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**INTELLIGENT MANAGEMENT OF RENEWABLE ENERGY RESOURCES  
AT LOCAL LEVEL, WITH SPACIAL CONSIDERATION  
FOR AGRICULTURAL BIOMASS**

**Abstract of the doctoral dissertation**

**Keywords:** energy independence, renewable energy sources, energy communities, agricultural biomass potential, solar energy potential, wind energy potential, organic waste

One of the key tasks facing the European Union member states is the development of a resource-efficient and sustainable economy, based on the use of, among others, innovative and low-emission energy production technologies. Such an approach requires the development of agriculture in a sustainable manner, ensuring food security and sustainable use of renewable biological resources, including agricultural biomass for the production of green energy. According to the assumptions of the EU strategic documents, green energy will replace fossil fuels, and its production should take place based on the existing local potential of renewable energy sources, including agricultural biomass, bio-waste, solar, wind, water and geothermal energy. The selection of appropriate energy sources should be made on the basis of analyses of the existing potential with the involvement of local authorities.

The methods proposed in the work for conducting the analysis of current possibilities of intelligent management of natural energy resources at the level of basic administrative units, which in Poland are communes (gminas) and counties (poviats), are universal and can be applied in other administrative units in Poland.

The model with the functionality of the decision support system developed as part of the work enables the identification of the most rational RES investments due to:

- existing infrastructure and demand for energy,
- available agricultural biomass resources,
- possibility of locating RES infrastructure based on the sun, wind and water,
- strategic documents.

The energy model of the powiat is based on actual data illustrating the potential of energy infrastructure and municipal waste management constituting the basis for the production of biogas and alternative fuels, allowing for energy balancing, planning and forecasting energy demand in the gminas/ powiats.



Using the model, an analysis was carried out for the tomaszowski powiat, which showed that at the local level there are still large renewable energy resources that can significantly contribute to achieving energy self-sufficiency of the region, which confirms the research hypothesis of this doctoral dissertation.

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