A Perspective Analysis on Emergence of Renewable Energy Basis Technology to Industrial Development in Bangladesh: Prospect, Overview and Fate of the Environment.

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Abstract

The rapid increase in electricity demand for industrial growth has been threatened due to depletion of fossilized fuel reserve. Natural gas shares a portion of 88.5% in the power supply chain which having an amount of 15.39 TCF reserve available that would be enable enough to serve the national grid for power generation up to 2030 unless further discovery. The coal reserve of about 1222 million ton may not be of use due to unavailability of extraction via selective method as well as importation of low rank coal would not be economic viable enough for the sustainable industrial infrastructure due to toxic gas emission. Considering the geographical status Bangladesh is located in a position where the potential sources of renewable energy including solar, wind, biomass, hydro, tidal, and geothermal energy are quite reliable as well as affordable. Deficiency in power sector may be lessened through the implementation of renewable energy technologies in addition to the conventional sources of fossils fuel. Results shown that, an amount of approximate 55899 MW power may be accumulated to the supply chain for power generation in an effective sustainable and reasonable manner. The following research paper is based on renewable energy technology along with all probable sources from perspective of Bangladesh. This paper provides a comprehensive study from field data and open literature available regarding significant implication for a decision making in an effort to enhance energy production via using green and sustainable energy technology.

Key words: Industrial Growth, Power Supply, Renewable Energy, Sustainable Technology.

1 Introduction

Bangladesh is a developing country and its prime environmental issue is the production of energy for the increasing demands of growing population. Due to global climate change, Bangladesh is facing energy crisis now a days. People have an unsatisfied desired to use energy to be luxurious in daily life. In Bangladesh the main source of energy is natural gas. Of them about 72% is burning up for commercial energy and 81.72% is utilized for production of electricity (Ullah et al.2012). Most of the industries like electricity production sector use natural gas as a main energy source. Due to increasing demands of natural gas usage, natural gas is in a threat to deplete in near future, though it is not enough in Bangladesh. Bangladesh has the potentiality in using renewable energy and it has ample of possibility to create alternative energy source. The key sources of renewable energy are solar energy, biogas, biomass, wind, and hydropower. To launch a green sustainable environment and social equity the development of renewable energy system is an urgent needed for our country.

2 Bangladesh energy scenarios

Bangladesh is situated in the north eastern part of south Asia and a densely populated country. It is predicted that the population will increase to 170 million and the density will be 1150 people per square km2 in 2020 (Siddiqui and Ellery, 2001). Bangladesh is a potential country to use available renewable energy sources in a sustainable and environmental friendly manner. In Bangladesh the generation of electricity in most of the power stations depends on the use of natural gas. It is also important to conserve energy and should use energy in a most efficient form. Among technological development of a country depend on its energy uses. In Bangladesh about only 40% of the
population have access to use electricity and in village area there is severe problem of load shedding (Chowdhury et al. 2012).

3 Potential renewable resource of energy

Bangladesh is enriched with renewable energy resources including biogas, biomass, geothermal power, hydropower, tidal energy. The technology for the use of these renewable resources is growing faster in the developing countries like Bangladesh. Technologically advanced and innovative ways of using renewable energy are yet to make an impact on the overall energy scenario and sustainable development to industrial growth of the country.

3.1 Solar Energy

Sunlight is a cheap, readily useable and it is a free source of energy. It is a clean energy source and inflammable. Bangladesh a subtropical country is located in a suitable geographic position and is suitable for the harnessing and use of solar energy. From March to April the sun rays maximum amount of solar radiation and from December to January the sun rays minimum amount of solar radiation. In the prospect of Bangladesh, energy crisis in near future various NGOs like Grameen Shakti, BRAC, Bangladesh Power Development Board (BPDB), Local Government Engineering Department (LGED), Bangladesh Poribesh Andolan (BAPA) etc. working toward development of solar energy program. To use solar panel as an alternative source of energy Bangladesh can solve the energy crisis. Proper sunlight is dropped in Bangladesh about 70% (Rahman et al. 2013). Bangladesh is potential in using both solar Photo Voltaic cell (P.V.) and Solar Thermal Energy (STM).

3.2 Biogas

Biogas is a non-fossil fuel which is produced by the Bacterial breakdown of OM in the absence of oxygen (O2) under the prevailing temperature of 35 °c.(Ullah et al. 2012). The predominant component of biogas is basically methane (CH4). The raw materials for biogas production generally consist of agro-based products. Such as cattle dung, poultry droppings, agricultural residues, forest residues, water-hyacinth and other organic waste, cattle head, cow dung which are easily and cheaply available everywhere (Imam, 2013). Biogas development program is currently running throughout the country by the host Government’s socio-economical infrastructure in association with several NGO’S, private organizations. As Grameen Shakti (GS), SETU, and RISDA- Bangladesh that jointly provides an installation of 18713 biogas plant. Average 34-40%. Conversion efficiency from biogas to electricity can be generated via modeling the unconverted raw energy.

3.3 Biomass

Biomass fuel is the available energy resource in respect of Bangladesh which is responsible for providing about 60% of the total energy consumed in the country. The major sources of biomass are agricultural residues, cow dung and leaves, fuel woods and other wastes. The Bangladesh council of scientific and Industry Research (BCSIR) has been working on the R&D project for improving the efficiency of biomass conversation technologies in the rural area. An approximately 364 MW electricity generation is possible by utilizing the 35,000,000 MT of paddy which is produced per annum (Chowdhury et al. 2012).

3.4 Wind

Bangladesh has lack of reliable wind speed data. For this reason Bangladesh have long been lag behind to convert wind energy to electricity by using wind turbines. A wind turbine is a machine that converts the kinetic energy of the moving air mass to mechanical energy. Bangladesh has potential islands along the Bay of Bengal such as Kuakata, Saint Martin, and Sandwip. Here the wind speed is so high and these places can be used as an ideal location for wind turbines. At St. Martin most of the people use solar power as an energy source for a limited time. It is also impossible for them to carry power line through this area. Wind energy can be used to produce energy continuously with the increasing demand of the people of this area and for the tourists.

3.5 Geothermal power

The inherent thermal energy generated and stored in the earth’s crust, which is referred to as geothermal energy. It is very much environmentally sustainable and convenient to extract a renewable energy from the subsurface through natural process. To generate electricity via using stream and hot water produced inside the earth surface is the technical consideration of introducing geothermal energy. Geothermal energy is generated about 6450 km below the surface in the earth’s core through the slow decay process of radioactive particles. The northern part of Bangladesh as well as Labanakhya hot salt water spring at Sitakunda have shown the prospect to explore the geothermal resources in deed. The electricity demand for rural areas can be covered by the 3rd generation of electricity directly and by these saved electricity the demand for urban areas can be mitigated. Anglo MGH Energy
which is a Dhaka based private company has initiated a geothermal power plant installation project with a capacity to generate 200 MW of electricity close to Saland in Thakurgaon district (Anam et al. 2011). The stable platform of the country like rangpur saddle, Bogra shelf potentially offers good conditions for geothermal power project. The project would have planned to set up 28 deep tube wells to lift the hot water and stream from the subsurface. The utilization of abandoned on shore dry wells having high temperature gradient (like over 30 Km) can effectively reduce the installation cost of a geothermal power plant. Geothermal energy can provide an effective energy solution for Bangladesh as it is green, sustainable, indigenous, abundant and undisturbed due to climate changes.

Figure 1: Percentage share of biomass types used(source: Bangladesh Bureau of statistics 2004)

3.6 Tidal Energy

The environmentally sustainable and eco-friendly tidal energy is a form of hydropower that basically converts the energy of tides into electrical energy. Tidal energy is more predictable and convenient than wind and sunlight as because of the coastal region of Bangladesh has been experiencing a tidal rise and fall of between 2 to 5 meters (Ullah et al. 2012). Tidal energy can be generated from the altering sea levels via applying Low head tidal movements and Medium head tidal movements. Tidal power project installation along the 710 km coastline with the Bay of Bengal may be a smart alternative to meet the current energy demand as well as may be used as protective measure of the coastal regions from natural calamities (Rasel et al. 2012). The capital cost for infrastructure set up in cage of Tidal power project is economically viable. The tidal power harnessing project may provide opportunities for unemployment diminution as well as earning foreign currency through tourism sector. So, considering the suitable tidal height available, this can be a reliable and promising source of renewable energy for Bangladesh.

3.7 Hydro Power

Hydro power is an eco-friendly clean power generation technique where kinetic energy from flowing water is exploited in conventional hydroelectric plant to generate electricity. It is a simple method that converts the hydropower of the fluid into mechanical power which is further converted to electrical energy. Bangladesh is occupied by deltaic and alluvial plain land with having three of the world’s major rivers the Ganges, the Brahmaputra and the Meghna creating an average water flow 1.3 trillion m³ throughout the country (Rasel et al. 2012). The Karnafuli hydroelectric power plant is the only one hydro power project in Bangladesh at Kaptai, Chittagong Hill Tract which having an installed hydropower capacity of 230 MW at present comprising two 40 MW units and three 50 MW units (Imam,2005). The required hydraulic gradient or head for driving a turbine which produces electricity involves the construction of a water reservoir through building a dam across Karnafuli river. This hydroelectric plant is contributing only about 5% of the total installed capacity of electricity in the country although Bangladesh Power Development Board (BPDB) has been estimated a total hydropower potential of about 330 MW. The Sangu Project and the Mata-Muhuri project have been considered for the installation of an approximately 140 MW and 75 MW hydroelectric power plants respectively (Ullah et al. 2012). There is existing a prospect for Hydro power project development at Teesta barrage although the share of the volume of water of Teesta river has not yet been settled down with neighboring country India for diplomatic concession. Hydro power energy is environmentally sustainable and it is possible to extract electricity from the hydro energy to a greater extent.

4Conclusions

The major non-renewable energy sources are all being depleted rapidly in Bangladesh. The remaining natural gas reserve of approximately 16.74 TCF will continue to generate electricity up to 2030. So, it is the
high time for us to look forward to searching about an alternative renewable energy source that must be researched, developed, marketed and established as quickly as possible to meet the energy demand for the upcoming decades. The possible forms of renewable energy in Bangladesh and their prospect in respect of power generation have been discussed in this paper and it is worthy of advanced research and assessment at least. The renewable energy technology can be an excellent, economic viable, reliable and also eco-sustainable solution to the existing energy crisis in respect of the country. The Government as well as private sector should work hand in hand to inaugurate the renewable energy extraction project in order to improve the socio-economic status of rural people as well as to produce electricity to solve our power crisis problem.

References


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