DEVELOPMENT OF AN INTERMLIGENT SYSTEM TO OPTIMIZE THE DESIGN OF HYBRID RENEWABLE ENERGY SYSTEMS BY USING GENETIC ALGORITHMS

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Abstract

Renewable energy sources (RES) is a promising option especially in remote and arid regions where the use of conventional energy is costly or unavailable.

If RES systems are optimally designed, some combinations can be cost effective and reliable. However, the design of such systems is complex because of uncertain renewable energy supplies, load demands and the non-linear characteristics of some components. In such system, different scenarios can be suggested; i.e combinations of PV panels, type and number of batteries, type and number of turbines, etc. Therefore, it is difficult to determine the optimal configuration with classical techniques. The development of a tool to integrate all parameters involved and compare between the possible scenarios is very important. This paper presents a new model based on the Genetic Algorithms allowing the generation of several individuals (possible solutions). A particular interest is focused on the hybrid systems (PV/WIND/Batteries). The objective function to minimize corresponds to the total cost of the produced kWh (Capital cost plus Operational costs). Finally, a case study of Hybrid unit in south Tunisia will be applied.