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Energy and reserve co-optimization of a combined cycle plant using mixed integer linear programming

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Abstract-

The growth in the importance of interruptible sources of energy is increasing the concerns of many electricity market regulators with respect to the reliability and stability of electricity supply. Decisions such as that to increase the number of reserve markets, their reserve requirements, or the role of reserve prices in the final electricity price have meant that generation plants are currently often operating with strategies to obtain not only large energy market quotes but also reserve ones. In this paper, a mixed integer linear programming (MILP) model is proposed to obtain the energy and reserve dispatch of a real combined cycle plant (CCP) to optimize its use on a weekly or annual basis. The dispatch is optimal in the sense that it maximizes the joint energy and reserve profits, including an estimation of the energy and reserve prices. The detailed technical and economic characteristics of the plant have been considered, such as start-ups, shut-downs, minimum hours for steam generation, supplementary firing, or natural gas contracts. The cases studies validate the main features of the mathematical model and analyze the computational efficiency in a realistic simulation.

Index Terms-

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