

WIND ENERGY IN BANGLADESH: PROSPECTS AND UTILIZATION INITIATIVES

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ABSTRACT

Wind, as we all know, is an important source of renewable energy. Bangladesh being a tropical country does have a lot of wind flow at different seasons of the year. However, there are some windy locations in which wind energy projects could be feasible. In our study, we studied previously collected data on the wind resources available in Bangladesh at present and by analyzing this data, have tried to predict if these wind energy resources are sufficient for applications like wind power generation.

1. INTRODUCTION

Wind can be a vital source of energy if properly utilized and exploited. But before high-end projects are implemented, adequate research should be done to study the feasibility and determine a suitable type of project to implement. The primary parameter needed is wind speed and direction. Over the past years, many organizations have made many attempts to collect data on wind resources in Bangladesh. Based on this collected data, many small wind energy projects have been undertaken.

2. SCENARIO OF RESOURCES

Bangladesh is situated between 20.30 - 26.38 degrees North latitude and 88.04 - 92.44 degrees East. It has seven hundred Km coastal line, analysis of upper air data by CWET India show that wind energy resource of Bangladesh is not good enough for grid connected wind parks.[1] At present, several wind resource assessment program (WERM, SWERA, WRAP of BPDB) is ongoing in the country. From the previous studies it can be inferred

that the small wind turbines can be installed in the coastal regions of the country.^[2]

2.1 Wind Data from Bangladesh Meteorological Department: Most of the previous wind speed data in Bangladesh available from the Bangladesh Meteorological Department. Meteorological stations measure winds at lower height. However, normal hub-heights of modern wind turbines ranges from 20 to 40m. Thus using meteorological data, designing wind energy conversion system would end in a failure and there are some previous experiences.

2.2 Wind data analysis by BUET at Gajipur: Wind data were recorded from august 1997 to July 1999 as a daily basis and recorded by a data logger. The wind speed frequency distribution is processed from these data and fitted to Weibull function to determine the nature of wind regime. The table shows data for 1 year with the shape factor k and scale factor c of the Weibull parameters.

Table 1: Standard deviation method derived from one-year data at Chandona (Aug.'98 -Jul.'99)^[3]

Month	k	C (m/s)	V _{mean} (m/s)
January	2.95	3.06	2.74
February	2.80	3.31	2.95
March	2.45	3.69	3.27
April	2.56	4.85	4.31
May	2.53	4.76	4.23
June	2.9	5.28	4.2
July	3.2	3.77	3.2
August	2.21	3.74	3.31
September	2.08	3.12	2.76
October	2.18	2.54	2.21
November	2.31	2.63	2.33
December	3.00	2.56	2.29

2.3 Wind Energy Study Project (WEST):

Table 2: Monthly average wind speeds from seven WEST stations at 25 metes height.

Name of the wind speed monitoring station						
Month	Patenga	Cox's Bazar	Teknaf	Char Fassion	Kuakata	Kutubdia
Sep'96	3.36	3.69	3.46	3.34	3.77	3.58
Oct'96	3.2	3.74	3.3	3.7	2.18	3.98
Nov '96	2.61	2.93	2.29	Lost	1.98	3.23
Dec'96	2.97	1.78	1.44	3.9	3.35	3.38
Jan '97	3.25	2.33	1.99	2.8	3.18	3.67
Feb '97	2.66	1.99	1.9	2.69	3.37	3.29
Mar' 97	3.13	2.42	2.26	3.54	4.84	3.53
Apr '97	2.88	1.84	1.65	3.29	4.93	3.11
May '97	4.96	3.97	3.09	4.81	6.28	4.89
Jun '97	5.83	4.64	3.26	5.76	7.31	5.9
Jul '97	5.67	4.8	4.33	5.22	7.34	6.17
Aug '97	5.13	4.31	4.03	5.17	Lost	5.34

2.4 Wind data study at Saint Martin's Island:

Recently a project on "Feasibility Study on R&D of Renewable Energy (Solar, Wind, and Micro-Mini Hydro)" has been undertaken by the Institute of Fuel Industrial Research (BCSIR). Under this program, wind speed data have been collected in the Saint Martin's Island. Research Development (IFRD), of Bangladesh Council of Scientific and

Table 3: Monthly average wind speeds in the Saint Martin's island [IFRD, 2002] ^[1]

Month	V _{av} (m/s)	V _{max} (m/s)
January	5.08	23.32
February	4.71	19.78
March	4.29	18.94
April	3.58	20.03
May	5.75	26.30
June	5.96	29.80
July	5.33	24.20
August	5.96	20.40
September	4.79	17.70
October	4.17	15.90
November	3.79	14.50
December	4.08	15.20

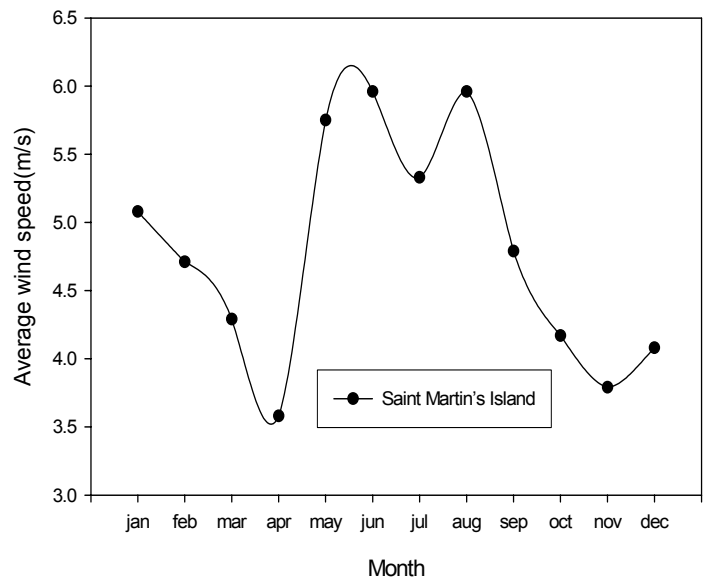


Fig 1: Monthly average wind speed at Saint Martin's Island.

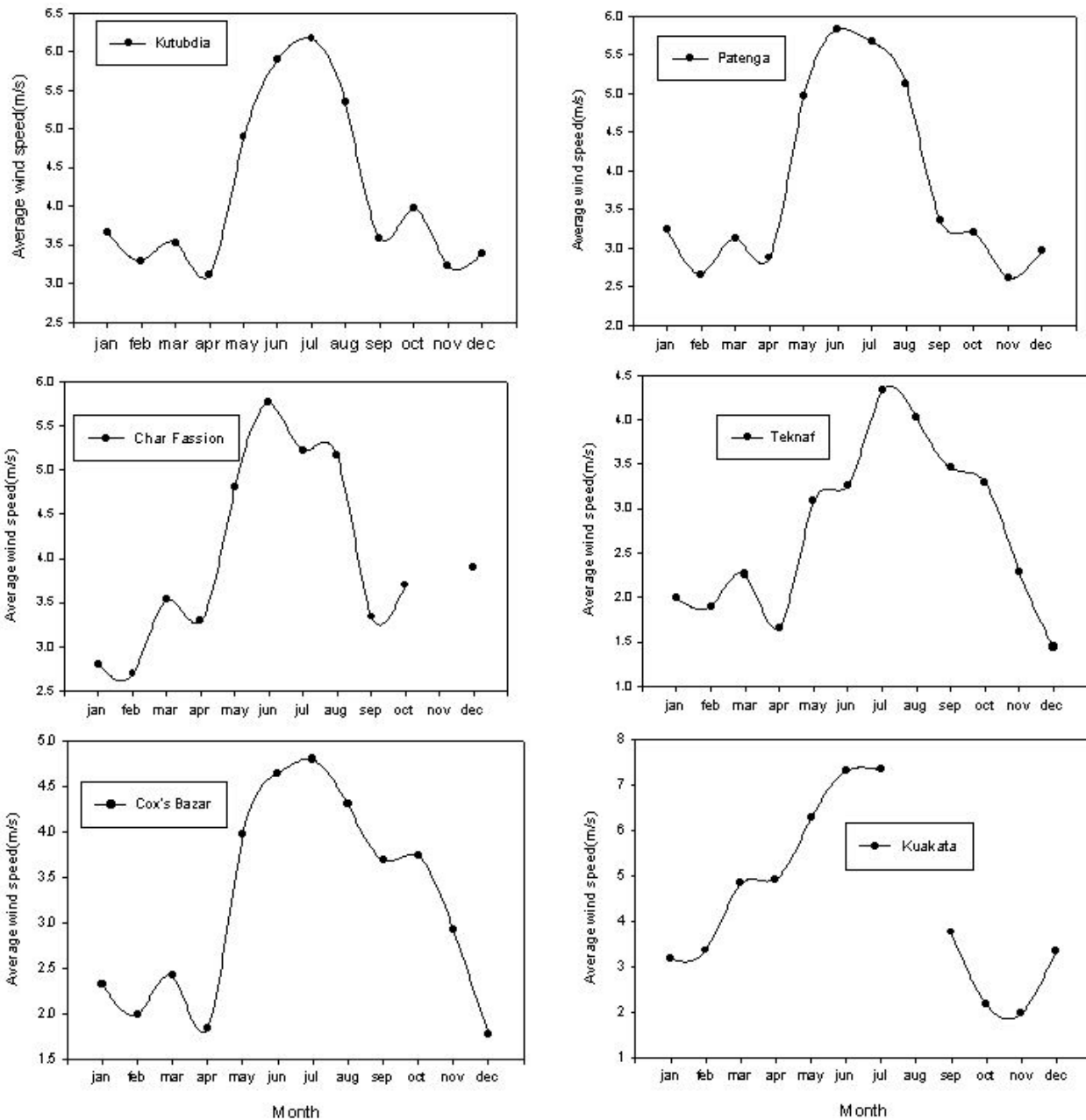


Fig 2: Monthly average wind speed at different locations.

3. UTILIZATION INITIATIVES

From the previous studies it can be inferred that the small wind turbines can be installed in the Coastal regions of the country. However, scope of utilization of wind energy resources can become effective in certain cases of exclusive applications including wind water pumping and power generation through Wind-Diesel-hybrid systems conducted by BPDB; Muhuri Dam area at Feni has bright prospects of electricity generation from wind. In the above-mentioned backdrop BPDB has

decided to undertake the Wind Resource Assessment Program (WRAP) at the Muhuri Dam site for one year.

3.1 Wind Energy Program under Grameen Shakti: Grameen Shakti (GS) installed 4 hybrid power stations (combination of wind turbine and diesel generator) in four cyclone shelters of Grameen Bank of which 3 are 1.5 kW and one is 10 kW.

3.2 Wind Resource Assessment Program (WRAP) of BPDB: According to preliminary study (diesel generator) in four cyclone shelters of Grameen Bank, of which 3 are 1.5 kW and one is 10 kW.

3.3 Wind Energy Program under Bangladesh Center for Advanced Studies (BCAS):

- Energy Resource: Wind Turbine
- Type of installation: Water pumping wind mill irrigation
- Capacity of installation: 1X1.0 KW, 3X1.5 KW, 1X10 KW
- Location of Installation: Patenga (Coastal Area), Chittagong
- Functional Status: Functioning

3.4 Wind Energy Program under Bangladesh Rural Advancement Committee (BRAC):

Program 1-

- Energy Resource: Wind Turbine
- No of installation: 3
- Capacity of installation: 0.9 KW
- Location of Installation: Coastal Area of Bangladesh
- Functional Status: Functioning

Program 2-

- Energy Resource: Wind-Diesel Hybrid System
- No of installation: 7
- Capacity of installation: 4.32 KW
- Location of Installation: Coastal Area of Bangladesh
- Functional Status: Functioning

4. CONCLUSION

Though some of the wind turbine is installed for pumping purpose, it is not enough compared to our total available wind energy resource in Bangladesh. From Table 2 and Fig1, Fig2 it can be seen that from May to August wind speed are higher, wind generated electricity and wind pumps can provide irrigation facilities in that time. All data in table 2 is taken in coastal region so we may use this wind for producing electricity in those remote areas for running ice mills and to preserve fishes. From seven WEST station it was found that the average annual wind speed values at 25 meter height for the seven stations vary from 2.96 m/sec to 4.54 m/sec. The

highest average annual value (4.54 m/sec) was observed in Kuakata and the lowest value (2.96 m/sec) was observed in Teknaf. From table 3 we find the wind speed is good enough to produce electricity in Saint Martin's Island. Though wind speed value is less than 7 m/s afterwards we know average hub height is 20 to 40m and that will increase the wind speed [4] and feasible to electricity generation. It is observed that wind speeds of Chandona are low. The wind speed is very high during monsoon period (June-July) and very lean from October to February. From the analysis of wind resource assessment it is found that 300-600 watt capacities Wind Electric Generators (WEGs) are preferable and windmill for water pumping are prospective for that site.

During the driest season, there is a very strong flow of NW direction wind and this is the season for paddy cultivation in Bangladesh, so during this period wind pump provide irrigation facilities. Wind pumping can play a significant role in the supply of water for irrigation and drinking for the rural areas in Bangladesh. In most of the areas in Bangladesh, the pumping head is less than 6m, which is appropriate for using diaphragm pump and man powered pump, by these pump available wind power can be produced good result with a suitable rotor.

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