

## **Cost regulation and power quality enhancement for PV-wind-battery system using grasshopper optimisation approach**

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### **ABSTRACT**

Renewable energy sources perform a potential role in the electrical industry for meeting the required load demand. However, the difficult aspect is to be reduced the entire cost including initial cost, operational cost, replacement cost and maintenance cost. Hence, to achieve this target, a grasshopper optimisation algorithm (GOA) is suggested in this work for optimum sizing of the off-grid. In this study, various power-generating renewable sources such as photovoltaic (PV), wind turbines (WTs) and batteries are integrated into the off-grid system. Moreover, solar irradiance, wind speed and required load are simulated by the HOMER software for 12 months of a year. Further, the performance of the suggested GOA is compared by hybrid genetic algorithm (GA) with particle swarm optimisation (PSO) (GA-PSO) for optimum sizing of the WTs and PV. As per the simulation outcome, the suggested GOA shows better performance and contributes the less levelised cost of energy factor (LFC = 0.502) as compared to studied GA-PSO.

### **KEYWORDS**

Battery; Grasshopper optimisation; Grid; Photovoltaic system; Wind turbines

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