

Conventional and Non-Resources of Energy Present and Future in India

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ABSTRACT

Energy is the prime mover of economic growth and is vital to sustenance of a modern economy. Energy is the key input to drive and improve the life cycle. Primarily it is the gift of the nature to the mankind in various forms. The consumption of energy is directly proportional to the progress of mankind. With ever growing population, improvement in living standard of the humanity, industrialization of developing countries, the global demand of energy is expected to increase rather significantly in the near future.

Keyword: Conventional Energy, Non –Conventional Energy, Environment, Solar, Biomass, Geothermal, Petroleum, Fossil fuels.etc.

1.Introduction

The energy which is derived from the resources that can be regenerated and do not deplete over the time is known as renewable energy. It is a clean energy which would not damage the quality of life. Fossils fuels too are theoretically renewable but on a very longtime – scale and if continued to be exploited at present rates then these resources may deplete in the near future.

Therefore, in reality, renewable energy is energy from a source that is replaced rapidly by a natural process and is not subjected to depletion in a human time –scale. Information on reserves of nonrenewable sources of energy like coal, lignite, petroleum, natural gas and the potential for generation of renewable energy sources is pare - requisite for assessing the country's potential for meeting its future energy needs.

The changes in the reserves over time indicate the research and development going into the discovery of new reserves and the pace of their exploitation. They also facilitate in devising effective conservation and nagementstrategies for optimum utilization of these resource. Fortunately, India is blessed with variety of renewable energy sources, the main ones being biomass, biogas, the sun, the wind, geothermal, and small hydropower. (large hydro power is also renewable energy in nature but has been utilized all over the world for many decades, and is generally not included in terms 'new and renewable source of energy').

Future economic growth crucially depends on the long – term availability of energy from sources that are fordable, accessible and environment friendly. There is vast supply of renewable energy resources in India. Indeed, it is the only country in the world to have exclusive ministry for renewable energy development, the Ministry of Non

–conventional Energy Sources (MNES). Since its formation, the Ministry has launched one of the world's largest and most ambitious programs on renewable energy. In October 2006, MNES was renamed the Ministry of New and Renewable Energy.

Renewable energy in India, excluding large hydro projects already accounts for 12.21 % of the total installed energy capacity, equivalent to 20404.01 MW of energy. In combination with large hydro, the capacity is more than 37.30%, i.e., 62169.35 MW, in a total installed capacity of 167077 MW by January 2011. Coal and petroleum are the most widely used.

Non-renewable energy resource for energy generation in present scenario. At present coal alone accounts for about 70% of India's electricity supply but is not environment friendly. The uncontrolled emission of CO₂ leads to global climate change which is the main culprit behind conventional nonrenewable energy resource. The developing world community is struggling with scarcity of power. Most of the power is derived from non-renewable intentional energy resources which are decreasing day by day.

Therefore, to combat this problem, renewable energy resources must be utilized. With high economic growth rates and over 17% of the world's population, India is a significant consumer of energy resources (4.04 % of global energy consumption). India, at 1.2 billion people, is the second most populated country in the world. India ranks fifth in the world in total energy consumption, and is projected to surpass Japan and Russia to or near actual load center, thereby saving on costly establishment and maintenance of transmission and distribution networks.

Conventional energy resources: Conventional energy is the one which cannot be renewed in human time – scale. Due to large population the consumption of conventional energy is increasing day by day. It is an exhaustible energy resource and is depleting at an alarming rate. Coal and Lignite India has a good reserve of coal and lignite. Peta Joules by primary sources shows that Coal and Lignite were the major sources of energy, accounting for about 62% of the total production during 2009-10. The availability of lignite during 2009-10 increased by 6.6% compared to 2008-09. The availability of lignite has increased at a CAGR of about 3.17% during the period from 1998-99 to 2009-10. Consumption of Lignite increased from 3.39 MTs in 1970-71 to 34.42 MTs in 2009-10 registering a compound growth of 5.9%. Consumption of Lignite is highest in Electricity Generation sector, accounting for about 80% of the total lignite consumption.

1) Natural Gas

According to Energy Statistics 2011 (Ministry of Statics and Programme Implementation), the availability of natural gas has steadily increased from a mere 0.65 BCMs during 1970-71 to 46.49 BCMs during 2009-10, registering a CAGR of 11.3%. Most of this increase in the indigenous production is due to discovery of new reserves.

The total world production of Natural Gas has increased from 2431 million tonne oil equivalent (Mtoe) in 2004-05 to 2696 Mtoe in 2009-10.

The production has decreased by 2.4% from 2008-09 to 2009-10. The total world consumption of natural gas has increased from 2420 Mtoe in 2004-05 to 2653 Mtoe in 2009-10. The world consumption of natural gas has decreased by 2.4% from 2008-09 to 2009-10. According to EIA (Energy Information Administration) estimation in 2009, India consumed roughly 1.8 Tcf of natural gas, almost 300 billion cubic feet (Bcf) more than in 2008. Natural gas demand is expected to grow considerably, largely driven by demand in the power sector. The power and fertilizer sectors account for nearly three-quarters of natural gas consumption in India.

2) Crude Oil

According to Energy Statistics 2011 (Ministry of Statics and Programme Implementation, GOI) on March 2010, there were a total of 20 refineries in the country out of which 17 in the Public Sector and 3 in the private sector. Total installed crude oil refining capacity in the country at the end of 4.1

Wind Energy The origin of wind energy is sun. When the sun rays fall on the earth, its surface gets heated up and as a consequence winds are formed. Kinetic energy in the wind can be used to run wind turbines but the output power depends upon the wind speed. Turbines generally, require a wind in the range between 5.5 and 25 m/s.

The development of wind power in India began in the 1990s. Although a relatively newcomer to the wind industry compared with China (44733 MW), USA (40180 MW), Germany (27,215 MW), and Spain (20676 MW), India has the fifth largest installed wind power capacity in the world by February 2011. According to the MNRE, the potential of wind power in India is approximately 46092 MW and installed capacity of wind power is 14550.68 MW by the end of March 2011. Major states with higher capacity and wind power potential are Tamil Nadu, Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh and Maharashtra.

Solar Energy Because of its location between the Tropic of Cancer and the equator, India has an average annual temperature ranges from 25°C – 27.5°C. This means that India has huge solar potential. The sunniest parts are situated in the south/east coast, from Calcutta to Madras. In solar energy sector, some large projects have been

proposed, and a 35,000 km² area of the Thar Desert has been set aside for solar power projects, sufficient to generate 700 to 2,100 gigawatts. India is endowed with rich solar energy resource. The average intensity of solar radiation received on India is 200 MW/km square. Number of solar street lighting systems 54795 Number of home lighting systems 342607 Solar lanterns 560295 Solar photovoltaic power plants 1566 kW Solar water heating systems 140 km² of collector area Box-type solar cookers 575,000 Solar photovoltaic pumps 6,818

Total Solar Energy Consumption in India (Source: Energy Alternative India) The amount of solar energy produced in India is merely 0.4% compared to other energy resource. The grid – interactive solar power as of March 2011 was merely 39.66 MW. According to EAI, as of March 2011, India is currently ranked number one along with the United States in terms of installed Solar Power generation capacity.

3) Biomass Energy

Biomass has been a key player in energy generation even in the past. Biomass, defined as all land and water-based vegetation as well as organic wastes, fulfilled almost all of human kind's energy need prior to the industrial revolution. In present day scenario, once again its utilization for generation of energy has gained momentum because of limited availability of the conventional energy resources as well as environmental concern due to (Green House Gas) GHG emissions. According to EAI, India has biomass production of 546 million tonnes per year from the agricultural sources alone to generate electricity at a capacity of 17,981 MW.

According to MNRE as on March 2011, India is very rich in biomass energy and has a potential of 16,881 MW (agro-residues and 4.4 Hydropower Hydropower is a renewable, non - polluting, and environment friendly source of energy. It is perhaps the oldest renewable energy technique to the mankind for mechanical energy conversion as well as electricity generation. Hydropower represents the use of water resources towards inflation free energy due to absence of fuel cost characterized by highest prime moving efficiency and spectacular operation flexibility. According to MNRE as on March 2011, out of total power generation installed capacity of 167,077 MW in the country, the large hydropower contributes 25% i.e. 62169.35 MW. In India, hydropower projects with a station capacity of up to 25 MW each fall under the category of small hydropower (SHP). India has an estimated SHP potential of about 16000 MW, of which about 18.5% has been tapped so far i.e. 2960 MW. Ministry of New and Renewable Energy (MNRE) has created a database of potential sites of small hydro and 5718 potential sites with an aggregate capacity of 15384.15 MW for projects have been identified out of which only 801 sites with an aggregate capacity of 2953.58 have been installed.

4) Geothermal Energy

A power plant based on geothermal energy basically harnesses the heat from the earth's inner layers to produce electricity. This energy is accessed by drilling water or steam wells in a process similar to drilling for oil. Geothermal energy is an enormous, underused heat and power resource that is clean (emits little or no greenhouse gases), reliable (average system availability of 95%), and home-grown (making us less dependent on foreign oil). India has a reasonably good potential for geothermal; the potential geothermal provinces can produce 10,600 MW of power. India's first geothermal plant is expected to come up by 2012, with an initial capacity of 25 mega watt (MW) at an investment of US\$ 64.66 million in the Khammam district of Andhra Pradesh (AP). It will be set up by Mumbai-based GeoSyndicate Power Private Ltd, a company incubated by the Indian Institute of Technology (IIT), Bombay, which has a special focus on exploration and production of geothermal energy. The estimated total potential of the Khammam site is approximately 60 MW that will be realized over a period of time. S.No. Geothermal Province Number of Thermal Springs Heat Flow Rate (MW/m²) 1 Himalaya 100 2 Krishna – Godavari 13 180 3 West coast 25 93 -1 29 4 Sonata 23 - 5 Combay 15 80

5. Conclusion

There is an urgent need for transition from petroleum-based energy systems to one based on renewable resources to decrease reliance on depleting reserves of fossil fuels and to mitigate climate change. In addition, renewable energy has the potential to create many employment opportunities at all levels, especially in rural areas. So Isolated systems, whose cost depends on load factor are needed to be linked with rural industry. The need to boost the efforts for further development and promotion of renewable energy sources has been felt world over in light of high prices

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