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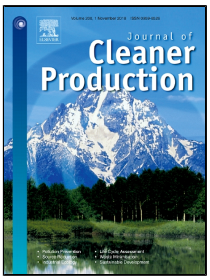

Real time energy management and control strategy for micro-grid based on deep learning adaptive dynamic programming

Nan Wu, Honglei Wang

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Real time energy management and control strategy for micro-grid based on deep learning adaptive dynamic programming

Nan Wu [a, b], Honglei Wang[a]

a School of management, Guizhou University, Guizhou 550025, China

b School of mechanical and electrical engineering, Guizhou Normal University, Guizhou 550025, China

E-mail addresses: gzdxhlwang@163.com (H.L Wang), eenwu@gznu.edu.cn (N. Wu)

Abstract: With the wide spread use of distributed new energy in power systems, energy management problems in micro-grid have become increasingly significant. Offline or static optimization methods are frequently used to solve the problems which are typically discrete and nonlinear. There are few online optimization methods but they are not only complex but consider normally the distributed generations and loads in micro-grid as a whole. The outcome is that the online methods, fail to reflect the composing characteristic of distributed multi-energy and the contribution made by developing new energy to reduce the consumption of traditional fossil energy. Moreover, results obtained using either the offline or the on-line methods can deviate to certain extent from the true values. Using system control theory, this paper treats the management of distributed energy in micro-grid as an optimal control problem and based on deep learning adaptive dynamic programming, establishes a real-time management strategy for distributed energy in micro-grid. Due to the introduction of the concept of closed-loop feedback, the new management control strategy was real-time, and furthermore the achieved accuracy of managing and controlling the objective function was higher, which suggests that the proposed strategy can improve the management of energy in micro-grid. Finally, the real-time and effectiveness of the proposed control strategy are proved using simulation.

Key words: Micro-grid, deep learning, adaptive dynamic programming, energy management, real-time, distributed energy