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Recent progress in renewable energy – Remedy of energy crisis in Pakistan



Ahmad Bilal Awan, Zeeshan Ali Khan*

Department of Electrical Engineering, COMSATS Institute of Information Technology, Islamabad, Pakistan

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ABSTRACT

Energy plays a pivotal role for the economic development of a country. A reliable source of energy is needed to improve the living standard of people. Today, industrial progress plays a vital role in the development of any country but the industrial progress depends on reliable supply of electricity. However, Pakistan is passing through an energy crisis that is seriously affecting the lives of people. The main reason for the energy crisis is rapidly increasing the prices of hydro-carbon resources and lack of planning to foresee the increasing energy demand in the country. Renewable energy (RE) can play an important role to minimize this crisis. Besides the depletion of fossil fuel, the accumulation of their emissions has catastrophic effects on our environment. Modern civilizations are more curious about environmental cleanliness. Environmental pollution is supposed to be a serious threat to the life on our planet. Our earth could heat up by several degrees in future if we do not stop using non-renewable energy resources. In this article, the exiting production of renewable energy through different RE technologies is discussed and the potential capacity of production of energy through these technologies in Pakistan is studied. Some suggestions are also proposed to increase the RE share in the energy mix of the country.

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* Corresponding author. Tel.: +92 51 9049279; fax: +92 51 9247006.

E-mail addresses: ahmed.bilal@comsats.edu.pk (A.B. Awan), zakhan@comsats.edu.pk (Z.A. Khan).

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1. Introduction

The electrical power system has a major role in reshaping the modern society. Today industrial progress plays a vital role in the development of any country. But the industrial progress relies on reliable supply of electricity. Modern civilizations are more curious about environmental cleanliness. Environmental pollution is supposed to be a serious threat to life on the planet. Therefore use of green energy sources is spreading day by day throughout the world. The industrial and other sectors require reliable electricity supplies for their work. Therefore most of the countries are interested to penetrate the RE in their power sectors to obtain economic and environmental benefits. Depletion of fossil fuels in near future and accumulation of their emissions in the environment have attracted the world’s attention to utilize renewable resources of energy. It is realized that a continuous reliance on fossil fuels will have catastrophic results because excessive carbon dioxide emission has dramatic global warming effects. Our earth could heat up by several degrees in future if we do not stop using non-renewable energy resources.

The global share of renewable energy in the power sector was 20.3% at the end of year 2011 [1]. The hydroelectric generation being the oldest and most mature form of bulk power generation has a share of 15.3% whereas only 5% was contributed by other renewable generations. Fig. 1 shows the global scenario of power generation.

Renewable energy generation has cost disadvantages when compared with non-renewable fossil fuel source of energy production [2]. Electricity production in Pakistan mainly depends on conventional sources of generation. During 2010–11, approximately 94,653 GWh of electricity was generated in the country. The main contributors in the energy mix are thermal power (62.5%), hydel (33.6%) and nuclear (3.9%) [32]. The share of renewable energy in the total energy mix is virtually negligible. The common perception about the renewable energy generation is the cost disadvantage but the increasing prices of fossil fuel in Pakistan and the abundant availability of renewable energy resources may help in achieving the grid parity.

However, in order to increase an environment friendly renewable energy production, many steps are needed to be taken by the

governments of developing countries like Pakistan. A proper financial support system, such as tax rebates, feed in tariff and a mechanism to provide sufficient funds should be ensured by governments. Government can provide support to renewable energy generation in different manners. The large amount of CO₂, NO_x and CO_x emissions is caused by fossil fuel generation of electricity. A CO₂ emission tax helps the development of renewable energy sector and the other option is Feed-in-Tariff (FiT). FiT are the most commonly used renewable energy policy worldwide and considered one of the most attractive ways to boost the renewable energy generation by providing investor security [2]. Thailand was one of the first Asian countries to introduce the FiT program called Adder because it adds additional amount of payment to renewable energy producers on top of the normal energy prices that power companies would receive when selling electricity to the power utilities [3].

The motivation behind this research work is to look for recent trends of development in renewable energy technologies and their application as a solution for the power crisis in developing countries like Pakistan that mainly depends on fossil fuel for the electricity generation. The article is organized as follows: solar energy including solar photovoltaic and solar thermal renewable

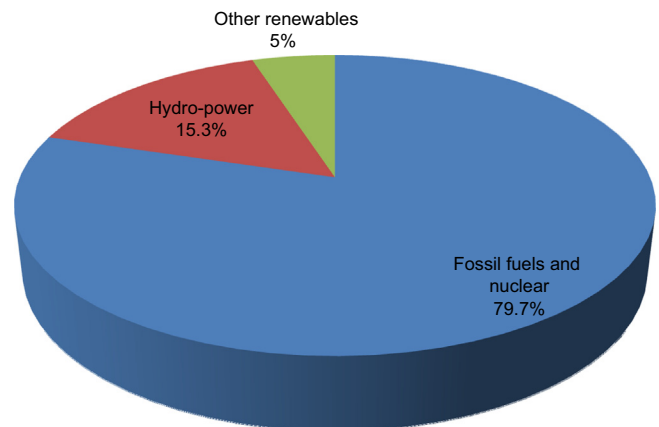


Fig. 1. Global scenario of power generation.

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