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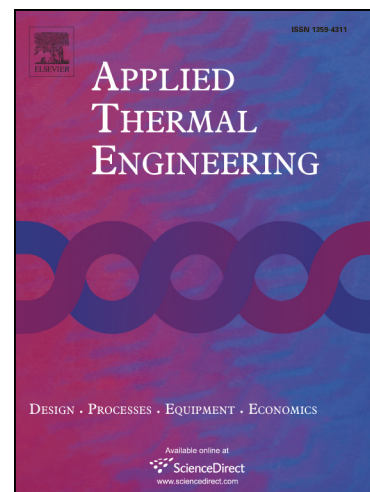
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A fuzzy-grey multicriteria decision making model for district heating system

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Abstract:

District heating (DH) is playing an indispensable role in the energy supply all over the world. The high share of DH based on combined heat and power (CHP) indicates the energy efficiency of the local heating systems. In the future, the optimal planning and design of a DH system should consider not only the techno-economic feasibility but also the capability to improve energy efficiency and environment protection. This means that single objective optimization model for the planning of DH system is limited in this regard. Therefore, a multicriteria decision making (MCDM) model for decision support on the planning and designing of DH system is developed in this paper. This is a typical problem with uncertainty and imprecision both in the criteria measurements and the weights. In view of this, we adopted the fuzzy set theory and grey relational analysis to develop a fuzzy grey multicriteria decision making (FG-MCDM) model for DH systems. Sensitivity analysis was also conducted to study the influence of weight vectors on the evaluation results. The model can take into account energy, economy and environment concerns synthetically and thus facilitates more judicious decision making on DH systems.

Keywords: District Heating; Combined Heat and Power; Multicriteria Decision Making; Weight.

Nomenclature

Abbreviations

AHP	Analytic Hierarchy Process
CHP	Combined Heat and Power
CI	Consistency Index
CJM	Complementary Judgment Matrix
CR	Consistency Ratio
DH	District Heating
DM	Decision Maker
FG-MCDM	Fuzzy-Grey Multicriteria Decision Making
GCC	Grey Correlation Coefficient

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