

# ABOUT ONE BEHAVIOR MODEL OF GENERATING COMPANIES IN THE ELECTRICITY MARKET

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We consider the electricity market model of interaction between power producers (GenCo) and System Operator (SO), taking into account the limits on generation, capacities of lines, as well as transmission losses [1].

Power producers are able to affect the market price. The problem should take into account the oligopolistic situation in the market. A short description of the model is as follows. SO solves a generation scheduling problem, minimizing total costs of electricity generation and calculating the nodal prices (dual variables) on the basis of technical parameters of the power plants provided by the producers. Thus the oligopolistic situation in the market and GenCo's desire to receive a profit maximum is not considered. To increase their profit power producers deliberately distort real values of some technical parameters of the power plants thereby implicitly influencing the prices.

A mathematical formulation of the problem taking into account the factors of market environment is presented. The problem is considered in two-level statement. The upper level corresponds to the profit maximization of Generating Company with true cost functions.

The lower level of the problem corresponds to SO efforts to schedule generation and calculate local marginal prices (LMP) on the basis of total production cost minimization.

The two-level optimization problem can be interpreted as profit maximization for producer with modeling of following activity of SO for generation scheduling and nodal price determination.

The standard replacement of the lower level problem by the Karush-Kuhn-Tucker (KKT) optimality conditions is proposed. In order to validate the proposed approach and demonstrate its main features a numerical example is presented.

## REFERENCES

1. S. Palamarchuk, *Generation scheduling in the electricity market environment*. — in Environment and Electrical Engineering (EEEIC), 2011 10th International Conference on, pp. 1-4.