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A Least Cost Approach for Power Plant Portfolio Optimization in a Regulated Environment Electricity Supply Industry with Constraints

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Abstract

Similar to other countries, in Malaysia, the daily demand exhibits large variations between weekdays and weekend and between peak and off peak hours. The ability to follow the load demand with reliable supply of electricity and optimal economic operation is of paramount importance, which is achieved by solving two power system scheduling problems, namely, unit commitment and economic dispatch. This paper proposes a hybrid method combining priority listing and dynamic programming as the solution tool for this study, with an ultimate objective of obtaining a least cost solution for the short-term scheduling period considered subject to unit and system constraints. An interactive model built using Microsoft Excel-VBA Macro program was used to perform simulations and analyses on small scale system consisting of four gas-fired units and two coal-fired units. The optimal solution for the system studied was achieved under a reasonable processing time. The least cost solution was found by using feasible combination of units that satisfies all constraints and with total minimum fuel cost, start-up cost and variable operating cost. Higher utilization of the more efficient units is a vital factor to achieve the least cost objective.

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