

# **Abstract**

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## **Intelligent energy management of optimally located renewable energy systems incorporating PHEV**

The recent interest in plug-in-hybrid electric vehicles (PHEV) results in the increase in the utilization of vehicles batteries for grid support. In addition, the integration of renewable energy systems (RES) into electricity grid is a promising technique for addressing the environmental concerns. This paper presents a multi-objective algorithm to optimally allocate a number of renewable energy systems including parking lots for PHEV in a distribution system. The proposed algorithm determines the number, locations and sizes of the RES and parking lots. In addition, a rule based expert system is used to find the corresponding energy scheduling of the system resources. The objective of the proposed algorithm is to minimize the overall energy cost of the system. The problem is formulated as an optimization problem which is solved using artificial bee colony (ABC) algorithm taking into consideration the power system and PHEV operational constraints. The proposed algorithm is applied to a 45-bus distribution network of Alexandria, Egypt. The test results indicate an improvement in the operational conditions of the system.