

Optimal Design of Supply-Adequate Microgrids in a Multi-Carrier Energy System

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Abstract

Energy hubs by interconnecting various energy systems give rise to the multi carrier energy (MCE) system, as the upcoming energy providing system. The appropriate design and operation of microgrids (MGs) are essential in the MCE systems. In this paper, the self-adequacy improvement of MG within an MCE system is got under studied while achieving an optimal design for MGs. It is considered that the constructed MGs operate in both grid-connected and islanded modes. In other words, separating the designed zones leads to independent performance of the MGs which give more importance to the supply-adequacy context. Implementing the mentioned problem to real systems leads to a large scale, nonlinear problem which should be optimized using the robust optimization techniques. A modified version of group search optimization (GSO) algorithm is utilized in order to solve such problem. In order to obtain reasonable results and perform analytical evaluations, some efficient indices are proposed. Afterwards, the proposed scheme is applied to an 11-hubs test system and the obtained results are analyzed and discussed.

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