

СЕКЦІЯ «ЕЛЕКТРОЕНЕРГЕТИКА»

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REGRESSION ANALYSIS OF THE POWER CONSUMPTION EFFICIENCY IN INDUSTRY

The energy monitoring and targeting method (M&T) is used as the basis of the energy management system. This method was developed and widely used in large industrial enterprises in Western Europe and in the USA as part of the overall enterprise management structure. According to the British Energy Efficiency Federation, the implementation of M&T reduces current energy costs in monetary terms by 10-20% without additional costs for upgrading technologies. Most often, the implementation of M&T is recommended as a priority measure in the integrated energy efficiency programme.

Energy efficiency control is usually carried out on the basis of developed regression models. Energy consumption is considered as random variables that change over time. The value of power consumption depends on a number of process parameters, which also change randomly. The analysis of such models allows the best optimization of existing processes and the development of measures to improve the efficiency of consumption of both electricity and other energy resources.

For more effective use of the results of the analysis in the enterprises it is extremely important to adequately assess the level of efficiency of electricity consumption according to the developed models. Therefore, improving approaches to the use of mathematical models of electricity consumption in enterprises remains relevant.

The object of the study is an industrial company for the production of coke-chemical products, which consists of ten main divisions. The operation of energy efficiency control systems provides for comparison of actual energy costs with planned.

Taking into account the factors recognized as significant in determining the specific consumption of electricity by individual units, including their mutual impact, a regression equation was found and its assessment was carried out.

$$y = 76512 - 3.54 \cdot x_1 - 2.34 \cdot x_2 - 0.29 \cdot x_3 + 0.575 \cdot x_4, \quad (1)$$

where x_1 – coke production, ton, x_2 – coke gas, thous. m³, x_3 – steam production, Gkal, x_4 – electricity, MWh.

Results of calculation in the form of confidence intervals are presented in Fig. 1.

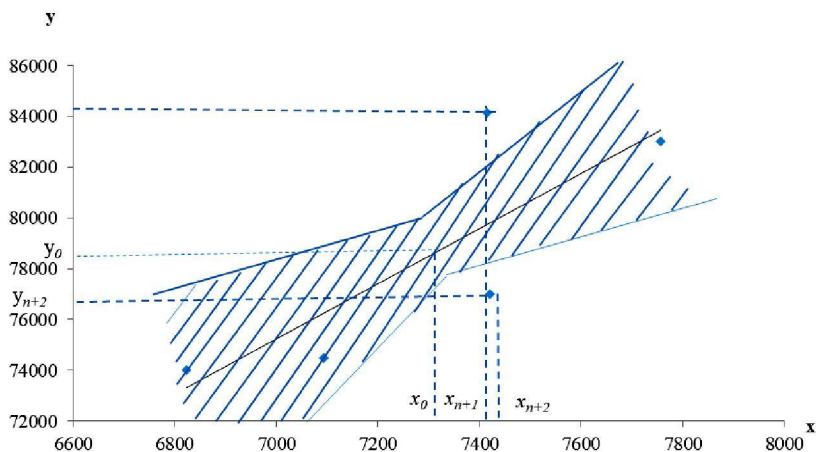


Figure 1 – Confidence intervals of the regression equation of the total electricity consumption.