ACTUAL TENDENCIES RELATED TO THE WIND ENERGY

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ABSTRACT: *The wind turbines have become very popular in recent years and their completion presents a growing interest. In general, the wind turbines represent a cheaper alternative for the production of energy, in regions where the wind speed is greater than 4m/s. In the work to submit an application and achieve an objective necessary in a changing world.*

The aim is to through a multidisciplinary approach to find solutions and results in areas where there is a possibility of recovery.Romania has a large potential for wind energy.

KEY WORDS: *wind energy, wind turbine, surface.*

1. WIND AS AN ENERGY SOURCE

Air masses away act together, causing rapid changes of weather elements: rainfall, temperature variations, the success of cloud systems, pressure variations. The separation of air masses is called fronts. Fronts are several types, depending on the genesis: cold, warm, occluded.

Because temperature and air pressure have the same values, the entire surface of the Earth, there is air travel. The temperature is not a constant size, determines the non-uniform distribution of the atmospheric pressure due to the different heating regions around the world. Moves from regions of higher pressure to the atmospheric pressure with low winds, so the winds form.

The wind is characterized by two extreme elements variable in time and space: the direction of the wind, judged by the 16 sectors of the horizon and speed, representing the displacement of the air particles in the time unit of m/s. In meteorology, the wind means a physical phenomenon that manifests itself as a movement directed air in Earth's atmosphere.

Winds with strength from 2 through 5 are called breeze and those with strength of 6÷8 are called wind, the storm began. The wind strength grade nine is called simply storm and wind strength 12 is called Orcan, hurricane, typhoon. On earth the wind can theoretically reach 1230 km/h (which is actually the speed of sound), but basically this speed can not be reached by the strongest tornado (up to now the maximum speed recorded by a tornado is 500÷600 km/h).

The air currents move by following the gradient force from a "minimum" equator where the hot air rises to a "maximum" at Pol.

The Coriolis force deviates, through the rotation of the earth, in the northern hemisphere, the air stream (wind) to the west forming the so-called western wind.

1.1 Wind formation

The main reason for the formation wind wind training is the difference in atmospheric pressure between the two regions. Warm air is lighter rises producing a minimum pressure, place will be taken by air masses of the cold (maximum air pressure) until it equals the pressure difference between the two regions. This movement of air masses behind

aerodynamics. It depends on the wind intensity directly proportional to the difference in pressure between the two areas.

The wind is a natural air stream. If it stops, it is called the wind has stood, and if it is very strong, a storm is created. A sudden, strong wind blow is called bust.

The air rises throughout the day above the sun-heated soil. It brings with it the breeze of the sea, a stream of air produced in coastal regions from the sea to the shore; During night the direction of movement changes.

In addition to the thermal factors, there are two other elements that influence the wind, the earth's rotation movement, which is taken over only by part of the atmosphere, as we can see with aliens and the structure of the Earth on the surface, including trees, constructions, hills or even mountains, influencing the power of the currents.

The wind direction is influenced by the Coriolis force that originates through the rotation of the earth, deviating, for example, the winds to the west in the northern hemisphere. Another factor that changes the direction and eventually the wind temperature are the topographical obstacles such as mountains, valleys or canyons.

1.2 Wind oscillation depending on the season

Besides the annual average wind speed, it is relevant and how it is distributed throughout the year. For example, the average speed in a particular location can be 5 m/s, because the average of 4 m/s in the hot season and 6 m/s in the cold. Details that may seem unimportant when calculating the average speed can significantly affect expected yield.

In northern Europe observed large variations of wind speed from one season to another, the average winter is higher than the summer. If we want to use energy produced by the turbine to power partly heating systems for buildings (and some householders choose really to use for this purpose), increased power of the wind in winter will fit perfectly with the necessary additional heat. Heat loss in buildings is not only due to external temperature difference, but also the wind.

1.3 Coriolis force

Forces occurring atmospheric fluid are strong volume and surface forces. Forces on which atmospheric circulation are: the force of attraction of the Earth, the Coriolis force, the force of pressure and friction forces. Coriolis force and centrifugal force are called apparent strengths. Name of force deviation is due to the phenomenon of deviation from the original direction that requires that drain fluids from the Earth's surface under conditions of low friction. In case of prolonged flows, eg atmospheric circulation, this force had a profound influence.

Coriolis parameter relationship is written as f = scalar $2\Omega\sin\varphi$ depends on the latitude of the place and represents the intensity of the Coriolis force. Along the axis of rotation does not appear Coriolis acceleration. Deviation from the fluid path is to the left in the northern hemisphere and to the right in the southern hemisphere.

1.4 Wind geostrofic

Given the general equation of motion of the atmospheric air can be concluded that the horizontal movement (wind geostrofic) can be treated separately to the vertical movement. From the general equation of the centrifugal force is neglected (considering the atmosphere in uniform motion, rectilinear and horizontal), neglecting friction forces, the relative acceleration.

On the particle of air would only act Coriolis force and the baric gradient force - the geostrophic approximation.

The simplest approximation for a moving atmosphere is the geostrophic approximation of the wind, in which motion and air circulation are considered to be synoptic.

Geostrofice winds are all large-scale air movements: cyclones and anticyclones circulation, the trade winds, the general circulation of the atmosphere, the

monsoons. Geostrofic wind is approached only real winds in the atmosphere, where friction forces do not intervene. Actual movement deviates geostrofic always balance because, especially Coriolis force. Barrel gradient force acts perpendicular to the isobaric pressure from large to small. So, in the northern hemisphere, the geostrophic wind is parallel to the isobars, the low pressure being on the left. In the southern hemisphere, the low pressure is to the right of the geostrophic wind. At the equator, the velocity of the geostrophic wind is maximum and decreases to the poles in the same barric gradient.

1.5 Wind strength. Scale Beaufort

The Beaufort scale is an empirical scale for describing wind speed and settled on observed sea look. Its full name is the Beaufort scale of wind force. The wind speed can be measured accurately with an anemometer and expressed in meters per second, kilometers per hour or knots. The wind strength is qualitatively evaluated by a scale in the speed (Beaufort scale in 12 steps). Formula that can be calculated based on the Beaufort wind speed "v" expressed in km/h is:

$$\text{Beaufort} \approx \sqrt[3]{\frac{v^2}{9}} \qquad (1)$$

The result is rounded to the nearest integer. This formula applies to the wind speeds up to 118 km/h, above which is meaningless.

1.6 Winds from Romania

Direction, wind intensity and frequency of winds are the main aspects. Wind direction is determined by the position cyclones and anticlonilor but highly influential presents physical-geographical factors and in particular guideline Carpathian chain. Carpathians essential change wind direction and speed, causing an intensive or local accents.

It was found in the annual data, as in Transylvania and the Tisza Plain prevailing winds from the northwest; Moldova north winds north and northwest and then the SE in southern Moldova and in Baragan, the NE (called Crivat), then the SE; in the western part of the Romanian Plain prevailing northwest winds and V (S and SW winds are called Austru in this plain).

In the west and in the Carpathian mountains prevailing winds behind the cold air specific baric depressions away. Air flows from the inside out and vice versa are barred from the Carpathian arc. To the east and south of the Carpathians is observed winds predominance of two ways, both parallel to the general direction of the Carpathian chain. Confirmation of this statement is given by the weather station data from the Peak Man, where prevailing winds from the northwest and then at the S and SV. Changes from winter to summer is found in the Carpathian mountains.

Wind speed is higher in the mountains than on the plains. At the mountain wind speed variability is characterized by excessive. The speed may be increased in a few minutes from 0m/s to 20÷30 m/s, then drops suddenly. At the plain maximum speed reached 35m/s, and at the mountain 43,8m/s.

Wind regime in Romania is determined both by the general particularities of the atmosphere, and the particularities of the active area, obviously the role of orographic barrier of the Carpathians, which determine by the orientation and altitude the regionals particularities of the wind.

2. ZONING WIND ENERGY

Due to increasing world population and in terms of advanced civilization, electricity demand is increasingly higher. The solution to increase electricity production was, until recently, that classical use of fossil fuels, and lately, the development of nuclear power.

The energy issue has been analyzed and debated frequently in international organizations. in accordance with the Kyoto Protocol (negotiated in 1997 by 160

countries) and Directive 2001/77 / EC of the European Parliament and Council to significantly reduce greenhouse gases and promote the production of electricity from renewable sources.

Namely 20% of the total energy used in 2020 be renewable. Renewable energy sources are: water, sun, wind, tides, ocean heat, biomass and others.

Romania's hydropower potential is used at 50%. Wind potential is estimated at 14.000 MW (power input). Increased production of electricity from hydro and wind resources is justified and is part of the trend-country target to reduce emissions by 39% in 2020 compared to 1990. To achieve this objective, the EU Energy Commission aims to focus on a number of energy related measures, such as:

- improving energy efficiency;
- increasing the share of renewable energies in energy sources;
- reducing carbon dioxide emissions.

In research programs it has an important share harnessing wind energy. He said wind potential of Romania's strategy for the use of renewable energy is 14.000 MW (installed capacity), which may provide an amount of energy of 23.000 GWh/ year. These values represent an estimate of potential theory and should be nuanced by the possibilities of technical and economic exploitation.

Based on theoretical wind potential is known as the real potential is much lower, it depends on the possibilities of land use and energy market conditions. Therefore capitalized economic wind potential can be assessed only in the medium term, based on technological and economic data today known and considered also available in the medium term. It is estimated that in Romania there are three areas with considerable wind potential.

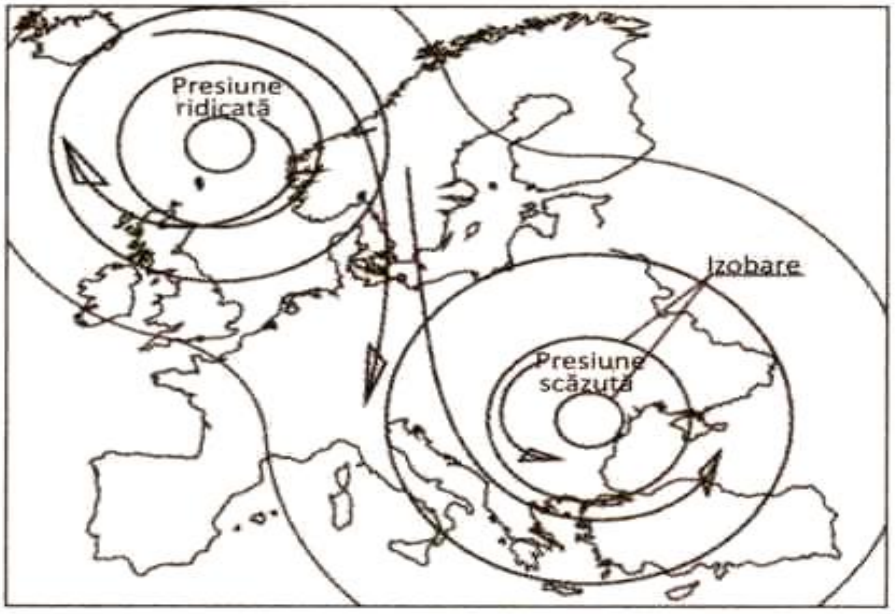

Figure 1. The currents in the northern hemisphere
The wind blows to the soil surface, from the high pressure region into the low-pressure

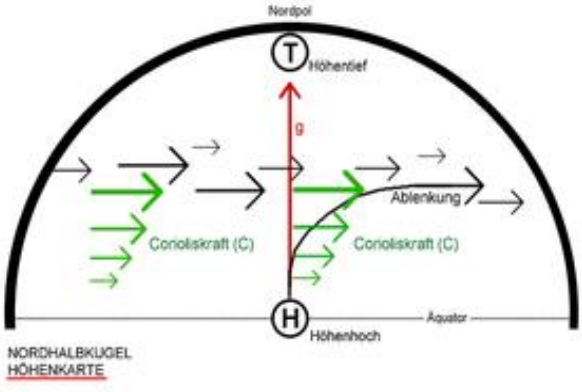

Figure 2. Moving air masses to the pole

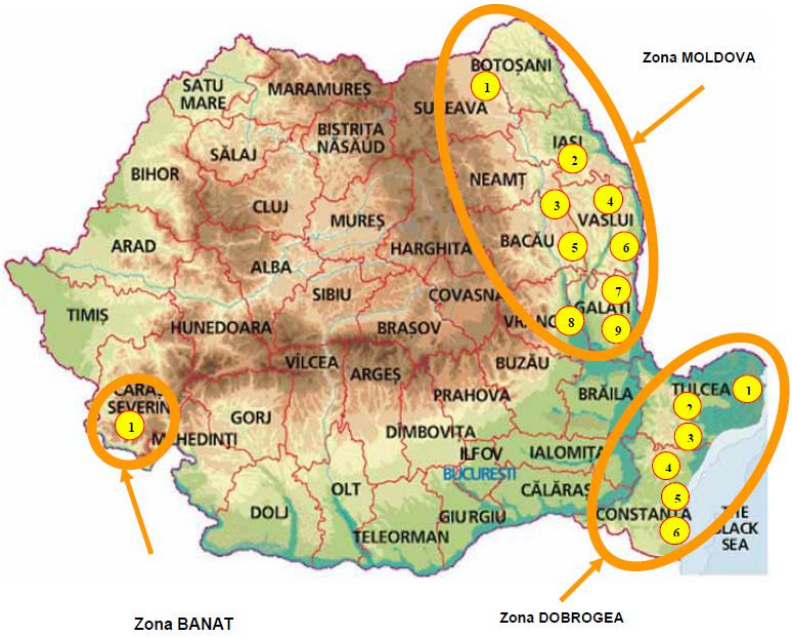

Figure 3. The areas of wind potential

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