

The Estimation of the Technical and Financial Indicators of Exploitation Combined Heat and Power Plants with Variable Load

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Abstract— The paper presented the algorithm for elaboration of the phenomenological model of the generation source, which includes both the technical and financial indices of operation, as well as the costs to the primary energy resources used in the production of energy. They were obtained relations describing the active generation power and the power consumption of the source according to the thermal power and the characteristic of the fuel utilization coefficient for the analyzed generation sources. Coefficient of fuel utilization is an individual feature of the power plant. It was proposed the process of analyzing the efficiency of the operation of thermal power plants based on the technical and economical indicators of operation at varying thermal load during different periods of the year. The comparison of the efficiency of the use of CHPs is based on three indicators for the operating quarter, taking into account the electricity, heat and natural gas supply tariffs defining as a full index for comparison, plus the value of the fuel transformation in energy. It has been established that at the tariffs in force Source 2 (CHP-1) of the thermal energy supply system in Chisinau has the higher economic efficiency of fuel transformation compared to Source 1 (CHP-2) for the power generation in the range 0-140 MW of thermal power. The functioning characteristics of CHPNORD in Balti municipality are presented. The parameter called "value added" is presented as an integral criterion for the estimation of the efficiency of the operation of combined electric and thermal energy sources at variable loads. It is presents the power plant loading domain, which provide the most economically efficient operating conditions. The use of the phenomenological algorithm and model allows for a parametric analysis to study the influence of factors on the efficiency of CHPs and thermal power plants, including the variation of fuel cost and energy tariffs.

Keywords—technical and economic efficiency CHP; phenomenological model; fuel utilization factor; tariff; added value; share of fuel cost.

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