

The proposed method for monitoring efficiency of electric power consumption is based on the analysis of power losses in the power supply system. The method consists in determining, for each power consumer, allowable power losses occurring in transmitting active and reactive power to the consumer as well as power losses caused by asymmetry of current and voltages, unbalance of the power transmission system, and the contents of high harmonic components of current and voltage in the power transmission system, by using the following indications: the indication α_{R1} that characterizes the part of reactive power that is transmitted to the consumer; the indication α_2 that characterizes asymmetry of current and voltages; the indication α_0 that characterizes unbalance of the power transmission system; the indication α_H that characterizes the contents of high harmonic components of current and voltage in the power transmission system. Then the indication α_{A1} that characterizes the part of useful power that is transmitted to the consumer is determined from the following equation:

$$\alpha_{A1} = 1 - \alpha_{R1} - \alpha_2 - \alpha_0 - \alpha_H.$$

To determine the above-mentioned indications, the following equations are used:

$$\alpha_{A1} = \cos^2 \varphi_{11} / D^2, \alpha_{R1} = \sin^2 \varphi_{11} / D^2, \alpha_2 = \varepsilon_2^2 / D^2, \alpha_0 = \varepsilon_0^2 / D^2, \alpha_H = k_H^2 / D^2, D = \sqrt{1 + k_H^2 + \varepsilon_2^2 + \varepsilon_0^2},$$

where D is the summary indication that characterizes degradation of power quality in the power supply system. The calculated power loss values are compared with specified values and, according to the comparison results, provisions are made for reducing power losses.