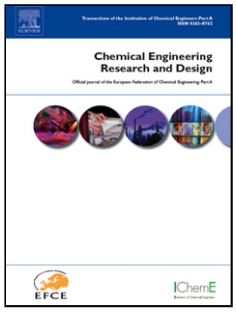

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PII: S0263-8762(17)30408-2
DOI: http://dx.doi.org/doi:10.1016/j.cherd.2017.07.030
Reference: CHERD 2771

To appear in:

Received date: 24-5-2017
Revised date: 17-7-2017
Accepted date: 25-7-2017

Please cite this article as: Koltsaklis, Nikolaos E., Giannakakis, Myronas, Georgiadis, Michael C., Optimal Energy Planning and Scheduling of Microgrids.Chemical Engineering Research and Design http://dx.doi.org/10.1016/j.cherd.2017.07.030

Optimal Energy Planning and Scheduling of Microgrids

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Highlights

- Optimal energy planning and scheduling of microgrids.
- Incorporation of power systems planning issues in decentralized energy planning.
- Reserve margin constitutes the key design constraint.
- CO_2 emission limits influence the optimal capacity mix.
- Electricity trade prices affect the optimal microgrid's energy balance.

Abstract

This work presents a generic optimization framework to address the problem of the optimal design and operational scheduling of energy microgrids. The problem to be solved is formulated as a mixed-integer linear programming (MILP) model whose objective function concerns the total cost minimization of the energy microgrid. The energy generating units to be installed consist of technologies using fuel (natural gas) as a raw material (microturbines, fuel cells etc.) and renewable energy sources (wind and solar). The microgrid is divided into a certain number of zones, each of which is characterized by a given amount of electricity demand to be satisfied, while the system can exchange electrical energy with the main power grid by acquiring