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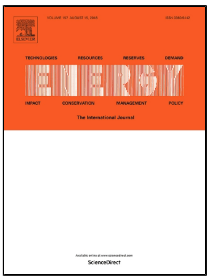

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Abstract

A predictive management system for cogeneration unit-based energy supply networks using two-stage multi-objective optimization was developed to tackle a trade-off between energy savings and operating cost reduction. The developed system integrated support vector regression-based energy demand prediction, MILP (mixed-integer linear programming)-based schedule planning, and rule-based operation control. The contribution is to develop two-stage MILP-based multi-objective schedule planning, which is extension of an ε-constraint method, and operation control rule of multiple cogeneration units. In the first-stage schedule planning, primary energy consumption in the prediction horizon is minimized, and a reduction rate of primary energy consumption is calculated. In the second-stage schedule planning, an operating cost is minimized additionally subject to satisfaction of partial achievement of the reduction rate of primary energy consumption calculated in the first stage. An energy-saving achievement rate is regarded as a decision-making parameter to control a trade-off between energy savings and cost reduction, of which definition is quantitatively apprehensible for decision makers.