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FIRST AND SECOND GENERATION ENERGY SCENARIO IN BANGLADESH

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ABSTRACT
Electricity is an unavoidable prerequisite developmental resource for the advancement of a nation. Energy is an unavoidable prerequisite developmental resource for the advancement of a nation. Bangladesh's share today represents only 3% of total energy. Bangladesh has already adopted a master plan for the renewable energy sector. While Bangladesh's installed generation capacity has rapidly increased to 13,265 megawatts, captive generation capacity is insufficient to meet countries' electricity demand. One-third of Bangladesh's energy production is based on imported and imported fossil fuel resources, and 65% of electricity generation is dependent on the country's natural gas reserves, although current gas reserves will be reduced. In addition, insufficient electricity production leads the country to the manufacturing process. The current and future situation of the critical energy crisis, adapted by the installation of renewable energies in the production of electricity. The Bangladesh Government's current renewable energy program sets the budget for renewable energy production by reducing global pollution while providing energy from biomass, solar, hydroelectric, wind and tidal energy. This paper presents national energy scenarios in Bangladesh. As a result, promising potentials for renewable energy sources are also discussed and presented in this paper.

Keywords: Renewable Energy, Solar, Electricity, Fossil fuel, Power, coal.

1. INTRODUCTION

The world reserve of fossil fuel energy resources Energy is key factor for the improvement of societal human lifestyle and the prerequisite condition for future development of a country. Energy needs are increasing due to population growth and economic and technological progress worldwide (Halder et al., 2015). The global fossil fuel reserve is an essential site for the exploration rate of new energy exploration and current consumption, while the discovered energy will be exhausted in a few decades. Albert Kaku, UN Resident Coordinator, believes that energy is an essential part of our lives. Without energy, we cannot even dream of economic growth. However, despite its central role, not everyone can access modern energy services "(UNDP, Tanzania, 2015) About one in five people have access to electricity and 130 million live with gloves without electricity (IDCOL 2015 By the end of 2014, total global energy consumption stood at 13232 million tonnes of oil equivalent (Mtep) (World Statistical Yearbook, 2015), compared to 12 730.4 million tonnes (MWe) worldwide (British Petroleum, 2015). Among all energy sources, the highest oil consumption was 92.85 billion barrels per day in 2015 (EIA 2015) (32.1%), Energy Research Institute (IER) and 30.1% (Bloomberg Business, 2015) respectively, while world fossil fuel consumption reached 1655.56 billion barrels (EIA, 2015) However, given the limited availability of fossil fuels and their negative impact on the environment, countries around the world are now turning to renewable energies such as solar, wind, bioenergy, hydropower, geothermal and the oceans. Efforts to ensure energy security. The use of renewable energy has increased significantly in recent times in both developed and developing countries. REN21's Global Renewable Energy Report 2014 indicates that renewables accounted for 19% of global energy use in 2012, up from 16.7% in 2010. More than 100 countries now have policies in place. renewable energy of some kind or other state of energy resources In Bangladesh, primary energy is not good at all compared to global energy, because oil, natural gas, coal and hydropower are limited and it is essential to develop the country's infrastructure (Yüksel, 2008; Islam et al., 2014). Ministry of Energy, Energy and Mineral Resources cited in 2015, the Government of Bangladesh provided electricity to 70% of the population (Bangladesh: increased access to energy) and currently produces 372 kWh of energy produced per capita. (EIA, 2015), while total primary energy consumption per

capita was 75%. (752 kWh) is the equivalent of the average per capita absorption rate in Bangladesh (EIA 2015). In addition, this energy consumption becomes a contributing factor to carbon emissions. However, the lack of fossil fuels encourages the government to use alternative energy sources and renewable energy has become a major source of concern around the world. The Bangladesh government has already developed a renewable energy master plan to address the energy crisis in Bangladesh (Siddique Zobair, 2015), which sees renewables as a new emerging source of sustainable energy to meet the growing demand for energy. . On the other hand, Bangladesh faces a major problem in the energy sector related to consumption and policies (Ahiduzzaman et al., 2011; Rahman et al., 2013). Bangladesh produces the maximum electricity from the national gas network, about 62.31 percent, according to Petro Bangla. Electricity generation in Bangladesh largely depends on 80% of the gas (BPC, 2015). Thus, the maximum electricity production from local and imported energy sources is only controlled by 4.28%, which is a key factor in the challenge of the future electrification of Bangladesh (point of privatization, current situation electricity in Bangladesh, 2015). During the 2014-2015 fiscal year, the Bangladesh Petroleum Company (BPC) imported 1,297 million tonnes of crude oil and 4,095 million tonnes of refined oil, including 63% of diesel (GCP) 2015, Mushaf Rahman, 2015. Field Gas in Bangladesh represents 2725 million cubic feet of gas and 9263.7 million cubic feet of condensate during the last operation, on September 21 and 22, 2015, with a demand of 3,800 in 2015-2016 (Bangladesh Oil 2015). Coal production in fiscal 2014 June - July 15 345751.44 metric tonnes (BCMCL., 2015.) However, electricity demand is increasing day by day and total electricity production is dependent on fossil fuels.

Table 1: Power plant installation capacity of Bangladesh power development board (BPDB) and major fuel contribution in Bangladesh (Yüksel et al., 2008).

Installed Capacity			**De-rated Capacity**	
Fuel Type	Capacity Unit (MW)	Total (%)	Capacity Unit (MW)	Total (%)
Coal	250	2.14	200	1.8
Gas	7200	62.31	6811	61.43
HFO (Heavy fuel oil)	2507	21.46	2450	22.1
HSD (High speed diesel)	916	7.84	897	8.09
Hydro	230	1.97	230	2.07
Imported	500	4.28	500	4.51
Total	11683	100	11683	100

However, with a combined capacity of 1,865 MW (Siddique Zobair, 2015), Bangladesh produces a maximum of 8122 megawatts (CIA, 2015) against a demand of 10,283 megawatts in 2015 (BPDB, 2015). Bangladesh's lack of demand for electricity is more serious than an obstacle to the country's growth and development. The Bangladesh government has already developed a renewable energy master plan to address the energy crisis in Bangladesh (Siddique Zobair, 2015), which sees renewables as a new emerging Sustainable energy source to meet growing energy needs. (Jayed, et al., 2011). Bangladesh is a land of natural beauty. Has enormous potential for renewable energy sources. Biomass or biofuel is an important renewable energy source in Bangladesh, where biofuels are used for cooking and electricity. Solar energy is another important energy source in Bangladesh. Solar photovoltaic cells are one of the most commonly used technologies in rural, mountainous and coastal areas of Bangladesh. Bangladesh has a long tradition in hydropower generation and Bangladesh has already developed small hydropower projects. Wind power is another renewable energy source in Bangladesh. In addition, small and small wind farms are available for power generation. Renewable energy plays an important role in energy security in Bangladesh. This paper focuses on recent energy exploration, energy production, energy consumption, energy growth rates, energy sector reform, future energy policy and energy efficiency. Sectoral successes in energy production from renewable and sustainable energy sources in Bangladesh.

2. GEOGRAPHICAL LOCATION OF BANGLADESH

Bangladesh is South Asia, on the border of the Bay of Bengal, between Burma and India, with geographical coordinates of 24 ° 0 '0 "N, 90 ° 0' 0" E24, 90 (Maps of World, 2016) and a total area of 143,998 km², 130,168 km.

Fig.1: Location, divisions and districts of the People's Republic of Bangladesh (Maps of World, 2015)

And 13,830 square kilometers of the border area where the borders of Bangladesh and India are, including six sections of Bangladesh, while the international border is 4,096 kilometers (2,545 kilometers), including 262 kilometers in Assam and 856 km Tripura, 180 km in Mizoram, 443 km in Meghalaya and 2217 km in West Bengal, the fifth longest in the world. On the other hand, the territorial sea: 12 Nemia (22.2 km, 13.8 miles), adjacent zone: 18 Nemia (33.3 km, 20.7 miles), exclusive economic zone: 200 Nemite (370.4 km; 230.2 miles) For the continental margin, the highest point: in the Mowdok range at 1052 m (N 21 ° 47'12 "E 92 ° 36'36"), Keokradong (883 m No. 1230 m) or Tajing Dong (985 m 1280 cm) Agricultural land: 50 000 km 2 (2008) Renewable water resources: 1 227 km (2011), total land use: 58.96%, permanent crops: 6.53%, others: 34 , 51% Freshwater (domestic / industrial / agricultural): Total: 35.87 km3 / year (Arakan River Network et al., 2012).

3. AVAILABLE ENERGY SOURCES

Natural gas, liquefied gas, coal, biomass, biofuels, hydropower, wind and solar are the most important sources of energy available in Bangladesh. However, natural gas represents Bangladesh's energy sources, 2.725 million cubic feet of gas and 2963.7 million cubic feet of condensate available for 2015-2016 (Bangladesh Oil, 2015) and coal production. for the 2014 fiscal year - July 15, 345,751.44 metric tonnes. Ton (BCMCL 2015). Energy consumption by fuel type Natural gas 63%, heavy fuel 18%, high speed diesel 7%, energy imports 5%, coal 2%, renewable energy 3%, as shown in Figure 3, with lines of transmission of 9,200 km, in September. 2015.

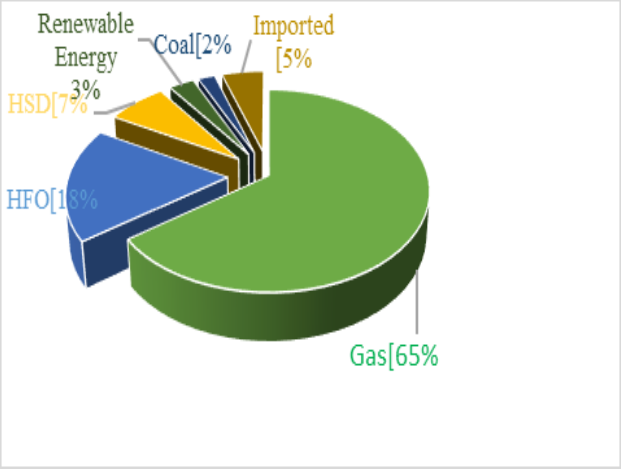

Fig.3. Primary energy consumption pattern in Bangladesh (Siddique Zobair, 2015)

4. ENERGY CONSUMPTION IN BANGLADESH

Electricity is the basic need of human life and today consumes 20 trillion kWh of electricity in the world (World Maps 2015). (17%), captive energy (17%), CNG (5%), commercial (10%) and domestic (12%). Consumers in Bangladesh. While the electricity consumption sector is consumed by the domestic sector, industry, commerce, irrigation, etc. 50.07%, 34.47%, 9.09%, 4.58% and 1.79%, respectively, as illustrated in Figure 2.

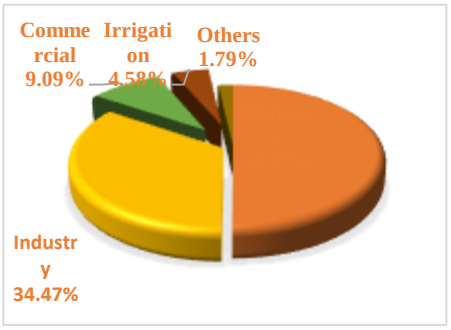

Fig.2: Sector wise electricity consumption scenario of Bangladesh (Siddique Zobair, 2015)

The comparative GDP growth rate and electricity per capita consumption rate are presented in Figure 4 and Figure 6, it can be shown that GDP growth rate 6.4% in the fiscal year 2015, which is higher than 2014(6.20%).

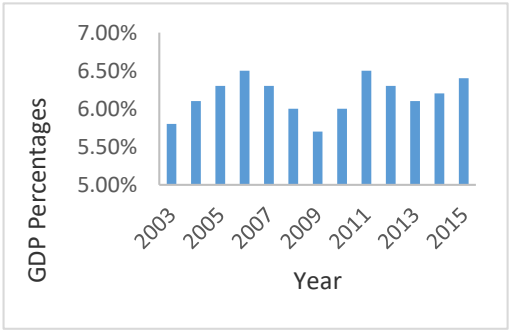

Fig.4: Real GDP growth rate of Bangladesh in the fiscal year from 2002-2015(Central Intelligence Agency, 2015)

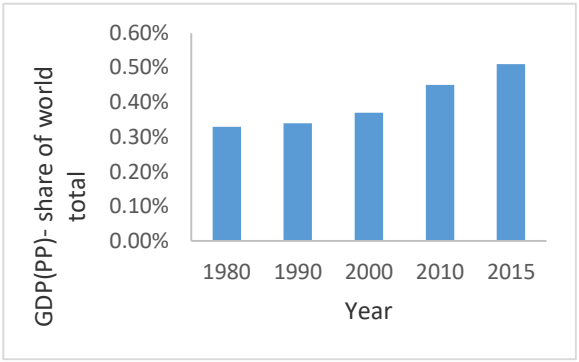

Fig.5: GDP (PPP) - share of world total (Bangladesh) (Global Finance, 2015; IMF, 2014)

On the other hand, in figure 6 it can be shown that electricity per capita consumption rate in the fiscal year 2015 is 372 KWh, which is more than 2014 (6. 20%).In the year of 2015, 15 august is the day of history when 8177MW electricity was produced (International Monetary Fund (IMF, 2014).). According to the vision of 2021 Bangladesh access to electricity increased to 74% from 43% in 6-year progress

(Bangladesh Awami League. Access to electricity; 2015). Whereas in figure 5 (Global Finance, 2015) GDP (PPP) share of world total in the fiscal year 2015 is 0.51% which is higher than in the fiscal year 2010(0.45%).

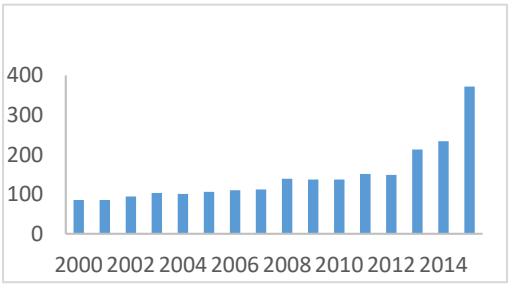

Fig.6: Per capita energy consumption in Bangladesh in the fiscal year 2000-2015(Central Intelligence Agency,2015)

5. ENERGY PRODUCTION IN BANGLADESH

Electricity is considered is one of the most valuable essence for human civilization and industrial, economic and technological advancement. The present situation of electricity in Bangladesh is on growing level. Electricity production in Bangladesh totally dominated by natural gas by 87%, 5.75 % by furnace oil, 4.29 % by coal, 3.19 % by diesel and 3.95 % is produced from hydro-electric plant (Assignment point, 2015). At present the poverty rate is 24.7 percent with a GDP growth rates of $1,190 to $1,314 in the fiscal year of 2014-2015(Government of the People's Republic of Bangladesh. Ministry of planning (NEC); 2015.). Loss of order occurs for technical reasons, as well as for inefficiency and corruption in management. The exact figures for the loss are unknown, but in about 30 percent of the cases, the net loss of the country's system is probably one of the highest in the developing world. The losses incurred are very different depending on the facility.

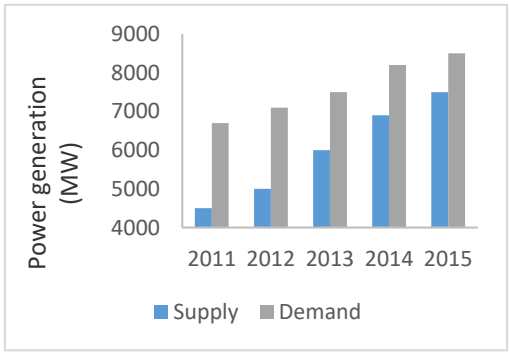

Fig.7: Power demand supply situation (during peak session of April-May) (BPDB,2015)

The government of Bangladesh have already taken an initiative steps to reform energy sector for the increment of per capita electricity consumption and the achievement of energy production is outstanding. Figure 7 represents that the overview of power sector energy production capacity was 4500 MW in the fiscal year 2011, which has increased to 7500MW in the fiscal year 2015 with the increment of 10%. The maximum generation has increased to 8122 MW in the year of 2015 which is the highest. However, in figure 7 it is representing that the demand rises to 8500 MW in the year of 2015 and the shortage of energy in the fiscal year 2015 is 1000 MW which is lower than in the year from 2011-2014 and the supply of energy in the fiscal year 2015 is 7500 MW which is higher than in the year from 2011 to 2014.

6. ENERGY POLICY OF BANGLADESH

Last 5 years the power production scenario of Bangladesh has in increasing level and remarkable advancement in energy crisis management. Conventional and non-conventional energy is the key factor for the advancement of power sector in Bangladesh, for energy crisis management Bangladesh government has proposed a master plan to reform the power sector and this development includes to diversify energy supply mix, energy conservation and renewable energy development (Islam, A et al., 2014. In 2010 proposed generation mix suggested in PSMP (Power sector master plan) focusing for detailed development of renewable energy and exploration of energy. This policy initialized for and energy exploration. This policy is designed for short- and long-term energy plans and electricity generation from different fuels. The energy requirements in the policy are 24,000 MW by 2021 and 39,000 MW. by 2030. PSMP proposed a mixed strategy by consumption type in the year of 2020 will be gas 55%, coal 20%, and oil 10%, others 15% and installed capacity will be 22500 MW. Long term plan includes the detailed prediction of consumption by energy type in the year of 2030 will be gas (25%), coal (50%), oil 10%, others 15% and installed capacity will be 38700 MW, whereas others energy includes renewable energy. Energy Efficiency Action Plan introduce the target setup 10% of primary and secondary energy savings by 2015, 15% by 2021 and 20% by 2030. The policy also indicates that efforts will be made to produce energy from energy wind and solar energy as well as energy imports from neighboring countries, including India, Nepal and Bhutan. (Siddique Zobair, 2015). Sixth Five Year Plan and Vision 2021 imposed specially on energy export from neighboring countries, this strategy proposed gas import from Myanmar by negotiation. Nuclear energy production plan has already been succeeding by a contract with Russian Federation for the production of 2000 MW electricity by vision 2021. Solar, hydropower, biogas, ethanol extracted from jatropha seeds, wind turbines and other renewable energy sources will be explored while reducing the use of hydrogen. This proposed 2021 vision foresaw 20 years of hydropower development strategies for the Himalayan region (IDCOL 2015). In fig.8 Power sector master plan with a generation mix suggested in PSMP are shown.

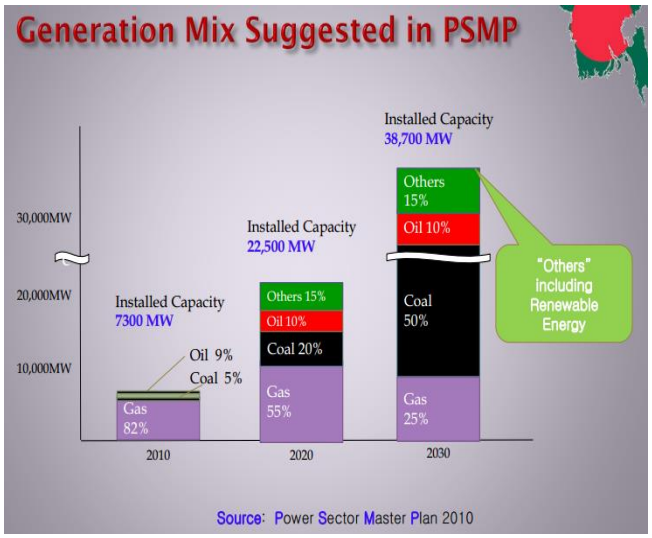

Fig.8. Power sector master plan of Bangladesh

7. RENEWABLE ENERGY POLICIES

Bangladesh's renewable energy policy is no longer too long and the first renewable energy since 2002 has been proposed to fill the energy gap in Bangladesh (Ahmed et al., 2014). The renewable energy policy takes into account the energy deficit of Bangladesh and uses a lot of resources. The five-year plan of Bangladesh's national energy system indicates that the 2010 renewable energy policy and the national energy building code are the two most important factors in meeting energy demand (INDC, 2015). The 2015 energy policy plan for HIFI technology covered the following objectives (Zubair, 2015).

- I am Realization of the "500 MW solar mission" by 2015.
- The renewable energy policy provides for 5% (800 MW) of total energy production by 2015 and 10% (2000 MW) by 2020.
- Wind generation in coastal areas.
- Wastes from power generation in Dhaka (10 MW, 10x5 MW, 1 MW).
- Increase Increase the share of renewable energy in the energy mix to reduce dependence on fossil fuels.
- Take appropriate measures to save energy.
- Harness the potential of any new sustainable energy solution.
- Explore practical financing for renewable energy, energy efficiency and capacity building.

The renewable energy policy requires 800 megawatts of renewable energy by 2015 (including hydropower). Solar-500 MW has already been launched. Wind-015 MW, biomass / gas-001 MW, Hydro -250 MW, other -025 MW. 2000 MW of renewable energy by 2020 and 4000 MW of renewable energy by 2030 (Zubair, 2015). Table 4 shows the promotion of renewable energies and the future renewable energy plan in Bangladesh.

Table 4: Advancement of renewable energy and future plan of renewable energy in Bangladesh (Siddique Zobair, 2015, Shah Zulfiqar Haider, 2015).

Advancement of renewable energy		Renewable Energy Target (MW)								
Category	Achievement total	Technology	2015	2016	2017	2018	2019	2020	2021	Total
Solar home system (SHS) successful business model	150, 3.5+Million unit	Solar energy, PV Panel electricity	222	253	422	237	195	203	208	1739
Other solar PV applicants (e.g. markets, offices etc.)	1									
Roof-top PV applicant	10									
Wind energy	2	Wind energy	0	220	250	350	350	200	200	1370
Biomass based electricity	1	Biomass to electricity	1	16	6	6	6	6	6	47
Biogas based electricity	1	Biogas to electricity	1	1	1	1	1	1	1	7
Hydro power	230	Hydro (mini/micro)	-	2	2	-	-	-	-	4
Total	395									

8. AVAILABLE RENEWABLE ENERGY SOURCES

Renewable energy resources are natural resources that play a vital role in meeting energy demand in Bangladesh. The renewable energy available in Bangladesh is solar energy, biomass, wind power, hydroelectricity and geothermal energy. This is a potential renewable energy to eliminate the energy problem in Bangladesh. Renewable energies play a vital role for the green environment and a reservoir for human civilization. Biomass, biogas, wind, solar and hydropower are the main sources of renewable energy in Bangladesh. Figure 9. Renewable energy consumption scenario in Bangladesh. These systems represent the sectoral share of energy consumption. In the total share of 3% of national energy consumption, hydropower, solar energy, wind power 60%, 39.5% and 0.5%, respectively. While solar energy in Bangladesh is the fastest growing renewable energy sector (Mohammad Alaeddin, 2014). Table 4, however, represents renewable energy resources and their technological uses in Bangladesh likely to generate electricity, heat production, biogas and bio-fuel production (Ahmed, F., 2013). However, the contribution of renewable energy in electricity generation 3% and potentially used for rural cooking and wood supply in the country.

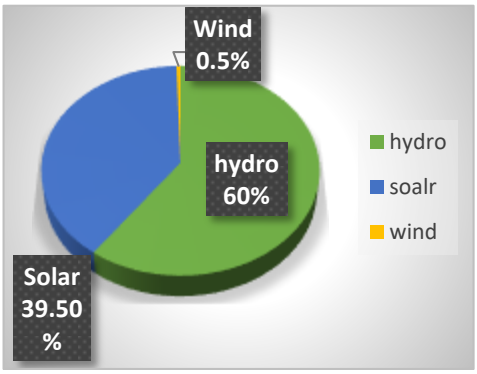

Fig.9: Renewable energy consumption in Bangladesh of total share 3% (EIA, 2015, Government of Bangladesh 2004).

Table 5: Renewable energy resources in Bangladesh (Bhattacharyya, S. C, 2015, Jilani T et al., 2011)

Renewable resources	Technology
Solar	Solar home system (SHS). Grid connected system, solar PV system
Biofuel	Combustion process , biomass gasification
Wind	Mini grid, micro grid operation system
Hydro power	Large scale production , mini grid production (small scale production)
Geothermal	

9. SOLAR ENERGY

Ongoing demand of energy and future stock of fossil fuels are limited and adverse effect on climate change, todays the world awaiting for more renewable resources and fulfilment the commitment of human civilization. Being at the forefront of the deployment of the domestic solar system (SHS) in the world, Bangladesh occupies a special place in any discussion of off-grid electrification (Bhattacharyya, S.C. (2015)). The small part of the energy demand in Bangladesh is partly met by the solar photovoltaic system and Bangladesh's local vision in terms of solar radiation at 241 0 '0' north latitude and 0 901 '0 "longitude.

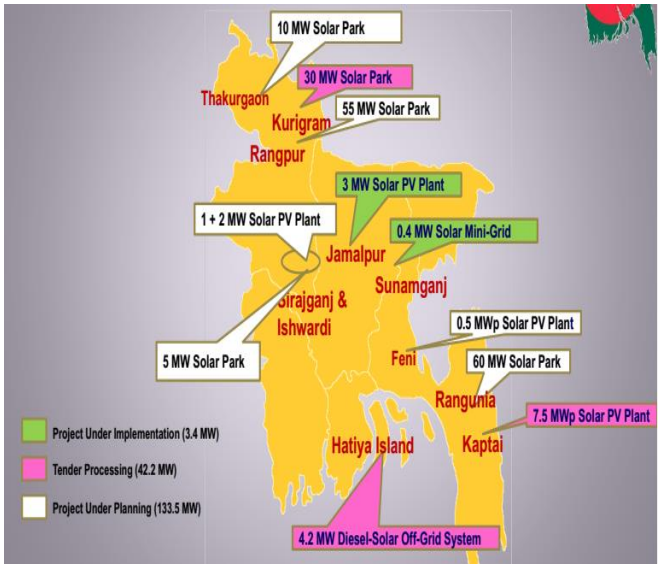

Fig.10: future solar master plan of Bangladesh.

However, total solar production in Bangladesh 500 MW and a total share of renewable energy (39.5%) while other countries are now turning to renewable sources such as solar, wind, bioenergy, hydropower, geothermal energy, and ocean energy security: global solar power production reached 180 gigawatts by the end of 2014, up 38 percent (IDCOL, 2015), a global contribution of 1 percent (Islam, M. T et al., 2014) and a contribution of 15 percent % of the global energy increase rate (BP) 2015. Bangladesh Infrastructure Development Co. (IDC) Bangladesh has already installed 3 million solar home systems, supplying more than 13 million rural residents with clean energy. The average sun exposure in Bangladesh is 4 to 5 kilowatts / m. The enormous new vision 2021, implemented by the Prime Minister of Bangladesh, has improved electricity Reconstitute all over the world (Energy Matters a Sun Edition company., 2015). In Figure 10 represents the future solar master plan of Bangladesh.

10. BIOFUEL

Biofuels produced for bioproducts, bioenergy and bioenergy (Sumathi, S et al., 2008). Biofuels produce zeta, a nice alternative to regeneration, which is produced specifically from fat, white or yellow fat, poultry fat or fish oils. It is mainly produced from natural vegetable oils (soybean, corn, rapeseed, sunflower seeds, cottonseed, etc.). (Mofijur et al. 2013-Guldhe, et al., 2014). When burning the engine, biofuels are an alternative solution and there is no need to modify the engine (Guldhe et al., 2014). The process of extracting gases and liquids from biomass is indicated by the production of biofuels (Guldhe et al., 2014, Mofijur et al. 2012) and oil from crops (Atabani et al., 2014, Jacobsson,, et al., 2000). The situation of biofuel production in Bangladesh is a very weak lever below the stare level (Jacobsson,S, et al., 2000). Biogas and biomass are more popular in Bangladesh. Bangladesh has more than 350 oil-producing biodiesel products such as J. curcas, sunflower oil, sesame, veal, cotton, peanut oil, and are alternative sources of fuel for Bangladesh (BP,2015-EIA,2015).

11.WIND ENERGY

The world is rapidly turning to the renewable energy sector and wind is using turbines to convert wind energy into electricity [83].Global wind energy generation growing at rate of 16.2% in last 2014 with contributing 4.3% of world total power generation (BPDB,2015) and the Global Wind Energy Council (GWEC) REPORTS THAT market grows by 44% yearly with passing of 51.2 GW IN 2014(BP, 2015);Finally installation capacity of 369,597 MW in fiscal year of 2014 (BPDB,2015) which contributes 3% of total electricity generation around the world , interestingly whereas in Denmark provides it's 41.4% of total electricity , EU countries provides 9.1% of total electricity by wind power generation and 4.4%% (BPDB 2015)power share by wind in U.S.A in Which has a production capacity of 66 GW (BPDB 2015). Organization for Economic Cooperation and Development (OECD) Bangladesh produced 900 kW of wind power at Mohori Dam in Sonangazi (Viny) and 1000 kW mixed wind power on Kutobia Island, Grameen Shakti, Advanced Study Center (BCAS) in Bangladesh Army, IFRD, a total of 19.2 kW in various coastal regions of Bangladesh (REN 2015). However, Bangladesh has the longest sector in the world (about 724 km on the Bay of

Bengal) and requires the electrification of wind turbines in Bangladesh to deepen its technical and economic assessment. However, BPDB recently identified 22 wind turbines and wind turbines along the planned coast of Bangladesh the coastal coasts of Bangladesh and plans to build 50 to 200 MW wind farms in Anwara, Chittagong and 15 megawatts. Wind power plant in Mohori dam in Fini, Monamagat in Cox bazaar, Barki Beach in Anwara in Chittagong, Kipopara in Burgona and Kawakata in Patawakali (BPDB, 2015).

12.HYDRO ENERGY

Hydropower is a natural source of renewable energy, and water is used to generate electricity by converting the water head into kinetic energy, in which the turbine fan rotates with the help of water flow. (Government of people's republic of Bangladesh 2015). Compared to global hydropower generation, Bangladesh has low hydropower sources (Mondal in 2014) and total hydropower output was 879.0 million metric tons at the end of 2014, an increase of 2 0% and less than the last two years; 3.3%. Total hydropower consumption in the world in 2014 was 406.83% and China was the highest (27.4% of global share) (British Petroleum) 2015. In Bangladesh, the power generation capacity hydroelectric capacity in 2014 was 230 megawatts and the worldwide participation rate is Slim. Table 6 shows the proposed hydropower project in Bangladesh, while Table 7 shows the potential of small hydropower and hydropower sites and hydropower targets (mini / small) for the period 2016-2017.

Table 6: Proposed future hydro-electricity projects in Bangladesh (PEC 2015)

Name of the River	Potential of Electrical Energy in MW
kaptai	100
Shangu river	100
Matamuhuri river	100
Mohamaya	23-65
Lohajari	4.5

13.GEOTHERMAL ENERGY

Geothermal energy is the ground heat of the earth and most renewables are clean. However, Bangladesh has the capacity to extract energy from geothermal sources and has a regional temperature gradient in the northwest of between 19.8 and 29.5 ° C / km, between 20.8 and 48.7 ° C / km, of which 110- 153 ° C. From 304 km. Down in the soil (Hassan Time, 2015). However, the areas of Rangpur Saddle (700 meters in circumference), Madhupur Clay (20 m), Singra, Kuchma, Bogra (60-125 km) and the hot water zone of Thakurgaon are the main sources of geothermal energy (Noor N et al., 2009, Hasan. A.P et al 2014). The Bangladeshi government is already planning to build a 200-megawatt thermal power plant at Thackerguan in cooperation with Anglo MGH (Guha, D et al., 2005).

14. THE PROSPECTS OF RENEWABLE ENERGY

The government's goal is to reach 3,168 megawatts of renewable energy by 2021. It also aims to achieve 5% renewable energy in electricity generation by the end of the year, which should rise to 10% by 2021. Government is currently developing some projects on renewable energy in Bangladesh which has been given as follows (Noor et al. 2009):

- The current solar system of 37.5 kW is converted to the maximum installed on the surface of the Bhadit Bhavan power station to the 37.5 kW solar network
- Convert the current 32.75 kW solar system installed on the WAPDA Bhaban surface into a 32.75 kW solar network
- Rehabilitation of 10 KWc solar power plants in Barkal and Oblazila Sadar in the Rangamati region.
- BPDB plans to install a photovoltaic solar plant based on the IPP, such as the 1 MW solar grid from RTC to Rajshahi.
- The solar system connected to the 500 kW grid of the 33.8 kilovolt power plant from Chagpur to Chandpur.
- BPDB plans to install a small solar power plant as part of the Climate Change Trust Fund (CCTF) in remote and inaccessible areas such as
- 500 kW solar power plant in Suandip Ozila, Chittagong province. A small 500 kW solar power plant in Thanchi Obazila, Bandraban district.
- BPDB plans to implement IPP / PPP-based solar park projects as part of the 500 MW solar roadmap for the Asian Development Bank
- 60 MW solar park project in Rangunia, based on the international phytosanitary portal of the Carnavoli River, Rangonia, Chittagong
- 40-45 MW solar garden project adjacent to Bangabandhu Bridge, Tangail Zone and Sirajgonj.
- The project consists of a 2-3 megawatt solar complex adjacent to the PGCB Grid substation complex, Ishwardi.
- The project consists of a 1 to 2 megawatt solar power plant adjacent to the PGCB station complex on the Genedha subnetwork.
- BPDB has installed an electricity grid of 4x225 KW = 900 KW connected to the wind power station of the Muhuri dam area in Sonagazi, Feni.
- In 2008, a 1000 kW wind power plant was completed on Kutobia Island in 2008, consisting of 50 wind turbines with a capacity of 20 kW each.
- BPDB plans to implement a 50 to 200 MW wind project in the Parky Beach area, Anawara, Chittagong based on the IPP program.
- The Power and BPDB divisions have identified 22 potential wind resource mapping sites in Bangladesh.
- The BPDB also plans to expand wind farms along the coast of Bangladesh.
- Micro-hydropower projects will be carried out on potential rivers / rivers in CHT areas after a detailed feasibility study.

- In Bangladesh, opportunities for solar, wind, biomass and micro-hydropower generation are good. The BPDB has taken systematic steps to develop renewable energy projects and has implemented and strengthened energy efficiency measures in recent years to achieve the 2008 energy policy goal. renewable.

14. CONCLUSIONS

Renewable energy can be considered as a potential alternative to conventional fossil fuel energy. At present, the use of renewable energies such as solar, biofuels, geothermal and wind energy is attracting considerable interest due to environmental and economic concerns. The Bangladesh government has made considerable efforts and goals to implement various renewable energy projects, which are also supported by the government. For example, the Energy Division has embarked on a program to generate 500 megawatts of solar power. Hydropower now accounts for the largest share of electricity produced from renewable energy sources, with a global capacity of 1,000 gigawatts. There is potential for 4 million biogas plants and 70,000 installations have been installed across the country. However, the development of large-scale renewable energy technologies in the country remains hampered by the lack of clear knowledge about renewable energies and their benefits and the absence of government policy to encourage and encourage communities and industries. to use and develop a renewable energy project. Wind energy is also limited to coastal areas, offshore islands and EIA rivers. Total power. Annually. Energy. <Http://www.eia.gov/ Total Energy / Data / Annual / pdf / aer.pdf df; 2014 (accessed November 2015). The sides and other open areas are internal with a strong wind system. However, reliable information and best practices can dispel the uncertainties and show that renewable energy is the most promising and sustainable option for energy in Bangladesh.

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