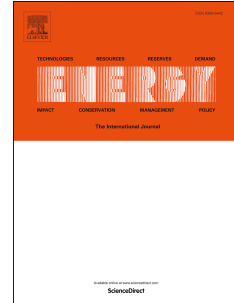


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Financial risks management of heat exchanger networks under uncertain utility costs via multi-objective optimization

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**Financial risks management of heat exchanger networks under uncertain utility costs via multi-objective optimization**

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**ABSTRACT**

Although various Heat Exchanger Network (HEN) synthesis methods have been proposed in the literature, fundamental study for addressing uncertainties arisen from market fluctuations using stochastic variables and parameters is scarce. Such feature certainly adds difficulties to a problem already not straightforward to solve. In that manner, this work adapts a meta-heuristic approach to be able to efficiently perform such task. Uncertainties are assumed from variations in costs of commodities related to production of utilities. Several forecast scenarios are generated via Monte Carlo Simulation in order to obtain discretized distributions for the uncertain variables. Five financial risk metrics are applied for risks management. Each metric is formulated as secondary function to expected total annual costs (ETAC) in a multi-objective optimization (MOO) model with two objective functions. A benchmark case study is adapted in order to demonstrate the method reliability. The approach is able to achieve results that fit for different types of investors (*e.g.*, risk-averse, risk-taker), handling uncertainty by efficiently performing trade-offs in heat exchange areas and utilities requirement.

**KEYWORDS**

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