Project theme name: ИРН №AP09058186. «Methodology development and computer program for determining additional electrical energy losses during its transportation and distribution in the electrical grid.».

Relevance: The operating conditions of power supply systems are changing rapidly. This is due to changes both on the power supply side and on the load side. The stable operation of the power supply system is based on mathematical models and operating rules. Under changing conditions, there is a likelihood of an inadequate description of the situation and, accordingly, erroneous operation of electrical equipment and the power supply system as a whole. To prevent this situation, it is necessary to check the parameters of the regime and the applied calculation methods for adequacy.

The most important criterion for the operation of the power supply system is the level of electricity losses. Under changing conditions, the magnitude and components of electricity losses change. In the current situation, it is necessary to analyze these processes and make adjustments to the applied models.

For this study, it is envisaged to conduct: a review of documentation on the calculation of energy losses; instrumental studies of mode parameters; analysis of applied methods for calculating electricity losses; consideration of influencing factors on the magnitude and components of energy losses. Based on the results of the formation of the database by mathematical methods, their processing is envisaged to obtain dependencies on factors affecting the level of energy losses.

The end result will be the development of an improved model for calculating electricity losses and a computer program for calculating typical cases, it is also envisaged to introduce them into educational and production processes..

Objective of the project: Creation of an improved methodology for determining additional energy losses caused by asymmetry and non-sinusoidal currents in electrical networks, as well as its implementation in a software environment.

Expected results:

The results of the study will be expressed as:

- developed methodology for calculating electricity losses, taking into account the influence of asymmetry and nonsinusoidality, implemented in the form of a computer program;

- educational-methodical manual for the implementation of the learning process;

- instructions for implementation in power grid and other organizations;

- 2 (two) articles and (or) reviews in peer-reviewed scientific journals in the scientific direction of the project, indexed in the Science Citation Index Expanded of the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five);

- 1 (one) article or review in a peer-reviewed foreign or domestic edition recommended by CCSES;

The implementation of this study affects the power grid sector, where the transportation and distribution of electrical energy is carried out. The impact of the results will be expressed in an increase in the adequate representation of the

ongoing processes in electrical networks and in the consideration of additional factors that affect the quality of electricity.

Члены исследовательской группы:

1) **Zhantlessova Assemgul Beisembayevna** (26.12.1982) - head, PhD "electric power engineering". Participates in the preparation of a utility model and development of a computer program for calculating the main and additional losses of electricity from non-symmetry and non-sinusoidality in power supply systems, in project risk assessment, preparation and publication of articles. Author ID: 57195505692. ORCID icon http://orcid.org/0000-0003-3730-0579. h-index=3. A total of 41, 7 copyright certificates, patents, 4 of which are published in Thomson Reuters.

2) **Akimzhanov Temirbolat Baltabayevich-**performer, PhD "electric power". In the project, he develops a utility model and a computer program for calculating losses of automatic reactive power compensation devices, prepares methodological guidelines for the developed program, prepares articles and reports, and participates in conferences. Certified energy auditor, is the head of the center for "energy Conservation and dissemination of knowledge". Author ID: 56485979700. the h-index:2.

3) **Zhumazhanov Serik Karatayevich-**candidate of technical Sciences "Eletrotechnical complexes and systems". In the project, he develops a utility model and a computer program for calculating the main and additional losses of electricity from asymmetry and non-sinusoidality in power supply systems, prepares methodological guidelines for the developed program, implements project developments, prepares articles and reports, and participates in conferences. Author ID: 54950223000. h-index: 2.

4) **Yermek Zhaslanovich Sarsikeev** (26.02.1987) - PhD "Electric power engineering". In the project, he is preparing a utility model and a computer program for calculating the main and additional losses of electricity from asymmetry and non-sinusoidality in power supply systems in engines, pumps and fans, and writing a methodological guide to the developed program, implementing developments on the project, preparing articles and reports, participating in conferences. Author ID: 56252099900. ORCID icon http://orcid.org/0000-0002-7209-5024. h-index: 5.

5) **Zhanat Beisembayevich Issabekov-** PhD "Electric power engineering". In the project, he develops a utility model and a computer program for calculating the main and additional losses of electricity from non-symmetry and non-sinusoidality in power supply systems in transformer substations, prepares methodological guidelines for the developed program, implements project developments, prepares articles and reports, and participates in conferences. Author ID: 57194215799. h-index: 2.

6) **Issabekova Bibigul Beisembayevna-** PhD "Electric power". In the project, he prepares a utility model and a computer program for calculating the main and additional losses of electricity, grounding the neutral of electric networks and implementing developments on the project, preparing articles and reports, participating in conferences. Author ID: 56826203500.

7) Amir Yerlan Kamalievich- master's degree. In the project, he develops a utility model and a computer program for calculating the main and additional losses of electricity from asymmetry and non-sinusoidality in power supply systems, implements project developments, prepares articles and reports, and participates in conferences.

Information for potential users:

As a result of the work carried out, a method for calculating electricity losses will be developed, taking into account the influence of asymmetry and non-sinusoidality, implemented in the form of a computer program and a training manual for implementation in the educational process, as well as instructions for implementation in power grid and other organizations.