

### Appointment

It is used to match the modes of production and consumption of electric energy in isolated energy systems, including several independent generating units, with the aim of improving their energy efficiency.

### Current phase

The present state of research is manufacturing an experimental model of the hybrid system of buffer accumulation of energy for autonomous power plants of renewable energy, GSBI-2/5-SPT on peak power 2 kW.

There are many more other products in TPU, however they must be presented separately.

### REFERENCES:

1. <http://inno.tpu.ru/>

## **THE MAIN PROBLEMS OF ENERGY AND POSSIBLE SOLUTIONS OF THEIR SOLUTIONS**

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Energy consumption is an indispensable condition for the existence of mankind. Availability of energy for consumption has always been necessary to meet the needs of the individual, to increase the duration and improve the conditions of his life.

The history of civilization is the history of the invention of new methods of energy conversion, the development of its new sources and, ultimately, the increase in energy consumption.

The first jump in energy consumption occurred when a person learned to obtain fire and used it for cooking and heating their home. The sources of energy in this period were wood and muscular strength of man. By the 15th century, a medieval man, using working cattle, the energy of water and wind, firewood and a small amount of coal, already consumed about 10 times more than a primitive man. A particularly significant increase in global energy consumption has occurred over the past 200 years.

In the modern world, energy is the basis for the development of basic industries that determine the progress of social production. In all industrialized countries, the pace of development of energy has outpaced that of other industries.

At the same time, energy is one of the sources of adverse environmental and human impacts. It affects the atmosphere, the hydrosphere and the lithosphere.

Despite the mentioned factors of the negative impact of energy on the environment, the increase in energy consumption had not caused much concern among the general public. This went on until the mid-1970s, when numerous data appeared in the hands of specialists, indicating a strong anthropogenic pressure on the climate system, which threatens the global catastrophe with an uncontrolled increase in ener-

gy consumption. Since then, no other scientific problem has attracted such close attention as the problem of the present, and especially of the forthcoming climate changes.

It is believed that one of the main reasons for this change is energy.

Three groups of basic problems related to meeting the growing demand for energy are considered: the shortage of energy resources and energy, the growing burden on the environment, geopolitical and social threats. Based on the analysis of the "energy image" of the modern world, it is shown that the main way to solve these problems is to implement the concepts of energy saving and energy substitution. The main reasons for the unjustifiably high energy intensity of the Russian economy, the potential for energy saving and state and public measures for its implementation are given. The concept of energy substitution is disclosed - replacement of traditional primary energy resources with auxiliary / alternative fuel resources and non-traditional renewable energy sources, as well as development of alternative methods of obtaining electric and thermal energy. An important role in ensuring the energy security of the formation of a fair world energy market was underscored.

Most experts come to the conclusion that solving the problem of meeting the growing needs of mankind for energy at affordable prices and with minimal damage to the environment in any of the forecasted options for energy development lies in the way of implementing the concepts of energy saving and energy substitution combined with increasing the volumes of traditional fuel production and involving it in an increasingly large scale in the energy production of auxiliary / alternative fuel resources. The concept of energy saving is to increase the efficiency of energy resources management at all stages of their life cycle: from prospecting, exploration to production of electrical and thermal energy, transport of energy to remote consumers, its distribution and, finally, consumption. The concept of energy substitution means a gradual transition from traditional fuel to non-traditional renewable energy sources, as well as the development of new technologies for obtaining electric and heat energy, which in the second half of the century can substantially change the appearance of energy, remove or at least reduce the acuteness of existing problems – those of resources, environment and geopolitics.

#### References:

1. Ecological problems of energy supply of mankind. URL: <http://nuclphys.sinp.msu.ru/ecology/ecol/ecol05.htm>.
2. Main energy problems and possible solutions URL: <http://izvestiya.tpu.ru> V. 319 №4 2011 Ushakov V. Ya. Accessed: 01 September 2017.