SUSTAINABLE ENERGY DEVELOPMENT IN INDIA

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Abstract:

Energy is a central concept in most branches of natural sciences and social sciences. It plays an important role affecting all the activities that take place in the society. Its role in economic development, social development, and production process are realized by the Gross National Product and per capita GNP. The increase in population, accompanied by rapid Urbanization and Industrialization led to increase the use of fossil fuels. Present fossil fuel is unable to meet the growing energy needs of the society. Thus there is need to look for viable sustainable energy sources to meet the energy requirements.

Key words: Sustainable Energy , natural sciences and social sciences.

INTRODUCTION

Emerging and developing countries have 80% of the world's population but consume only 30% of global commercial energy. As energy consumption rises with increase in population and living standards renewable energy can made to energy independence, climate change mitigation, rural development, improved health and lower health costs which are linked to air pollution is shifting renewable energy from the fringe to the main stream of sustainable development.

The economy of India has the second fastest rate of increase in the GDP in the world, the country accounts for a third for of the world's population without access to electricity. Five different ministries have structurally handled the Indian economy sector, among them the ministry of New and Renewable Energy development. The country ranks sixth in the world in terms total energy consumption and need to accelerate development of the energy sector to meet its growth aspirations. Though rich coal and abundantly endowed with renewable energy in the form of solar, wind, hydro and bio-energy.

RENEWABLE ENERGY IN INDIA:

Energy can be classified into different categories such as renewable and non-renewable, conventional and non-conventional, traditional and modern, commercial and non-commercial, experts can use any one of the above mentioned according to their convenience and disciplines. "Renewable energies are energies, which are renewable in nature there is a scope for regeneration and its availability is unlimited. Any form of energy should possess the

characteristics features such as versatility, portability, storability, and cleanliness. All these characteristics are inherited by the renewable and sustainable energy sources.

According to environmentalist a good energy and energy technology should not create pollution e.g. land, water, noise, air etc. during production and consumption. Renewable energy sources fall into different categories such as Solar Power, wind power, hydroelectric power including mini hydro, bio-energy, in its traditional solid form as biomass (fuel wood, wastes etc) or converted into liquids (ethanol and methanol) or gas, geothermal energy, ocean energy.

Some renewable energy technologies have been commercialized including biomass conversion, wind turbines and solar photovoltaic cells and arrays, are undergoing rapid development with increasing technical effectiveness and few renewable energy technologies have yet matured to their full potential. The success of renewable energy technology depends upon people's acceptance, cost-effective price affordability, integration and combination of different energy sources.

OBJECTIVES:

To understand the Alternative renewable energy sources and their status.
To understand the affordability of renewable energy sources.
To understand how the use of sustainable energy is helpful for Socio-economic development of nation.

METHODOLOGY:

This paper is based on secondary data; the data has been collected from books, journals, articles, government reports, etc.

Policies and Regulations on Renewable Energy.

India is one of the countries in the world; it has the potentials of renewable energy sources. The Ministry of Non-Conventional Energy Sources (MNES) has been entrusted to provide importance to the renewable energy sector. The two-fold objectives of the Ministry are I) to increase the role of renewable in the energy sector, and II) to reduce the pollution caused by conventional fossil fuels. India Renewable Energy Development Agency Limited (IREDA) a Non-Banking Financial Company (NBFC), provides innovative packages of financial assistance and marketing techniques. Further it also provides the much-needed financial, technical and consultancy support to the target groups. Beside All State Governments in India have established their nodal agencies for propagating the renewable energy technologies, for instance Maharashtra Energy Development Agency (MEDA). To fulfill the objectives of MNES, IREDA and State Nodel Agencies, Several renewable Energy Programmes have been introduced by the MNES. The programmes are,

Solar Thermal Energy Program me.
Solar Cooker Programme.
Solar Photovoltaic Programme.
SPV water Pumping Programme.
National Project on Biogas Development.

Integrated Rural Energy Programme.
National Programme on improved chulhas.
Wind Power Programme.
Biomass Power Programme.
Small Hydro Programme.
Energy Recovery Programme.

At the outset we must differentiate between alternative energy and renewable energy. Alternative energy refers to the any form of energy which is an alternative to the traditional fossil fuel of oil, natural gas and coal. Renewable energy is the forms of alternative energy that are renewed by the natural processes of the earth, such as sunlight from the sun or wind from the air, and so are environmentally friendly. We cover all alternative energies, but we will begin the overview with the renewable energy sources.

Solar Energy:

India promises to become one of the world's largest photovoltaic energy market. The country has the best energy resources in the world with 260-300 clear sunny days per year; on the other hand it is conformed to continuous electricity shortage. Over the past few years these power deficits have increased. Millions of Indian households have already been helped with solar light solutions. But with a population of 1.17 billion people, around 100,000 villages and 450 Million people still do not have electricity. Recently the government of India has announced The National Solar Mission targeting 20,000 megawatts of cumulative installed solar power by 2020.

The Rapid Increasing Energy Needs:

India is the world's sixth largest energy consumer with an installed power capacity of 150, 323, MW. However India's demand and supply gap is 12% on average and the progressive states see a gap in access of 15% being one of the fastest growing economies, the average energy usage per capita is expected to increase from 632kWh per annum today to 1000kWh by the beginning of 2013.

Solar power arises from the light of the sun which can be harnessed through the use of solar power cells, which are called photovoltaic cells. Sunlight is easy to harness and free, but it can be difficult to harness solar power for large scale power plants. However, there are several solar power plants projects in existence. Solar power has a great deal of potential in the field of home electricity generation. Solar power is attractive because sun light is free and the only coot involved is the cost of solar panels. Solar is also very environmentally friendly, as it produces no pollution or waste by products, and it is, therefore essential for a greener future. Solar panels come in various sizes and can be used on a small scale by mounting solar panel on a house for home electricity production, or they can be used on a large scale for electricity production. It is often used by consumers who want to help the environment, and also plays a vital role in supplying power to buildings that cannot easily access power lines.

India's Energy Challenge:

India needs more power day by day because of the increase in demand for power growing population. Not only to cover its daily power short falls, but also to support its economic and social development. According to CEA, the peak demand in 2008 was 120 gigawatts of Power, while only 98 gigawatts could be supplied. According to an analysis by the Indian PV project developer Aston field, quoting the precedent of India Energy Review, this deficit is likely to grow to 25 gigawatts by 2012. The target share of renewable energy is 24% for 2031, with the amount of solar energy increasing to 56 gigawatts of installed power.

The average electricity consumption in India is still among the lowest in the world at just 630 KWh per person per year, but this is expected to grow 1000 KWh. Within coming years. Every month, 8-10 million new mobile phones are connected in India. This is an interesting market segment for solar PV as well: thousands of new GSM poles will be needed across the country.

Wind Energy:

Wind power is also a very attractive field. Wind technology has grown in scope, and in various places wind is becoming a feasible source of energy. Wind has a lot of potential and investors should keep an eye on it. Wind is vulnerable to weather conditions, but is certain locations, manly in costal offshore areas and at high altitude; there is a steady stream of wind. Wind power is harnessed through the use of wind turbines, which are turned by the wind to produce electricity. The technology is not unlike a more modern and sophisticated version of a windmill. Wind power can be used both for electricity production on a large scale with multiple turbines to form what is called a wind form, or in other words a wind power plant, or, more infrequently, on a smaller for home electricity production. Wind power is the most presented of all India ranks fifth in the world in wind energy with installed capacity of 10,891 MW (as on Oct 31, 2009) India Wind Energy Association has estimated that the with the current level of technology, the 'On-shore' potential for utilization of wind energy for electricity generation is of the order of 65,000 MW.

In December 2009 Indian Ministry of New and Renewable Energy said it is offering new incentives for grid-connected renewal wind power generation. Wind electricity produces will now receive a generation-based incentive of 0.50 rupees per unit of electricity fed into the grid.

Advantages of Wind Power:

1) Most environment friendly, clean and safe energy resources.
2) It has the lowest gestation period as compared to conventional energy.
3) Equipment erection and commissioning involve only a few months.
4) There is no fuel consumption, hence low operating costs
5) Maintenance costs are low.

Wind Energy Potential in India:

Sr. No.	State	Potential (in MW)	Installed (in MW)
1	Andhra Pradesh	8968	122

2	Gujarat	10645	1433
3	Karnataka	11531	1184
4	Kerala	1171	23
5	Madhya Pradesh	1019	188
6	Maharashtra	4584	1838
7	Orissa	255	120
8	Rajasthan	4858	671
9	Tamil Nadu	5530	4124
	Total	48561	10891

Forms of renewable energy, as there is a multinational anti-wind lobby that accuses wind turbines of being ugly, noisy, interfering with radars and killing birds, all of which are completely unjustified claims.

Biomass Energy:

Another alternative energy source is the development of biomass technology. Biomass is a term for any kind of organic biological matter that can be converted in to energy. Biomass technology is being created that will enable dung, for example from colds or pigs, or dead vegetable matter to be converted into energy. The transformation of these common substances, which would otherwise end up as waste, in to electricity is an exciting area that has a great deal of potential to produce energy from previously untapped source without polluting the environment. Biomass is usually either plant matter, from either crops or forest waste or fecal waste. A subsection of biomass is biogas, natural gas produced from biological sources. The most successful forms of biomass are sugar cane bagasse in agriculture, pulp and paper residue in forest and manure in livestock residue. It is argued that biomass can directly substitute fossil fuels, as more effective in decreasing atmosphere CO2 than carbon sequestration in trees.

India is very rich in biomass, it has a potential of 19,500 MW (3,500 MW from bagass-based cogeneration and 16000 MW under construction. The facts reinforce the idea of commitment by India to develop these resources of power production.

Following is a list of some states with most potential for biomass production:

Sr.No.	State	Potential (in MW)
1	Andhra Pradesh	200
2	Bihar	200
3	Gujarat	200
4	Karnataka	300
5	Maharashtra	1000
6	Punjab	150
7	Tamil Nadu	350
8	Uttar Pradesh	1000

Alternative energy is more important to every nation of the world. Investors need to keep track of these alternative energy areas in order to take advantage of the growing trends in the energy industry. Government initiatives combined with private enterprises will grow the

alternative energy industry a very great deal in the near future, and this growth will affect individuals, industries, nations, and the entire world. There are many opportunities for businesses and investors to put money into alternative energy and reap the rewards of the coming future growth.

Sustainable energy is very important for sustainable development and modern era is waiting for sustainable development which is going to done by the people and for the people, and only the sustainable development can save the earth from the hazardous like global warming. Sustainable energy can appeal to both individuals and families on the one hand and to corporations and businesses on the other hand. Sustainable energy sources particularly solar and biomass energy can be used on a small scale for domestic use. Solar power and wind power can also be used for home electricity production, enabling households to remove themselves from costly electrical girds and produce their own electricity more cheaply and with greater concern for the environment at the same time with house hold use, sustainable energy is going to become popular with corporations and businesses. The price of oil is continually rising and global supplies of light sweet crude oil are running out. Also, oil production is controlled by a cartel of countries that drive the price up and make oil overpriced in American markets. This is going to make oil an unattractive option for industrial purpose in the future. The prospects for coal, natural gas and nuclear are also bad, due to both financial and environmental reasons.

CONCLUSION:

Renewable energy programme is definitely sustainable for the growth of nation in terms of socio-economic development; renewable energy sources are economically affordable. Based on our analysis renewable energy technologies suggested that in the immediate future there is high economic potential in India for solar energy, wind energy and biomass energy technology. Therefore there is a small contribution of renewable energy in electricity generation and this is very necessary for environmental protection and sustainable development. There are various hurdles to implement the renewable energy programs in India such as policy hurdles, institutional hurdles, market hurdles, economic hurdles, and technological hurdles, these hurdles should be successfully tackled with sustainable economic reforms including energy sector reforms, mechanism for appropriate technology transfer in the area of renewable energy technology all over the country. If India wants to become economically and socially super power in the world we should use maximum renewable energy sources for industrial, commercial and domestic use. The sustainable economic path can be achieved through the use of renewable sources.

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