












Improved locust swarm optimization algorithm applied for building retrofitting based on the green policy of buildings

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Abstract

Regarding the high costs associated with retrofitting buildings, finding an optimal retrofit plan considering existing buildings' environmental effects is critical. Each building following the green policy of buildings should gain a particular rate of EPC. In this paper, the most appropriate defined retrofit options are selected by the decision-makers for the building retrofits based on an optimization model. To assist decision-makers in have sensible decisions, the model incorporates economic analysis. A new algorithm called Improved Locust Swarm Optimization is used to retrofit an existing office building as a studied case. By incorporating the envelope components and indoor facilities into the model, optimal retrofit plans are systematically determined for an entire building. Electricity produced from fossil fuels decreased by utilizing a solar PV system on the roof. As a result, the concept of a zero-energy building with the lowest environmental concerns is achievable by reducing the use of nonrenewable energy in buildings. The model breaks down a long-term investment into yearly short-term investments to make investments further appealing to investors. Investments have an extended payback time that is offset by a government tax incentive program. The results indicate that 761.6MWh of energy can be saved with a 70-month payback period and a rating form of EPC, demonstrating the model's effectiveness. Environmental concerns, such as excessive fossil fuel use and CO₂ emissions, have significantly decreased.
