

ENERGY RESOURCES FROM WIND ENERGY IN BOSNIA & HERZEGOVINA, CURRENT STATE AND PROSPECTS

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ABSTRACT

This paper presents results of wind characteristics research performed in the area of Bosnia & Herzegovina in the period 1999-2007.

Based on this research, seven wind farms have been designed, with an installed power of 210 MW, with a high coefficient of energy efficiency. Three farms, each of 100 MW capacity are under construction currently.

This paper presents field for further research and prognoses of possible installed capacities.

Keywords: wind energy, research, capacity, Bosnia & Herzegovina

1. INTRODUCTION

EU has "on time" realized strong potential of renewable energy sources (RES). In fact, over 15 years ago objectives, guidelines and mechanisms for their realization have been defined. In time, objectives became bigger, and mechanisms and guidelines were finished. Today, result of all political decisions are more than good results. Everything shows that these positive advances will continue in the next period as well. [1, 2, 3].

Since Bosnia and Herzegovina (B&H) aims to join the EU, it has to meet certain conditions, which means that it has to coordinate regulations and system. That also applies to the field of energetic. In the next short period it is necessary to elaborate B&H Energetic Development Strategy by the year 2020. As the starting point for elaboration of Energetic Development Strategy, the Study on Energetic Sector in B&H [4] is going to be helpful. The Strategy elaboration should also be a sign for the beginning of big investments, around 3,5 billions € for elementary energetic facilities in one part of B&H, for energy sector in B&H, and that is in fact the beginning of overall development of B&H. However, the Strategy should consider and potential of RES in B&H. In [4] those potentials are not correctly processed. For that reason, in this paper are going to be shown only results from previous research on wind power potentials for getting electricity in B&H.

2. MEASUREMENTS OF WIND CHARACTERISTICS

In the previous period in B&H wind characteristics have been measured at weather stations. Moreover, those stations have often been installed in urban centres, and they were equipped with inappropriate equipment for measurement of wind characteristics in order to estimate wind power potential. This situation, as well as ground complexity, wind complexity [5,6] and the previous war, resulted with the lack of appropriate data basis for making B&H wind atlas.

Measurements at basic weather stations have been basis for standards and technical regulations from the area of wind pressure in ex-Yugoslavia [7]. Of course, this information could not have been relevant for determination of wind power potential, but analysing the same information, as well as satellite snapshots (Fig. 1), the area of southeast B&H is recognized as interesting for installation of wind power plants.

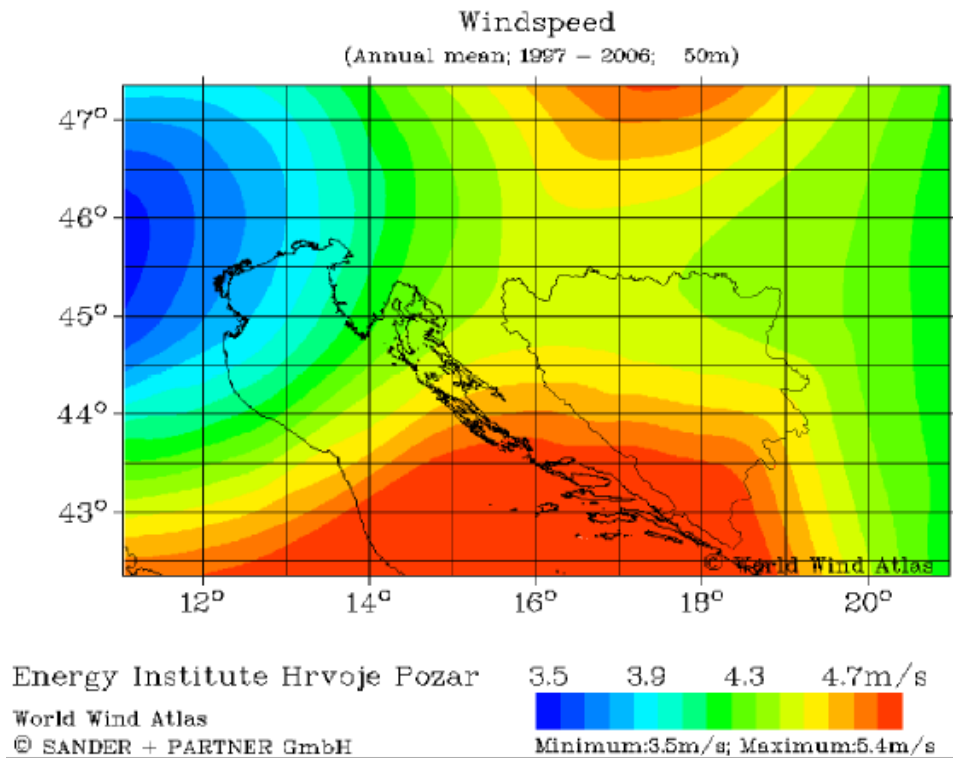


Figure 1. Average annual wind speed at height 50 m above ground for the period 1997-2006, [4]

Therefore, the first analysis, research and examinations of wind power potential are linked to the area of south B&H. In April 2002 at the location Sveta Gora – Podveležje Mostar the first measuring station with appropriate equipment is installed, and then the other ones followed. Inclusive to 31.12.2007, at 13 areas the total number of locations where measuring equipment has been installed is 33. Location arrangement is shown in the Fig. 2 and Table 1.

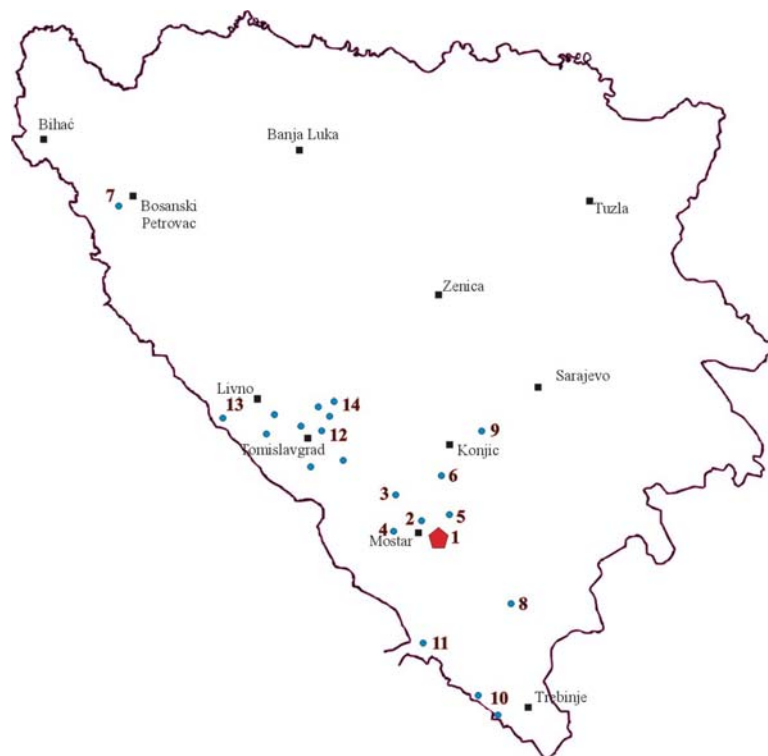


Figure 2. Locations of measuring stations

Table 1. Locations of measuring stations

	Area	Micro location	Measuring height
1.	Podveležje Mostar	Sveta gora	10
2.		Poljica 1	20, 30
3.		Lokvice	20, 30
4.		Mali grad	20, 30
5.		Relej – Velež	6
6.		Smajkići	10
7.		Kamena	20, 40
8.		Velina gomila	20, 40
9.		Ravnice	20, 40
10.		Dražnjača	20, 40
11.		Merdžan Glava	20, 40
12.		Poljica 2	20, 40
13.	Planinica Mostar	Planinica	50
14.	Jastrebinika Mostar	Velika Vljajna - Jastrebinika	10, 50
15.	Miljkovići Mostar	Miljkovići	10
16.	Pločno Mostar	Pločno	10, 30
17.	Prenj Mostar	Bahtijeвица	10, 30
18.	Bosanski Petrovac	Medeno polje	25
19.	Berkovići	Berkovići	10
20.	Ivan Sedlo	Ivan Sedlo	10
21.	Ravno	Ivanjica	10
22.		Velja međa	10
23.	Neum	Crkvina	10
24.	Tomislavgrad	Mesihovina	10, 50
25.		Mokronoge	50
26.		Srdani	50
27.		Vitrenik – Stipanići	10
28.	Livno	Kamešnica	10
29.		Borova Glava	10, 50
30.		Pločno (Vran)	10
31.	Kupreško polje	Ravanjska vrata - Crljenac	25, 50
32.		Paklina – vrh Klis	25, 50
33.		Debelo brdo	10, 30

At these locations wind speed and direction have been measured at different heights (6, 10, 25, 30, 40 and 50 m) using anemometer and wind vane with 10 minute average. Measurement period is from 6 months onwards. Acquired information from measuring stations may be considered representative and be useful for further analysis. Analysis has showed that some locations have good potential, but the other ones have not. First measures and research have resulted in new perceptions. In other words, because of the distinctive features of area and wind conditions it was necessary to develop and implement a special research model [8,9,10,11]. Ground complexity as well as wind complexity – “bura” at interesting area required for greater number of measuring locations. The measurements were performed in a relatively small area of Podveležje (12 locations). Within FP6 project [12] at the location Mali Grad – Podveležje the measurements were performed using special equipment: SODAR (SOmic Detection And Ranging) and LIDAR (Light Detection And Ranging) aiming to define the vertical wind profile.

3. ESTIMATION OF POTENTIAL FOR CONSTRUCTION OF WIND POWER PLANTS

On the basis of measurements, research and analysis in B&H by the end of 2007 inclusive, using feasibility study, wind farms have been defined with installed power of 210 MW. The beginning of construction is expected in 2009. With regard to potential for construction of wind power plant, it is necessary to differentiate real and technical potential. Both demand a certain number of representative input data. In consideration of ground complexity and wind conditions it is necessary to perform many measurements more with longer measurement period. After complete analysis it is possible to talk precisely about potential for wind farm construction. All other information is flat and imprecise. It is possible to say now that technical potential is over 2 000 MW, but the real potential is difficult to assume because of defining spatial plans, among other things. At any rate, there are number of factors that influence on precise estimation of potential for construction of wind power plants in B&H.

4. CONCLUSION

B&H has the potential for construction of wind farms. In this moment it is impossible to talk precisely about real potential for wind farm construction. Namely, it is necessary to carry out more research. Apart from many interactive factors influencing on the project's implementation, the beginning of construction will quite possibly commence in 2009. For successful implementation of these potential projects, it is necessary to have unambiguous political support for defining objectives, legislative, for introducing scientific – research institutions in process, making favourable economic climate, preparation of national production capacities for equipment production etc.

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