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Issues and Crises of Energy Resources in Pakistan

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Review Article

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ABSTRACT

Industrial revolution is totally dependent on energy resources, energy is essential for life to survive; human beings are totally dependent on energy for their daily life purposes. Developing countries have higher growth rate instead of developed ones. Pakistan facing electricity shortage problems hardly, Pakistan can generate 50000 MW through nuclear reactors. The current observations, based on the revision of the geological structure, of the geographical position, reveal that there are good exploitation methods for various renewable resources of energy, the resources such as hydal, biogas, wind, solar and other solid waste, use of low levels of canals sea waves and tides and geothermal energy etc. These renewable energy sources are utilized to decrease the rate of poverty and to maintain a harmless environment in Pakistan. As Pakistan is an agricultural country and most of its population lives in rural areas, electricity generated from renewable sources will also improve rural life, thereby reducing urban migration which is taxing cities' ability to cope with their own environmental problems.

INTRODUCTION

A nation's socio economic growth and its development are based on its energy sectors advancement. Current economic growth in all over the world based on energy resources [1]. There will be no survival without energy resources in developing countries. Developing countries have higher growth rate instead of developed once. Most of the population in developing countries is rural who have low living standards having fewer sources of commercial fuels used to fulfill their energy requirements by using traditional sources of energy. In 1997, Pakistan was known

to produce 60 MW electricity to fulfill the need of electricity for 31.5 million people. Demand of electricity has been increased 4000 MW in 2008. Some natural resources produce energy which is called the renewable energies, natural resources such as sunlight, wind hydro power. Some countries having nuclear industries use nuclear energy as an energy producer which contains uranium. Pakistan has a few nuclear power plants and the nuclear plants need more cost to fulfill the uranium requirements. Nuclear energy can reduce the carbon emissions. Pakistan has to improve its nuclear resources facilities to overcome its dependency on import energy resources. A current estimation about Pakistan was that Pakistan can generate 50000 MW through nuclear reactors. About 20 percent of the world's energy requirements fulfill by hydro power generations, and Pakistan generate energy of 45000 MW by hydro powers. With the development of recent period, the global environment is getting harmful effects due to the more use of nonrenewable energy sources for power generation purposes. Gas, oil and coal are main concerned natural resources which are responsible for the environmental depletion. Pakistan consist of number of natural reservoirs but lacks the employment, focus, policies, planning's to make solutions to improve the energy crises [2]. Increasing energy crisis in Pakistan pushing the policy makers to make such type of policies that overcome these crises. The total worldwide population of Pakistan is estimated as 2.56%, and it is known as the world's sixth most populous country. About 8 hours to 10 hours of load shedding experiences the urban areas regularly, on the other side rural areas experience average load shedding in 20 hours. According to a report, the renewable energy sources for the sake of electricity generation will be less than 1% in 2010. Current situation of energy issues in Pakistan indicates that energy resources are less to fulfill the increasing energy demands [3].

LITERATURE REVIEW

Nonrenewable energy resources in Pakistan

Petroleum, coal and gas are nonrenewable energy sources that are recognised to be the most effective economic growth generators but they also contribute to environmental deterioration and are thought to be hazardous to human health.

Oil

Pakistan is a well-known developing country for importing oil. There are very less oil reserves in Pakistan because of the increased demands and prices. Pakistan was to produce 66079 barrels per day in 2004-2005. The price of oil is steadily rising over time as a result of the government's increased efforts to transition to natural gas for generating electricity and the rise in demand for oil. The highest companies of oil in Pakistan are Oil and Gas Development Company Limited "OGDCL", Pakistan Petroleum Limited "PPL", and Pakistan State Oil "PSO" are the national companies of Pakistan. While, British Petroleum "BP", Austrian mineral oil authority "OMV", Orient Petroleum International "OPI", Petronas and Tullow are the international oil companies of Pakistan [4]. Pakistan is rich to produce about 27 million barrels of oil resource. About 13 companies work for the production of crude oil from 133 fields of oil. The more oil was being consumed by the transportation sector from about 2010-2011 which was estimated as 48.9%.

Natural gas

The natural gas firstly originated in Pakistan as at Sui 1952, which is the biggest gas reservoir of the country. There were no new reserves were introduced to produce natural gas, it would last for just 22 years only. The consumption of natural gas by power sector in 2004-2005 was 43.7%, industrial consumption was 19.5%, domestic 14.8%, fertilizer 12.9%, commercial 2.3%, transport 2.1% and cement industry 1.2%. The more use of gas making a shortfall for the supplement of gas for domestic and industrial purposes. According to an estimation that Pakistan

can be going to face a shortage of natural gas in nearby future, demand for gas was set to rise from 31.2 cm in 2008 to 39.2 cm in 3013 which needs import of 1.2 cm. It can be result as a gas shortage during winter due to the more consumption. Pakistan has about 282 trillion cubic feet of reserves of natural gas. It is producing about 4 billion cubic feet of natural gas. The total working companies are fifteen for the production of gas from about 190 gas fields, 44 are reservoir of natural gas with deposits of petroleum and other 146 reservoir are without the deposits of crude oil [5].

Coal

Pakistan consists of extent coal producing reserves and Thar coal mines are huge ones. According to the estimation that Pakistan contains 185 billion tons of coal reserves which are equal to minimum 400 oil barrels according to Dr. Akram sheikh. The total utilization of coal energy decreased from about 8.3% to 5.5% in 1977 to 78 after the origination of gas. Gas and oil take the place of coal due to the lack of well-developed plans for the coal production and its transportation process. Power generation by coal needs preference in Pakistan like other countries of Asia such as India and china. Thar is enrich for the generation of power of 50000 MW by coal. Heating value for coal reserve is 6223 to 10288 Btu. Coal is mostly utilized by the cement sector and by brick kiln industry. Coal is a most rich naturally producing fuel, produce in many countries. China is known as the biggest coal consumer and may its consumption of coal will more increases in coming 2030. Coal is the main source for the emissions of harmful carbon than any other fuel, and the released CO_2 is not possible to dispose. The reserves of coal in Thar was rich in ignite from 2003 to 11. The generation of energy increases about 6.5% to 7.6% by coal. Pakistan can generate about 100000 MW electricity from coal [6].

Nuclear power

In the year of 2009, there was only one nuclear power plant in Pakistan Chashma-1. The nuclear plant was operated by Pakistan Atomic Energy Commission “PAEC”. A second nuclear power plant was being establish named as Chashma with the contribution of China National Nuclear Corporation which was have 325 MW of installed capacity and were to be completed with the end of 2009. The nuclear power plants of Pakistan are operated by Pakistan Atomic Energy Commission “PAEC”. According to the recent information about the power plants in Pakistan Chashma Nuclear Power Plant 1 and 2 and the Karachi Nuclear Power Plant contains 787 MW of working capacity. Direction given by government to the Pakistan Atomic Energy Commission to enhance ability to produce energy of 8800 MW by 2030.

Renewable energy sources of Pakistan

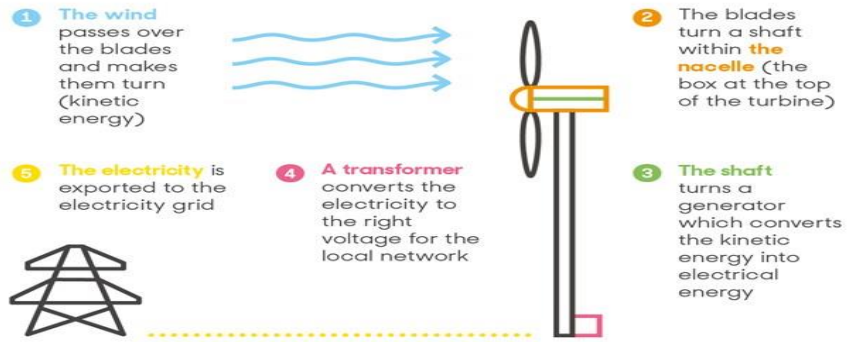
Pakistan is facing many serious problems of energy same as other developing countries. Pakistan consists of a huge range and high capability of renewable-energy sources production, which have not been diagnosed, accomplished or developed. Today supply of energy primarily does not fulfill and support the present demand. A huge part of the rural areas lack electricity facilities because they are too costly to connect to the national grid. Many renewable resources of Pakistan are technologically having bright prospects for commercial exploitation such as solar, water, wind, wastes, geothermal and others. Pakistan can be benefited from these as substitute energy in areas where these renewable energy sources exist [7].

Wind

The production of electricity by wind is a rapidly increasing technique on a commercial scale. Pakistan has the ability to produce electricity by wind but due to the lack of facilities wind power generation process does not exist in the country. The coastline of Pakistan is 1000 km long which can be used as wind farms like as other foreign

countries. In 2001 to 2002, The Ministry of Science and Technology has provided funds to the Pakistan metrological department for the formation of chain of wind masts near by the coastal areas. A project was established by the PCRET to install small stand and alone type of turbines for the generation of power in the south coastline areas of Sindh and Baluchistan [8]. New Zealand Official Development Assistance has also provided funding for the establishment of wind turbines in poor villages. According to an estimation, the coastal areas of Sindh and Baluchistan has the gross potential of about 43000 MW by wind electricity while 11000 MW is estimated as the exploited energy production capacity. In many areas of Pakistan about 30 windmills were inserted to pump water, but because of cheap qualities of mills and infrastructure the experiment flopped. A turbine can run 3-4 km/sec which is the minimum range of wind velocity. Pakistan's speed of wind is examined as 6-7.5 m/sec which cindered as the run speed for a turbine (Figure 1).

Figure 1. Working principle of wind turbine.



Solar

From the last 20 years, solar energy techniques development were least in Pakistan. According to recent studies, Pakistan is using the solar technologies in many household, official, technical and commercial sectors. Solar water pumps were inserted by public health department for water in many areas of the country. The photovoltaic techniques are increasing rapidly by the help of private and public sectors in the country. The manufacture of components of photovoltaic systems is being applied by many of companies of the country. Thermal energy can be used in saline water for the desalinization. Pakistan has a good capacity of solar energy, its average amount of insolation ranges as 5.3 kWh per cubic meter. South western areas of Baluchistan has the best environmental conditions for the solar energy production because the sun shines ranges from 8 to 8.5 hours daily in these areas or can be says as 3000 hours per annum [9].

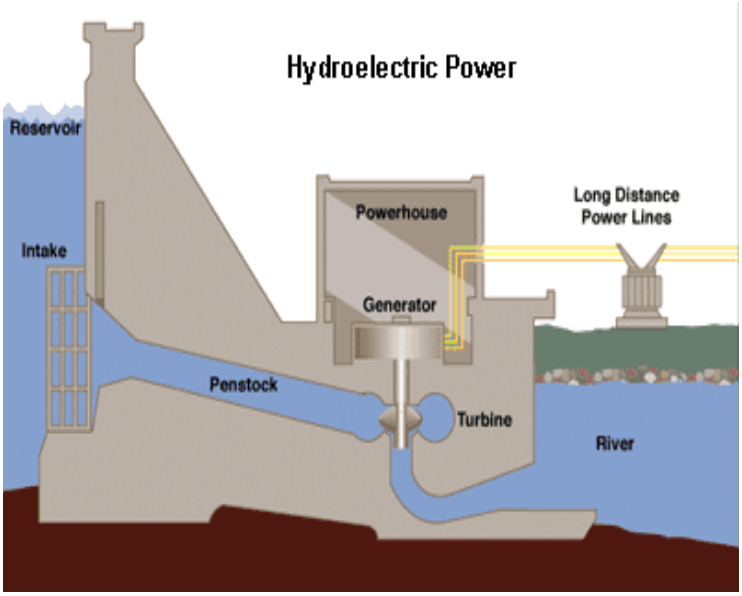
Pakistan comes in ranges of the area with the 15.5 × 1,014 KWh of solar radiation. About 13 solar panels with the capacity of 26.5 KW were inserted by the Pakistan Council of Renewable Energy. Today Pakistan is known as the country which is rich for the solar insolation. Pakistan is known as the 2nd high country receiving solar radiations, annual average of solar irradiance is of 1900 to 2200 kWh per cubic meter. According to an estimation the generated solar energy receives energy from the sun is maximum 3300 hours in a year while the minimum amount of energy is received by Gilgit and Chitral is 2400 hours in a year.

Hydroelectric

Source of energy by water is not rare in Pakistan, the capacity of hydropower according to estimation is about 50,000 MW from which 4800 were become advance during past 50 years. The areas of the north part of the country are richer for the generation of hydropower. The northern areas of Pakistan consists of small streams and

water falls which have a little capacity to generate electricity by micro hydroelectric power plants. The major irrigation system was developed in the upper and middle parts of Indus basin which use water from Indus and its nearby small water falls for irrigation. Pakistan has 3 big reserves Terbela, Mangla and Chashma, and a huge canal system. Canal system has a higher hydropower capacity which ranges from 1 MW to more than 10 MW and can be used for the development of little hydropower stations. Hydropower is renewable resource, it is not expensive to produce electricity and do not cause pollution to the environment, furthermore it can be reuse. Hydropower plays an essential role for the reduction of greenhouse gases. Small hydro plants are the plants that are less than 10 MW, 2 MW and 100 KW. For the generation of electricity the total hydropower share was 70% in 2004 to 2005 [10]. Economic utilization for the hydropower potential in Pakistan is relatively 20,000 MW. Many hydropower plants have been developed at various areas of Pakistan in 1998 of about 4,825 MW, at Warsak 2,40 MW, at Tarbela 3,478 MW, at Mangla 1000 MW as well as small hydropower plant on Canals with capacity 107 MW (Figure 2).

Figure 2. Hydroelectric power generation system.



DISCUSSION

The potential of power plants to generate electricity is of about 22,957.4 megawatts while energy demand in the country is least as 17000 MW. If it is true, there are some questions which raised like why Pakistan is suffering from energy crises, what are the reasons for the load shedding and less power supply in Pakistan, why the generation of electricity is so less if there is capability of power production of about 17000 MW. These statements are known to be fake or assumed, not adequate as there is a power crisis in Pakistan.

CONCLUSION

The economic growth of a nation and its development is based on its energy sectors advancement. Pakistan is rich in production of energy resources but there is less capabilities to completely take benefits by resources due to lack of implementation, norms, principles, management and monitoring. On the other hand, the nonrenewable resources are becoming more harmful for the environment and human beings and other livestock's, because of the harmful emissions in to the environment. So, keeping in mind that the demands of energy have to be discouraged and guidelines should be provided for the consumers and sellers about energy crises awareness. There is need for

establishment of a law should be made and implemented around the globe about power crisis and energy resources.

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