Assessment of regional wind energy resources over the Ukraine

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The purpose of the study has been to provide a preliminary assessment of different regions of the Ukraine. Investigation is based on thirty-minute wind observations collected through an 8-year period (January 1, 2002 to December 31, 2008) for seven airports of the Ukraine. For renewal of vertical profile of the wind direction and speed radiosounding data were used.

By applying of the probabilistic analysis techniques to series of wind data and the wind extreme values, yearly, monthly and diurnal variation of wind speed and direction are derived. Based on these results theoretical distribution functions and exceeding probability are found for each airport. The statistic characteristics obtained were compared with the correspondent values provided for 1936-1960 and 1961-1990 periods and site-related temporal changeability is determined. For each period considered assessment of wind resources at 10 meters height is carried out. Since the geostrophic wind are frequently used to calculate the surface wind at heights between 10 and 200 m, in the research the distribution of the geostrophic wind for each airport were determined. Comparative analysis of distribution and statistic characteristics of geostrophic and surface winds are made.

The relation between a set of values of the geostrophic wind and a set of values of the surface wind speed was provided for each airport.

Using different relationship for variation of wind speed with height wind resources at heights between 10 and 200 were assessed.

The results obtained show that with the lapse of the time wind speed and wind resources is decreased half the size. It is reflected general tendencies in the wind speed changeability over the European territory. Places which are most perspective for wind turbine installation are off-shore sites such as Odessa, and sites situated in the Crimea mountain (Simferopol) and the Donetsk ridge (Donetsk).

The results derived in the contribution may be used for modeling and mapping wind resources of Ukraine.