WIND ENERGY CONVERSION

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ABSTRACT: *In the work shall be submitted to the criteria governing the selection of locations wind turbines.For the choice of locations of the wind machines are required detailed information on the structure and the intensity of the wind, but also to climatic conditions, the particulars of the relief, the acess and environmental interference.*
The study shall take into account the implications of the environmental damage related to the valorisation of wind power.

KEY WORDS: *wind energy, wind speed, wind structure.*

1. CRITERIA FOR CHOOSING THE SITES WIND

Choosing locations for the wind machines are needed detailed information on the structure and intensity of the wind, and the weather conditions, particuliarities of relief, access and environmental interference.

Basic information can be obtained from: map of zoning new wind, data on the rate and structure of wind that are obtained from the stations of the site for a period of at least one year, surveying the area in order to analyze the situation of the site and removing obstacles on main directions of the wind, study relief zone, prospecting field.

The recommended criteria for choosing optimel locations are:

- wind power potential: average speed as possible, during annual operating speeds in the range of the wind turbine to be as high,
- structure Wind: wind direction show no large variations in short periods, atmospheric turbulence to be as low as possible, the maximum wind speed to be as low variation vertical wind speed to be as small;
- morphology relief: recommended hills sloping and rounded, open plains, lakes, open beaches of the seaside, long valleys parallel to the direction of prevailing winds.

Not recommended hills ridge exceptionally rugged mountains, valleys perpendicular to the direction of prevailing winds.

- roughness land, nature and size of obstacles: land roughness be as little vegetation as grinding and uniform, are avoided forests; lack of natural obstacles (trees taller, uneven local); no artificial obstacles (skyscrapers, towers, warehouses, generally will avoid urban areas)
- climatic phenomena: phenomena of formation of frost, ice be as rare and have little persistence; in areas where lightning is frequent attention will be paid to lightning protection
- distance or network use: it will seek a minimum distance between the windmill and the user;
- existing access roads to the technical and service
- ensuring the protection and safety areas to avoid accidents technical of moving bodies, blades, rotor, nacelle or separation and design pieces of ice or frost.

In case of obstacles will follow the following conditions: in situations with the flat according to [6], the installation height is

$H>3z_H$ where z_H is the maximum land subsidence within a radius of 1km. If areas with obstacles (buildings, walls)
maximum installation height will be $H>3z_H$ minimum distance to the obstacle ~$20z_H$. In areas with small obstacles often an installation height:

$$H = \frac{4}{3} z_H \qquad (1)$$

1.1. Vertical profiles of wind speed

It is known that ususal wind speed is measured at a height of 10m above the ground.
Vertical wind speed varies, increasing the height above the ground and reaching 500÷1000m geostrofic wind speed values (horizontal movement of atmospheric air). The relationship that takes into account speed increases with altitude is:

$$\frac{v_1}{v_2} = \left(\frac{h_1}{h_2} \right)^{\alpha} \qquad (2)$$

where v_1 and v_2 is wind speed at the heights h_1 and h_2 and "α″ is an exponenet which depends on the nature of the current and the thermal stratification of the atmosphere.
In the Table 1 below are mentioned "α" exponent values for different types of sites.

The wind turbine should be located away from any type of natural or man-made obstacles to avoid the occurrence of turbulent air.

As there are more turbulent, the lower the intensity and wind speed. It is recommended that a radius of 50m from wind turbines to obstructions (trees, uneven terrain, construction, etc.).

For greater heights of 41m is compulsory to install red light signaling on top of the tower for locations near airports are special restrictions.

1.2 Performance Wind

To maximize production and performance of wind farms, while reducing risk, downtime and maintenance costs, optimize the placement of wind turbines Windsor pioneering use of technology CFD (Computational Fluid Dynamics) offers software for CFD, training, independent engineering and technical services to the wind industry. Based in Norway and a global presence in over 30 countries, Windsor was long CFD leader and expert in the wind industry.

In 1998, Arne Gravdahl, founder of Windsor took special task to simulate wind atlas Norway, in cooperation with the Norwegian Meteorological Institute. Simulation of local wind conditions along the Norwegian coastline complex was a difficult task, the use of CFD has been a requirement to obtain accurate simulations needed. Studies have shown that CFD to simulate the effects of land on wind conditions more realistic than traditional linear technologies. To meet these requirements, it was developed methodology Windsor.

The first version of Windsor was launched in 2003. Since then, the focus has been on improving and further developing.

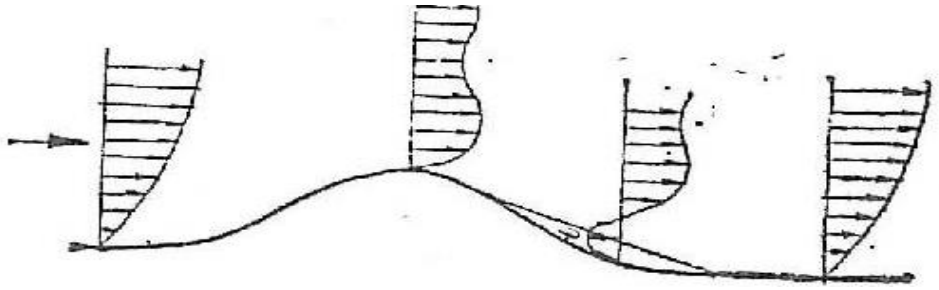

Figure 1. The distribution of wind speeds at a well rounded hill

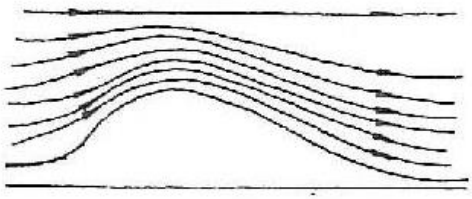

Figure 2. The effect of accelerating the wind speed of a hill sloping

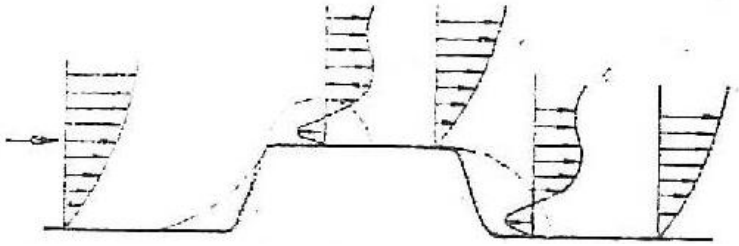

Figure 3. Wind velocity distribution of a hill with steep walls

Table 1

Nr. crt.	Nature landscape	Non-uniformity of the ground [m]	α [-]
1	Relief flat water surface, shorter grasses	0-0,02	0,08-0,12
2	Little rugged relief with low value non-uniforms, agricultural crops	0,02-0,2	0,13-0,16
3	Rugged terrain: forests, steep hills	10,0-150,0	0,2-0,23
4	Very rugged relief: cities, forests, hills, bumps high mountains	100,0-400,0	0,25-0,4

ENVIRONMENTAL IMPLICATIONS RELATED TO THE DEVELOPMENT WIND ENERGY

Wind energy is not a pollutant of the atmosphere, does not produce greenhouse gases, does not cause damage to soil, do not consume resources.

Wind farms may pose a danger to poultry flocks, but it is absolutely necessary to place them outside their migration routes.

In the case of the installation of wind farms, they deal with important areas of agricultural land or pastures, but the produced electricity compensates for the area taken out of the agricultural circuit.

Made of metal and plastic, a removable wind is at end of life, and almost entirely recyclable. Once dismantled, do not let the location pollutants. Estimated lifetime of a wind farm is 20 years.

From aesthetically, if not bother looking large buildings or wind turbines could not do this. There are regulations on the location of wind turbines and architectural heritage protection, urban and landscaping.

The study also keeps track of the impacts of noise. The noise is 55 dB and attenuates ground level as the distances: 350 m is 35 ÷ 45 dB.

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