

PRINCIPLE VALUE ADJUSTMENTS ELECTRICITY CONSUMPTION DEPENDING ON ITS QUALITY

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Modern production requires high-quality power supply. The quality of electricity is one of the factors that directly affect the energy efficiency. In the Russian Federation, there are many regulations that establish quality requirements of electricity, but in practice they do not always work effectively. At the same time the need to maintain its normalized value is becoming increasingly important task in connection with the use of modern electrical equipment and automation systems that are sensitive to the deviation of each power quality. Inconsistency power quality regulations leads to economic loss due to undersupply of products, its damage, loss of productivity of enterprises, equipment downtime, increase electrical losses and other negative consequences.

The purpose of research - development of the principle of adjusting the cost of electricity, depending on its quality, which will create an effective mechanism for economic regulation power supplier relationships with customers, based on the interest of both sides in the maintenance of the rated power quality at the balance sheet distinction.

Materials and methods of research. We study the results of measurements of power quality for compliance with regulatory requirements at the point of common coupling and at the balance sheet distinction between the consumer and the energy system, the principles of value adjustments of electricity consumed, depending on its quality. Method of research is to develop mathematical models, algorithms control the cost of electricity consumed in the depending on its quality. The object of study - the quality of electrical energy supplied to consumers.

The results of research. To assess the quality of electricity to meet the requirements in the Oryol region measurements were made in 100 points of common coupling in winter and summer.

It was found that a large number of points at which the quality of electricity deviated from the standard indicators associated with:

- Uneven distribution of the phases of the load;
- Change in the value generated and (or) the power consumption in the power system;
- The use of equipment, distorting CE;
- Depreciation of network equipment;
- Significant (above normative) length of electric networks;
- Lack of interest of network organizations, and sometimes consumers in the maintenance and monitoring of TBE.

The authors have developed the principle of value adjustments of electricity consumed, depending on its quality. It is supposed to make adjustments to the cost of electricity at the balance sheet distinction between the consumer and the grid. The corresponding function must be built into the meter.

Developed "method for measuring energy consumption and adjust its value with regard to quality and source of distortion." This method allows automatically producing accounting amount of the consumed electric energy and determine its value, depending on the quality of the consumed electric energy and the source of distortion.

The developed method is a techno-economic mechanisms to encourage both consumers and suppliers of electricity in terms of maintaining CE. The economic part of the mechanism is as follows: if the distortions in the EC makes the consumer, it will be forced to pay for electricity at a higher price, if the electric power entering the consumer does not meet the regulatory requirements for fault power supply organization, the consumer pays less.

Designed principle allows accounting for the quantity of electric energy consumption and determine its value, depending on the quality of electric energy consumption and sources of distortion. Correction factors are available for all power quality, but their justification requires additional studies that are currently underway.

For practical use of the principle of determining the cost of electricity, depending on its quality solve such priorities.

1. Assessment of the actual QE at the balance sheet distinction between the consumer and the energy supply company (statistical studies on the results of measurements).
2. Development of a legal mechanism for the calculation between the supplier and consumer of electricity with the EC.
3. Development of a methodology for determining the "culprit" distortion performance of CE at the balance sheet distinction.
4. Development of a mathematical model of power metering system, which allows to determine the cost of electricity, depending on its quality.
5. Rationale for the value of the correction coefficient depending on the power offset value of one or more indicators of the normal value FE.
6. Development of functional unit and software for new types of electric meters, which enables the automatic calculation of the cost of electricity, depending on its quality.