

Researches in the field of hydro-electric engineering on the Kola were started in the post-war years. In 1950, after the Kola scientific base was reorganized into the Kola Branch of the USSR Academy of Sciences, the Department of hydro-electric engineering became a part of it, mainly aimed at studying water resources of the Kola Peninsula in order to substantiate the construction of hydro-electric stations. In 1961, the Department was reorganized into the Laboratory of power engineering and integrated water-economic problems, being attached to Mining-and-Metallurgical Institute, KSC of the USSR Academy of Sciences. The results of wide studies into hydro-electric resources of the Kola Peninsula have been used in making up a hydro-energy cadastre and in construction of the Serabryansky and Teribersky hydro-electric stations cascades.

In the late 1950s - the early 1960s, the intensive development of the national economy of Murmansk region and of the power system of the Kola Peninsula put forward new tasks aimed at the problem of central heating in the industrial enterprises and towns, as well as of construction and exploitation of thermal power stations. The Department of Power Engineering was engaged in complex research works on optimization of the fuel and power energy balance of Murmansk region and neighboring regions.

In 1973, the Department of Power Engineering has become a subdivision attached to the Presidium of the Kola Branch of the USSR Academy of Sciences, and in 1990 the Department of Power Engineering was reorganized into Institute of Physical-and-Technical problems of Power Engineering of the North of the Kola Science Centre of the Russian Academy of Sciences, functioning till 2004.

Established by Decree 2 of the Presidium of KSC RAS of March, 25th, 2004, was the Centre of physical-and-technical problems of power engineering of the North, a branch of the Kola Science Centre of the Russian Academy of Sciences, i.e. as a subdivision of the Kola Science Centre of the Russian Academy of Sciences.

The Centre of Physical-and-Technical problems of Power Engineering of the North, FRC KSC RAS, is the leading organization on the Kola Peninsula, which specializes in basic researches and applied developments in the field of complex physical-and-technical and technical-and-economic problems of power engineering.

The Centre is aimed at studying and substantiating the ecologically and socially effective ways of power engineering development, taking into account the specificity of the region under new requirements of economic managing, as well as at studying the problems of reliable and effective electric-power supply to customers under the specific conditions of the North, the problems of electrical power use in ore mining and mineral raw materials processing.

### **The Big Data concept development in power industry problems solution**

The Centre carries out studies on earthed devices resistance and impulse current flowing. A unique instrument base is developed to be applied in geological explorations, ore mining and mineral raw materials processing. In a number of high voltage sub-stations, recorded with the device developed, are geo-induced currents in the transformers neutral points of the main line. Since 2007, a number of operations have been carried out on monitoring the electrical power quality and on revealing the sources of distortion.

Based on the analysis of the results obtained in the power supply systems of Murmansk and Arkhangelsk regions, an effective procedure is proposed to determine the individual share of users in electrical power quality decrease. Great experience has been gained in perfection of power-engineering objects protection from lightning under the conditions of the Kola Peninsula.

Thunderstorm activity is being recorded in the region.

Studied under the specific conditions of the North is electromagnetic compatibility of high-voltage networks with disconnected power lines, instrumentation and communications, and railway transport.

Energy survey is carried out in buildings and constructions to reveal the energy conservation potential.

Technical-and-economic and physical-and-technical assessment of possible introduction of the renewable power engineering objects into the regional energy economy.