



Editorial

ENERGY EFFICIENCY IN THE MINERAL RESOURCES AND RAW MATERIALS COMPLEX

Energy efficiency and energy saving at all times and especially at the present stage of development of industry and economy have played an extremely important role. Regardless of which countries and according to what criteria they build energy development plans, energy efficiency and energy saving are always a priority. This fully applies to the mineral resources complex, in which energy consumption as a whole makes up a large share of total consumption. The resources mined in the mineral resources complex are themselves a source of energy. The energy sector is evolving in many ways. Many scientific works, the results of which are reflected in publications, confirm the relevance of research in the energy efficiency field. But the approach to individual decisions in the mineral resource industry is specific and it is worth of separate consideration. Recently, much attention has been paid to “green energy” and renewable energy sources. However, energy efficiency in the field of traditional generation and consumption remains an urgent problem and its solution is in constant development. One of the main directions for improving energy efficiency is the development of autonomous systems for the electrical and thermal power engineering. All these problems are reflected in a special volume of the Journal of the Mining Institute, the articles are divided into four sections: energy efficiency of the electric drive in the mineral resources complex (MRC); energy efficiency of industrial plants and enterprises in MRC; power quality and renewable sources in MRC; autonomous power supply systems in MRC. The presented articles contain valuable material from the scientific and practical points of view and can form the basis for further research in the energy efficiency field.

A number of articles are devoted to the solution of issues on the electric drive energy efficiency. In the article by *Oksana Yu. Ganzulenko, Ani P. Petkova* the results of the use of a linear rack-and-pinion drive as part of a sucker rod pump drive are presented, which makes it possible to reduce energy consumption in oil production up to 10 % in the form of a significant increase in efficiency. Article by *Mikhail S. Ershov, Aleksandr N. Komkov, Evgeniy A. Feoktistov* is devoted to the creation of an original mathematical model of the system asynchronous electric drive – drill string – bit – rock. The value of the research lies in the creation of a correct model that allows you to calculate the energy efficiency of various drilling modes with the existing composition of the electrical complex. Article by *Dmitriy I. Shishlyannikov, Valeriy Yu. Zverev, Anna G. Zvonareva et. al.* is devoted to the necessity of improvement the sucker-rod pumps drive operating in marginal and complicated well conditions in oil production. Solutions to improve the energy efficiency of hydraulic drives of sucker-rod pumps are proposed. One of the most important factors in the efficient operation of the mineral processing plant is the reliable haul trucks operation. The article by *Alexander N. Nazarychev, Grigory V. Dyachenok, Yuriy A. Sychev* defines the main mechanical external influences that determine the degree of possible defects in the electric drive of a haul truck. The authors propose practical recommendations for increasing the reliability of the operation of electric drive individual unit, which is associated with energy efficiency in the system of costs for extraction and transportation of minerals. The article by *Maxim G. Rakhutin et al.* studies the influence of the working fluid temperature influence on the losses of a mining hydraulic excavator on the example of using the Komatsu PC750-7 excavator. Based on the power loss criteria application, it is proposed to reasonably choose the working fluid type and operating modes of the hydraulic system.

The topic of energy efficiency of plants and enterprises is presented in several articles. Article by *Vladimir Ju. Bazhin et. al.* is devoted to the results of theoretical and experimental studies in the field of raw aluminosilicate smelting process. Research is aimed at creating an algorithm for controlling the technological process. Article by *Roman V. Klyuev et. al.* considers the electricity consumption forecasting at any stage of power supply. The article presents a new approach in the field of load forecasting, in particular, in MRC enterprises, the use of ensemble learning methods, in particular a recurrent neural network model, is proposed. In the article by *Aleksandr V. Nikolaev, Stefan Vöth, Aleksey V. Kychkin* a cybernetic model of electricity demand management on the example of the main fan installation is presented.



The model is implemented on the Internet of Things platform and allows you to determine in advance the electricity costs caused by the operation of the main fan installation. The article by *Ekaterina A. Yushkova, Vladimir A. Lebedev* presents an original solution to the energy efficiency problem of a vacuum plant for the fuel oil distillation using pinch analysis. The article determines the optimal flow heat capacity of the installation that ensures an increase in its efficiency.

In the section of the electricity quality improvement and development of using the renewable sources and storage devices, an article by *Valery M. Zavyalov et al.* presents an original solution to the issue of charging the mining electric locomotive battery installations and is of practical interest. Article by *Aleksandr N. Skamyin et al.* is devoted to the unsolved problem of determining the supply network not by calculation, but experimentally, the material of the article is a big step towards achieving this goal. In the article by *Fedor S. Nepsha et al.* an original approach to solving the problem of using renewable energy sources in the mining industry is proposed.

Particular attention should be paid to the section devoted to autonomous power supply systems, the implementation of which raises unsolved problems. Article by *Sergey S. Chervonchenko, Vladimir Ya. Frolov* is dedicated to solving the urgent problem of ensuring the reliability of power supply of remote consumers. In emergency conditions, it is proposed to use rechargeable batteries. In the article by *Vadim A. Shpenst et al.* an algorithm for the operation of an autonomous electrical complex with adaptive regulation is proposed, taking into account the mode of electricity consumption and emergency situations.

Responsible scientific editors of the volume: Doctor of Engineering Sciences Yaroslav E. Shklyarskiy, Candidate of Engineering Sciences Aleksandr N. Skamyin, Doctor of Engineering Sciences Miguel Jiménez Carrizosa