dominated by State Electricity Boards (SEB's) characterized by the vertical functional integration, transmission and distribution owned by the State Governments and created under the Electricity Supply Act (ESA), 1948. Prior to the ESA, generation and supply of electricity was the primary responsibility of Licensees, Municipalities, Cantonment Boards and Energy Department of Government. Generation grew from a mere mega watt of capacity in the year 1900 to 1363 MW in 1947. The ESA empowered the SEB's to establish systems and structures for generation, admission and distribution, whose planning at the central level was the responsibility of the Central Technical Power Board, which later became the Central Electricity Authority in 1974. In 1975 to meet the rapid growth in power demand central organisations like the National Thermal Corporation Limited (NTPC) and the National Hydra power Corporation Limited (NHPC) were setup with a view to integrate the regional and State Transmission Systems and to develop the inter- connected grid system across the country, The Power Grid Corporation of India Limited (PGCIL) was setup in 1929.

To enable project development appraisal and financing of power sector project in the public sector, the Rural Electrification Corporation Limited (REC) was incorporated in the year 1969 under the Companies Act 1956 with the main objective of financing rural electrification in the country. The Power Finance Corporation Limited was incorporated in the year 1986 as the prime Development Finance Institution dedicated to the growth and overall development of the power sector. Apart from these several central power undertaking including joint ventures like Neyvelli Lignite Corporation, Damodar Valley Corporation, The Tehrai Hydro Development Corporation, The Naptha Jhakri Power Corporation and the North East Electric Power Corporation were setup.

The installed power generation capacity in India stood at 159.4GW at the end at fiscal 2010 with 49.8% in state sector, 32% in central sector and 18.2% in private sector, 32% in central sector and 18.2% in private sector. During the eleventh plan period (fiscal 2008-2012) target investments in power infrastructure stand at 10316 billion INR with addition of 78700 MW installed power generation capacity during the $12^{th}$ plan period (fiscal 2013-2017) which together with related transmission and distribution infrastructure is estimated to require funding of over 11000 billion INR. These investments are likely to improve the per-capita availability of electricity to 1000 KW by 2012. Incidentally consumption of electric power in India is only 704 KWH/year per-capita,

as against the global average of 9090 KWH/year per-capita. With a target GDP growth, India's energy requirements are expected to grow at 6.4 to 8%.

## V. ENERGY LAWS IN INDIA

Electricity being a concurrent subject in the constitution of India both centre and states can formulate the policies. The first ever Electricity Act in India dates back to 1910, i.e the Indian Electricity Act 1910. It was an Act to amend various laws relating to the supply and the use of electrical energy and also introduce licensing. After almost 30 Years the Electricity (Supply) Act, 1948 was enacted. The primary focus of the Act was to set up Electricity Boards in different states of India and thus to provide for rationalization of the generation and supply of electricity in the country. The Electricity Regulatory Commission Act, 1998 was enacted to provide for the establishment of a Central Electricity Regulatory Commission and State Regulatory Commission. This paved the way for an independent statutory body that would be responsible for rationalization of tariff, i.e. generation transmission, distribution and trading in electricity. Finally the Electricity Act, 2003 was passed by the parliament and it sought to replace the then existing Electricity Acts, namely, the India Electricity Act 1910, the Electricity (supply) Act 1947 and the Electricity Regulatory Commissions Act 1998. At present the Electricity Act 2003 is the comprehensive law in India relating to generation, transmission and distribution of electricity and it also deals with the powers of the Central Government and State Governments in these matters.

## VI. INDIAN NON-RENEWABLE ENERGY SECTOR CHALLENGES

India's energy sector faces enormous challenges like: challenges linked to addressing energy security, advancing energy access to urban and rural people, global climate change and reducing g energy shortages. Over 600 million of its people have no access to electricity or are undeserved and over 700 million depend on traditional fuels.

The per-capita consumption of 650 units of electricity per annum is well below the global average. The country imports 70% of its oil, 11% of its coal and 17% of its natural gas. As per government of India (GoI) projections, by 2031-2032 India will have to import oil of about 3 billion barrels per year, which is impossible due to the risks of fuel supply disruption and fuel price volatility. Coal has similar story, but may be available for a longer period as India has a coal reserve of 52.24 billion tonnes. At the current rate of consumption, the GoI predicts that the complete depletion of domestic coal will be in 40 years. The known reserve of natural gas in India is now around 0.6% of world reserve. The reserve/production ratio for our domestic natural gas is up to 33 years. Our nuclear power reserves would be adequate only for meeting the requirements of 10000MW of electricity for about 30 years. Due to the problems of nuclear waste disposal, and with the threat of Chernobyl type of accident looming large, nuclear power is not a preferred option in the world.

According to the Integrated Energy Policy Report released in July 2006 by Indian Planning Commission "…..to deliver a sustained growth rate of 8% through 2031-2032 and to meet the lifeline energy needs of all citizens, India needs, at the very least, to increase its primary energy supply by 3 to 4 times and, its electricity generation capacity by 5 to 6 times of 2003-2004 levels. India's commercial energy supply would need to grow from 5.2% to 6.1% per annum while its total primary energy supply will grow at 4.3% to 5.1% annually". The report also makes pertinent observation that by the year 2030, power generation capacity must increase to nearly 800 GW from the current capacity of 160GW.

## VII. RENEWABLES ENERGY IN INDIA: POTENTIAL & PROSPECTS

Table 1 below demonstrates the renewable energy potential in India up to 2032. This is a medium term projection and does not include quantification of the huge solar potential. The 45,000 MW potential of wind is a conservative estimate and with the growth in unit size of turbines, greater land availability, and expanded wind resource exploration, this potential should go up significantly up to 1,00,000 MW. The possibility of technology leapfrogging in the renewable sector is also considerably great. Even at the conservative total estimated potential of 1,72,000 MW (without considering the solar energy sector), the investment potential in the country is Rs.8600 billion! In fact, an urgent assessment of the potential of electricity generation from solar energy in India is essential. This is more so because of the recent growth of Concentrating Solar Power (CSP). The Global Market Initiative for CSP plans to add 40,000 MW from this source by 2030. This technology will be highly competitive with conventional power. The other advantage is its capacity to produce power even in the night with the use of storage media like molten salt, etc… The desert areas in India have the solar radiation required for CSP production. A 60 km x 60 km area can produce 1,00,000 MW of power. We have a desert area of 2,08,110 sq kilometres in Rajasthan and Gujarat. Even if we use only 15,000 sq. kilometres of the desert, we can produce 3,00,000 MW of power.

Table 1 R.E. Potential in India (upto 2032)

| Sr. No. | Resource | Estimated Potential (in MW) |
|---|---|---|
| A. | **Renewable Power:** | |
| I | **Grid-Interactive Renewable Power** | |
| 1. | Bio Power (Woody biomass) | 52,000 |
| 2. | Wind Power | <45,000 |
| 3. | Small Hydro Power (upto 25 MW) | 15,000 |
| 4. | Cogeneration - bagasse | 5,000 |
| 5. | Waste-to-Energy | 5,000 |
| 6. | Solar Power | 4-7kWh/sq.m./day |
| 7. | Geothermal Energy | neg* |
| 8. | Tidal Energy | neg* |
| | **Grid-Interactive Renewable Power-Sub-Total** | **1,22,000** |
| II | **Distributed Renewable Power** | |
| 1. | Distributed Renewable Power-Rural | 30,000 |
| 2. | Captive generation-industrial, commercial | 20,000 |
| | Distributed Renewable Power-Sub-Total | 50,000 |
| III | **Renewable Power-Total** | **1,72,000** |
| | *Feasible potential for near commercial applications is negligible | |

(Source: MNRE Annual Report, 2005–06)

Investment transactions in the renewable energy sector in 2009 crossed 162 billion according to a recent study by the UNEP. This is four times that of the investment in 2004. The sectoral break up of some major R.E technologies is as follows: $67 billion in the wind power, $24 billion in solar energy, $11 billion in biomass and waste-to-energy, $7 billion in biofuels and $4 billion in small hydro. Together the investment potential in the R.E sector could be as high as Rs 1,00,00,000 crores.

The R.E. power production potential in India can easily be scaled up to 6,00,000 MW in the future through multifarious sources and new energy technologies. India also has considerable potential for production of biofuels. The current estimates are over-optimistic. But if properly planned and executed, India's investment potential in biofuels can grow to the same levels as in renewable power generation technologies. Wind power is the only renewable technology which has a reasonably good policy framework in the country. But much needs to be done in the area of solar energy. Similarly, there is an urgent need to evolve a comprehensive and realistic framework for biofuels development in the country.

## VIII. A RENEWABLE ENERGY LAW FOR INDIA

The World Institute of Sustainable Energy(WISE), Pune has done extensive documentation on renewable energy and sought help of National Law School of India University of Bangalore, particularly of CEERA, the law school's Centre for Environmental Law, Education, Research and Advocacy, to prepare a model legislation for India, way back in 2005. The Model Law was first presented in a seminar held in New Delhi on 25th August 2005. Thereafter, a working group chaired by Dr Pramod Deo, then chairman, Maharashtra Electricity Regulatory Commission (MERC) was constituted to pursue its advocacy. The Working Group conducted many seminars to promote this idea. On 30th August 2007, a delegation led by Dr Pramod Deo visited Delhi and submitted the Model Renewable Energy Law to then Minister for New and Renewable Energy, Govt. of India, Shri. Vilas Muttemwar. The minister promised to process the same for the Parliament's approval. During the 2007, the National Citizen's Working Group co-ordinated by WISE, approached 300 selected parliamentarians for supporting the R.E Law initiative. Many of them replied saying they were looking into the matter.

WISE's advocacy effort found success in 2008, when the Government of India took the decision to have a R.E Law for India. Pursuant to this decision the Ministry of New and Renewable Energy (MNRE) was asked to prepare a draft. The MNRE then constituted a Technical Committee to formulate the draft. To begin with, WISE draft was selected as the first draft. One meeting of the Technical Committee took place and some action plan was decided. However, thereafter the MNRE seems to have decided not to vigorously pursue the matter.

Some of the recent developments in the areas of legislative policy, regulatory and institutional transformation are listed below:

- Sections 3, 4, 61(h) and 86(1) (e) of Electricity Act, 2003 promoting development of renewable sources of power.
- Tariff for R.E. declared in many states, by the State Electricity Regulatory Commissions.
- CERC (Central Electricity Regulatory Commission) R.E. Tariff Notification 2009.
- Scheduling norms for wind and solar under Indian Electricity Grid Code (IEGC) from 2010.

- Rs.5000 core provision by 13th finance commission for incentivizing states doing well in R.E. power generation.
- A National Clean Energy Fund announced in Budget 2010.It will mop up Rs. 67500 crores up to 2022, for development of renewable.
- The National Action Plan on Climatic Change (NAPCC) announced in 2008, which stipulates 15% of all power consumed in the country to be from R.E.
- National Solar Mission announced in 2009 – major initiate for solar energy development including 20000MW grid connected solar power by 2022.
- Generation Based Incentives (GBI) for wind power.
- Increasing number of States announcing comprehensive R.E. policies.
- Many prominent corporate like Suzlon Energy Ltd, Jindal Power Ltd, Moser Baer Projects Ltd moving into R.E. manufacturing and power generation.

Many of the above initiatives will gain teeth, if they are supported by legal empowerment. The target of 15% by 2020 set by the NAPCC requires that will have to add close to 90000 MW of renewable power (wind, solar, biomass and small hydro combined) by 2020, over and above the 16817 MW installed as of March 2010. All round activities will have to be launched on a war footing to achieve this national target. Legal empowerment through an R.E. law will go a long way in facilitating this much-desired gradual transition to a sustainable energy system. A status report on the renewable energy industry worldwide, prepared by Renewable Energy Policy says that 'renewable energy had reached a clear tipping point in the context of global energy supply'. Renewable sources of electricity generation is about 12,30,000 MW according to this report and it comprises one–quarter of global power capacity from all sources i.e., about to 4,800,000 MW and delivered 18% of global electricity supply in 2009.

## IX. CONCLUSION

The Electricity Act, 2003 was a turning point in the reforms process which removed the need for license for generation projects, encouraged competition through international competitive bidding, identified transmission as a separate activity and invited a wider public and private sector participation among the other things. The Energy Conservation Act, 2001 and the Electricity Act, 2003 have been welcome steps in the right direction. However they have not been successful in addressing a quiet transition underway in the energy sector, i.e. the transition to a clean and green economy.

As the electricity sector in India is undergoing very significant evolutionary changes, characterized by de-licensing of generation, open access to transmission, competition amongst distribution licensees establishment of regulatory institutions obligation to supply electricity to rural areas and increasing role for renewable power, ideally time is now ripe for India to have a separate renewable energy law. The proposed energy law should go beyond electricity and holistically address energy production from renewable, even extending to transport fuels or biofuels; it will not be another electricity law. Thus, a comprehensive legislation for development of all types of renewable energy technologies is a must, as renewables are the future of energy sector and this future necessity needs to be addressed through a new law. A great amount of detailing of technological, developmental, legal, policy and institutional framework is required, which should be the aim of new law.

## REFERENCES

[1] S. Padmanabhan, Indian energy sector challenges: The legislation context of sectoral development, Charted Secretary journal, vol: XL, No.9,2010, pp 65
[2] G M Pillai, Director General, WISE as Member Secretary, Needed: A renewable energy law for India, Charted Secretary journal, vol:XL, No.9, 2010.
[3] Government of India, Prime Ministers Council on Climatic Change- National Action Plan for Climatic Change, 2009, pp 01-52.
[4] The National Solar Mission, URL – http:// www.mnre.nic.in
[5] Integrated Energy Policy – Report of Expert committee, Planning Commission, Government of India, 2010
[6]Provisions pertaining to renewable energy in The Electricity Act 2003, http://www.indg.in/rural-energy/policy-support/provisions-pertaining-to-renewable-energy-in-the-electricity-act-2003
[6] Renewable Energy Law For India, seminar conducted by WISE, India, http://relaw.wisein.org/seminars.htm