

Markov Model of Generation Unit for Short Term Capacity Obligations

Roi Schwartz¹ and Anatoly Lisnianski²

¹*Finance Division, The Israel Electric Corporation Ltd.
1 Netiv Ha-Or, 31000 Haifa, Israel.
E-mail: uq81e@iec.co.il*

²*Planning, Development and Technology division
The Israel Electric Corporation Ltd.
1 Netiv Ha-Or, 31000 Haifa, Israel.
E-mail: anatoly-l@iec.co.il*

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The paper considers a coal power generating unit as independent electricity provider in restructured power system. A new method for optimization the unit capacity obligation in short-term contract is presented .

While determining the capacity obligation, the generating unit's owner faces two opposite considerations. On one hand, the owner would like to set a high obligation, because he wants to maximize potential benefit from electricity trade. On the other hand, he should take into account financial penalties, when capacity obligation is too much and in reality, because of the unit's failures, the owner cannot satisfy the contract capacity obligations .

For long term contracts, there exist some tools for the necessary calculations. However, these tools cannot be applied to short term contracts, as they use stationary states probabilities, which are independent on the unit initial state.

In the short term, the initial state significantly affects the unit's states probabilities, therefore dynamic Markov models must be developed. In the paper a method for dynamic Markov model building (determination of corresponding transition intensity matrix) is presented as well as a method for corresponding reliability indices calculation. By using these methods the unit's optimal capacity obligation is found.

The results show that by using suggested method significant amount of money can be saved by the unit's owner.