

Application of photovoltaics in high-latitude countries as a contribution to sustainable development

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Abstract

Renewable energy sources are gradually becoming more common due to their numerous advantages. They provide energy services in a sustainable manner, play a crucial role in reduction of negative impact on the environment and in the context of climate change mitigation efforts, they contribute to lowering GHG emissions since they substitute fossil fuels. Photovoltaic (PV) conversion of solar energy into electricity gain popularity all over the world since the Sun is infinite source of energy; photovoltaic modules can work also in places where is no electric grid, they produce little or no waste products and facilities require less maintenance than conventional power stations.

The presented work is devoted to overview of photovoltaic technology applications, especially at high latitudes where the insolation is lower and weather conditions often change. The performance of photovoltaic plants from various countries is juxtaposed with the results obtained in Poland where the investigations were carried out on the solar plant with various types of modules installed (traditional polycrystalline silicon and three thin film technologies). The structure of used modules and their absorber material are not the same which results in differences in their performance. In the final assessment of different kinds of modules, the efficiency of solar radiation conversion into electric energy was the main parameter which was studied in the context of the influence of external conditions under temperate climate. Additionally, the recycling possibilities of different modules types, the amount of materials and energy usage during production process were considered.

Biography:

Agata Zdyb received her PhD in 2002 from Gdansk University of Technology in Poland. She completed the habilitation in 2012 at AGH University of Science and Technology, thesis title: "The research on the improvement of dye-sensitized solar cells efficiency". She is the head of the Institute of Renewable Energy Engineering at Lublin University of Technology, Poland. Agata Zdyb is author and co-author of more than 80 publications in international and Polish journals and conference contributions. Her scientific topics of interest are: thin film solar cells, dye-sensitized solar cells (DSSC), photovoltaic systems, organic dyes for applications in DSSC, renewable energy sources, nanotechnology.



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