

Studies of literature have allowed us to conclude that there is currently no universal methodological solution for estimating helio-energy resources and planning solar investments, taking into account the conditions prevailing in Poland. Therefore, the aim of the study was to develop a nationally universal method for estimating helio-energy resources and planning solar investments, based on the implementation of GIS&T technology, multi-criteria analyses and spatial data gathered in the National Geodetic and Cartographic Resources.

In the analytical part of the study it was proposed an approach allowing to estimate helio-energy resources with the use of GIS&T technology and a *r.sun* model, and the research was conducted with regard to the whole area of Poland. In this respect, a comparative analysis of two approaches was made in terms of taking into account the role of cloudiness in the calculation of solar potential – an empirical formula proposed by Kasten and Czeplak (1980) and the use of climate data for energy calculations in the building industry. Due to the significant overestimation of results obtained using the approach proposed by Kasten and Czeplak (1980), the method developed by the author is based on the use of statistical climate data. This method allows determining the helio-energy resources in real conditions in relation to the horizontal surface and planes inclined at an angle 30, 45, 60 i 90°.

Next, the author's methods allowing for planning solar investments in the form of stand-alone photovoltaic power plants and installations installed on the roofs of the buildings were presented. In the case of a method of planning solar energy investments in the form of photovoltaic power plants, an approach has been proposed using sets of exclusion criteria and soft criteria to assess the suitability of the area of a given commune. It is worth mentioning that in the selection of soft criteria, the survey conducted in many communes in Poland was used. As regards the soft criteria, a total of 6 alternative sets of weightings were proposed. The developed method was illustrated by a practical example relating to the areas of the communes of Juchnowiec Koscielny and Zabuudow. Another of the author's methods allows us to assess the usefulness of roof slopes for the mounting of solar installations. This method widely uses the data from aviation laser scanning, thanks to which it was possible to create a 3D model of a selected part of the housing structure, together with the representation of roof geometry at the LoD2/LoD3 level of detail, together with a proposal for the placement of solar panels and the presentation of the results in the form of 3D solar cadastre. The developed method was presented in the form of a case study concerning a selected part of a housing estate in Bialystok.

The utilitarian element of this treatise are 3 calculation models allowing for automation of the calculation process in the field of solar energy investment planning in Poland. The final part of the work is a summary with an indication of the final conclusions, broken down into conclusions concerning the estimation of the helio-energy resources, the planning of solar energy investments, as well as general conclusions.