

Editorial

Applied Optimization in Clean and Renewable Energy: New Trends

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In recent years, more and more countries have paid close attention to energy and environmental issues. The deterioration of air quality and pollution of the Earth's atmosphere with greenhouse gases, which contribute to global climate change, make us think about the advisability of using one or another type of fuel. The processes of extraction and subsequent use of fossil fuels for energy production make a significant negative contribution to the ecology of the planet and call into question the sustainable development of mankind. To replace fossil fuels, renewable energy converters are increasingly being introduced into the energy system of countries. The cost of electricity from such power plants is decreasing every year, while the cost of fossil fuels and, accordingly, the energy obtained with its help, are subject to significant fluctuations, with periods of growth significantly predominating over periods of cost reduction.

At the same time, power plants based on renewable energy converters need to optimize their operation in order to find the optimal mode of their operation for minimizing the costs of their design and operation. The Special Issue "Applied Optimization in Clean and Renewable Energy: New Trends" of the *Applied Sciences* journal is devoted to such issues, which presents various modern research in the fields of intelligent systems, optimization and algorithms, modeling of energy processes, etc. The presented studies were carried out by scientists and researchers from around the world and were highly appreciated by peer reviewers in their respective fields of knowledge; the main objectives of the published works can be found below.

In the paper [1], the authors propose a mathematical model that takes into account the weight of the product obtained from the case study and also improved order picking by making simultaneous decisions about the storage location and the picker routing problem, given priority constraints based on product weight and characteristics of the case study. In the paper [2], the authors created a hybrid method for integrating demand forecasts derived from expert judgments and historical data for use in the automotive industry, where the authors showed that fuzzy logic and neural networks are an alternative for demand planning activities. In the paper [3], the authors proposed the use of drones for a new delivery system in order to improve the university distribution system, given the fact that in recent years companies have focused on using logistics operations to improve productivity and delivery times. The developed model takes into account restrictions on the use of drones, such as travel time limits and maximum distance. In the paper [4], the authors study the covering of spheroids (ellipsoids of revolution) by various spheres. Similar problems arise in natural sciences (in powder technologies). The authors propose a fast heuristic



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algorithm for constructing an optimized ε -cover that gives a reasonable balance between the value of the proximity parameter ε and the number of spheres used. In the paper [5], the authors investigate coreless microgenerators implemented in electromagnetic vibration energy harvesting devices and developed a targeted optimization procedure that is based on the numerical identification of the turns that contribute the most to the electromotive force and the elimination of those with the least contribution in order to reduce the internal impedance of the winding. In the paper [6], the authors created a mathematical model by using a multi-criteria optimization mechanism to resolve the impact of economy and energy allocation in the mixed photovoltaic type microgrid (combined cooling, heating and power). In the paper [7], the authors propose the creation of standardized test cases based on a hybrid model by using Lévy alpha stable distributions and generalized additive models in order to present a methodological proposal for the creation of test environments for optimization models based on general information about the operation of particular power systems. In the paper [8], the authors propose a hierarchical fuzzy logic controller for solving nonlinear system effects caused by atypical winds, where the methodology includes a statistical analysis of the wind variability at the installation site, which determines the functions of belonging and its hierarchy. In the paper [9], the authors propose a low complexity maximum power point tracking algorithm based on the neural network model of the photovoltaic module, where the expression for the model output current is used to derive the analytical iterative rules for determining the voltage at the maximum power point and irradiance estimation. In the paper [10], the authors propose a novel variable step size incremental conductance method with adaptive scaling factor, which uses a model-based state estimation method to calculate the irradiance level and then determine the appropriate scaling factor to enhance the capability of maximum power point tracking. In the paper [11], the authors propose a method for methanogenesis restoration in sour reactors by adding a cationic polyacrylamide flocculant, after which addition mixing should be minimized in order to prolong the existence of the floccules formed in the presence of the flocculant. In the paper [12], the authors present the results of the start-up of continuous production of biohydrogen from cheese whey in an anaerobic filter and an anaerobic fluidized bed with a polyurethane carrier, where pretreatment with heat and acid was used for the inactivation of hydrogen-scavengers in the inoculum (mesophilic and thermophilic anaerobic sludge).

Thus, the presented works contribute to solving the issues of development, research, and optimization of clean and renewable energy processes and their results will be of interest to specialists, researchers, and scientists in the considered areas. Of course, only a small part of the issues that are relevant today are touched upon in the Special Issue “Applied Optimization in Clean and Renewable Energy: New Trends”; however, the authors have done significant work in their research and will continue their work in the stated direction, and their research publications in the future will make a significant contribution to solving the issues of optimizing various processes on the presented and related topics.

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