Abstract

Optimal planning for the energy storage elements' status of charging and discharging,

besides managing the buying and selling energy from the grid, is the first step for enhancing energy usage and saving costs for customers. Therefore, in this work, an enhanced multi-objective optimization algorithm of the Marine Predators Algorithm (MOEMPA) is proposed to handle three objective functions for minimizing the operating cost and emission with maximizing the renewable factor for optimal usage of the energy resources. The proposed MOEMPA is applied for managing the sharing energy in an interconnected micro grid with utility grid. The considered micro grid consists of solar and wind renewable energy sources, diesel for emergence loads, and set of batteries for storage extra energy. The described system used for feeding the required power under three different cases for the weather and the grid continuity/discontinuity along 96 h horizon in India, Delhi. The proposed MOEMPA results are compared with recent multi-objective optimization algorithms including, basic variant of multi-objective versions of marine predators algorithm (MOMPA), grasshopper optimization algorithm (MOGOA), slime mould algorithm (MOSMA), grey wolf optimizer (MOGWO), antlion optimizer (MOALO), and multi-verse optimizer (MOMVO) to assess the performance of the proposed scheduled system based MOEMPA. Furthermore, the baseline system is implemented to provide a comprehensive evaluation for the proposed approach based on MOEMPA. The comparisons and analyses reveal the efficacy and excellence of the proposed approach in minimizing the cost and emission with enhancing the profit.