MATHEMATICAL MODELING FOR LONG TERM EXPANSION PLANNING OF COGENERATION SYSTEMS

Y.M. Hamud and D. Herrmann
Water and Electricity Department, Abu Dhabi, UAE

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Contents

Summary

The problem of long term cogeneration system expansion planning is studied applying linear programming, mixed integer linear programming and simulation techniques. The functional relations for investment and operation costs are described under the conditions forced upon the system by the inherent characteristics of these different solution methods. Then, the problem of cogeneration expansion planning for a one-node demand-supply system is formulated in terms of objective function and constraints. This basic model is refined by including the power and water transmission networks.

1. Problem Formulation

The purpose of generation expansion planning is to find an optimal expansion sequence of generation and cogeneration units to meet the power and water demand of an area over a given period of time. Hence, the objectives are:

- To expand the existing system by adding power and desalination plants in order to cover demand and reserve requirements.
- To evaluate the variable operation costs of the existing system and the system additions by means of load dispatches for all years of the expansion period.

Such that the present worth of the investment costs of the system additions and the fixed and variable operation and maintenance costs are minimized.

The problem is solved by:

- Analysing the existing system structure.

- Defining the supply options.
- Describing system expansion and system production by a mathematical model consisting of objective function and constraints imposed upon the system.
- Applying a mathematical method (linear programming, mixed integer linear programming, simulation) to find optimal values for all system variables.

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Bibliography and Suggestions for further study

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