

Radiative parameters specific to Braşov urban area

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Direct irradiation, Linke turbidity factor, clearness index.

The paper objective is to present the input data needed for the renewable systems design, namely the recording and the analysis of the local meteorological and climatological parameters such as the solar radiation, the wind speed, the clearness index and the atmospheric turbidity factor. The diagrams presented are obtained on the basis of the meteorological data recorded during three years, 2006-2008. The used meteorological data, for this study, were recorded with a local weather station positioned on the building roof of the Transilvania University of Braşov.

Referring to Braşov area, in the first chapter, the paper presents the recorded values of the direct irradiations onto a horizontal surface. There are also presented the direct solar energy available, averages of the hourly values, for December, March and June 2008.

The second chapter of the paper proposes a study concerning the availability of wind power for Braşov city area. There are presented the monthly mean values of the wind speed and the wind power recorded for Braşov urban area. The registered values of the wind speed characterize an area with a very small wind potential. The monthly mean wind speed is around 1-2m/s, values that cannot lead to important values of the wind power. The aeolian regime of the Braşov depression comprises the characteristics of long intramountain depressions that favour an atmospheric circulation territorially divided. The height and the morphological openings (passes) assure an active ventilation of the depression and imprinting its central area with less ordinary aeolian characteristics for the depression climates [1].

The paper presents also an analysis concerning the clearness index for Braşov urban area. Clearness index

can provide information concerning the real solar radiation compared with the available solar radiation. This parameter describes the attenuation of the solar radiation due to clouds and it depends on the geographical coordinates of the location for which is calculated. In this regard, using the meteorological data for the years 2006 - 2008, the paper presents for Braşov urban area the monthly variation of the clearness index. There are also plotted – for March and September 2008 – the superimposed diagrams of the clearness index variation and the direct energy on a horizontal surface and on an inclined surface with 45°.

Another important parameter that helps, in a convenient way, to the study of the absorption and scattering phenomena that occur with the sun radiation passing through the atmosphere (because of the water vapour, aerosols particles) is the Linke turbidity factor [2]. In this way, there are presented the variation curves corresponding to the monthly means of the Linke turbidity factor during the three years considered.

Finally the paper presents the comparative diagrams of the solar and wind potential variation recorded for Braşov urban area for the three years studied. A few conclusions of these diagrams are:

- ✓ the obtained wind power for the Braşov area is much lower than the solar power; for the Braşov area, the PV systems are recommended;
- ✓ because of the too low values recorded for the wind speed, the wind turbines' using is not recommended for this area.

References

- [1] M. Marcu and V. Huber, "Air Thermal Stratification in the Depression Area Forms", in *Phytogeographical Implications*. Anale I.C.A.S., 46, pp. 141-150.
- [2] F. Kasten, "The Linke turbidity factor based on improved values of the integral Rayleigh optical thickness", in *Solar Energy* 56, 1996, pp. 239-44.