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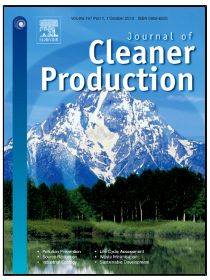

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PII:	S0959-6526(18)32206-6
DOI:	10.1016/j.jclepro.2018.07.217
Reference:	JCLP 13671
To appear in:	*Journal of Cleaner Production*
Received Date:	22 September 2017
Accepted Date:	23 July 2018

Please cite this article as: Soheil Pouraltafi, Amirreza Azimi, Behnam Mohammadi-ivatloo, Mohammad Rasouli, Optimal Design of Wind Farm Layout using a Biogeographical based Optimization Algorithm, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.07.217

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Optimal Design of Wind Farm Layout using a Biogeographical based Optimization Algorithm

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Abstract- Promoting renewable energy utilization is treated as a must in current energy market worldwide. This paper studies the layout optimization process for wind farms with more realistic mathematical models. It uses a recent evolutionary algorithm known as BBO (biogeographical based optimization), which produces better results for various benchmarks, especially in continuous problems. Single and multiple wake models are adopted from latest work, which gives the best approximation according to real-world experiments and exact computer-aided simulations. Cost function models have been designed to best simulate a detailed practical farm during its lifetime. Weibull distribution for wind speed over a year period with arbitrary factors is considered for the site under study; this model is applied to the farm with the uniformly distributed wind to be able to compare turbine micro sitting results. Utilization of the realistic and detailed models provides different results compared to those of generic models. The practicality of the obtained results forms the distinction between the present work and previous studies. Various tests are performed using the aforementioned wake model on the former results for wind farm layout optimization problem (WFLOP). In addition to the suggested layouts for different land types and wind models, the sensitivity analysis of financial parameters is also conducted in this work.

Keywords: Wind farm layout, Biogeographical based Optimization (BBO) algorithm, optimization, micro sitting, and cash flow

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