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Experimental and numerical analysis of wind turbines operation – Polish case

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Statement of the problem: Growing demand for energy generated from renewable energy sources is observed worldwide. This fact is caused by many factors especially environmental ones. The sector of renewable energy sources which can be seen the most dynamic development is wind energy. This is caused by the construction of huge wind turbines, whose power exceeds one megawatts. Main problem of wind power systems is location for such turbines. Generally, wind turbines are located on-shore and off-shore. The most favourable are off-shore because of better wind condition what causes bigger power generation. To optimize construction and localization of wind power systems it is significant to

analyze meteorological data for minimum 10 years. Furthermore it is necessary to prepare simulation of system operation in proposed location. Software which allows to observe meteorological trends and to simulate operation of energy systems based on wind is TRNSYS. The study shows TRNSYS model of wind power system located in Poland with its validation. Optimization of the system was also proposed. Some economical parameters of the installation were calculated. Conclusion & Significance: It is possible to predict operation of wind turbines in different locations using numerical models. Profitability of wind farms strongly depends of location.

Biography

Maciej Zoladek has extensive experience in the design of multigeneration energy systems in the TRNSYS software. In particular, his research interests focus on issues related to the combustion of biomass and the operation of wind turbines. He participated in international projects involving the construction of a straw-trigeneration installation and the study of concentrators concentrating solar radiation. In addition, he spent several years of study designing thermoelectric generators that use heat from wood stoves.

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