

MAIN PROBLEMS OF ENERGY AND POSSIBLE METHODS OF THEIR SOLUTION

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ABSTRACT

The article presents an analysis of the main energy problems and possible ways of solving them in relation to the economic situation in Uzbekistan at the present stage.

Keywords: energy security, energy saving, energy substitution, unconventional fuel, renewable energy sources, alternative methods of energy production.

INTRODUCTION

At the moment, the term "energy security" has become widespread, along with military, economic, environmental, food and other types of security [1]. This concept can be interpreted as the state of protection of the country, its citizens, society and economy from threats to reliable fuel and energy supply. To ensure the energy security of Uzbekistan, it is necessary to timely identify the main energy problems and describe the methods that are suitable for real implementation in a crisis economy.

The twentieth century and the first decade of the new century are characterized by a high growth in the consumption of primary energy resources and electricity. In the world, the total consumption of electrical energy has increased 15 times and the consumption of electricity per one inhabitant of the planet has increased 4.4 times [2]. Moreover, the rate of use of energy resources continues to grow. At the same time, primary energy sources with a higher energy content continue to be actively developed - coal, uranium, gas, oil.

METHODS

Upon careful consideration, the most significant problems associated with energy are built into the so-called "triad of energy problems" [3].

First, the main sources of energy today are non-renewable, and they are unevenly distributed around the planet. Because of this, some countries are experiencing a deficit and are forced to spend a significant part of the budget on the purchase of energy resources, while becoming dependent on their suppliers. Others, on the contrary, can get hooked on easy money, which threatens such states to become raw material appendages of countries that have chosen an innovative path of development. As, for example, Uzbekistan, decades ago, was tightly "sitting" on a hydrocarbon pipe, but now the course is rigidly focused on the development of more advanced methods of producing electrical energy.

Secondly, modern energy is causing significant damage to the environmental situation in the world. These are anthropogenic emissions into the Earth's airspace, pollution of its bowels and water envelope. The unpredictability of the weather is increasing, the climate on the planet is

changing [2]. To top it all off, mention should be made of major accidents at technogenic facilities such as the Chernobyl nuclear power plant.

Third, all of the above provokes the emergence of new geopolitical and social problems. So the shortage of energy sources forces the states to unleash military conflicts for resources or to redistribute territories with their deposits by non-violent, economic and political methods. And climate problems lead to a worsening of the situation in agriculture, an unplanned weather change can deprive farmers of crops and cause famine in the region, which in turn can lead to social explosions or even population migration.

RESULTS

It is possible to solve the problems included in the triad by saving energy resources and replacing traditional fuels with non-traditional renewable energy sources (NRES) with the involvement of auxiliary fuel resources (AFR) on an ever larger scale and the use of modern methods of generating energy.

Interest in AFR is growing due to the increase in the cost of traditional energy resources, which was a consequence of increased demand and reduced supply due to the depletion of deposits. AFR includes oil shale (from which oil and gas are extracted), tar sands (one of the types of unconventional oil), heavy oil, associated petroleum gas, coalbed methane, gas hydrates [5, p. 247]. It should be noted that the extraction of methane from gas hydrates creates great difficulties in its extraction without damaging the environment and therefore requires a lot of money.

Non-traditional renewable energy sources (NRES) allow you to obtain energy by taking control over the natural processes occurring on Earth, as well as the processing of human waste. To (renewable energy sources) include the bowels of the planet, the sun, wind, small rivers, seas and oceans, as well as combustible waste from industrial production and households. The energy received from large rivers has long been mastered by the energy industry, therefore, it belongs to a wider group of renewable energy sources (RES). Renewable energy sources are inexhaustible and capable of restoring energy potential within several decades.

DISCUSSION

At the moment, the global potential of NRES is about 20 billion tons of standard fuel, which is almost twice the amount of extracted mineral fuel. However, in addition to the obvious advantages, NRES also have a number of significant disadvantages [2]:

- Significant daily and seasonal changes in capacity during the operation of most of the NRES, which leads to the need for joint operation of power plants at various NRES, work in conjunction with units on traditional energy resources, accumulation of electrical energy. All this "costs a pretty penny" in the construction and operation of such complex energy complexes;
- Low energy efficiency of the system;
- Large dimensions and weight of installations and, as a consequence, significant costs for their construction. Energy conservation and substitution measures should be implemented in parallel. But energy saving is possible up to a certain limit, because the main energy sources for today and in the near future are exhaustible and after use it is impossible to replenish the

reserves of natural resources. Therefore, the emphasis should gradually be shifted towards energy substitution.

It is also necessary to mention the alternative energy, which is based on well-known, but not yet mastered on an industrial scale technologies. Such as the use of nuclear reactors on fast neutrons, controlled thermonuclear fusion, direct conversion of hydrogen and oxygen energy into electrical energy using electrochemical generators, magnetohydrodynamic method of energy production [5, p. 204].

At present, nuclear power supplies approximately 18% of the world's electricity needs. Given a significant increase in the efficiency of the use of nuclear fuel and the safety of nuclear power plants, it is possible to achieve an increase in the share of this type of energy up to 30–40% in total electricity production by the middle of the XXI century.

With regards to thermonuclear energy. Since the middle of the twentieth century. advanced states spend a lot of effort and money to take control of the reaction of controlled synthesis of light elements - in fact, an inexhaustible source of energy. A unit of mass of such a fuel makes it possible to obtain about ten million times more energy than mineral fuel and a hundred times more than uranium.

CONCLUSION

In recent years, hydrogen energy has become a promising direction in solving problems associated with the environmental situation, which proposes to use hydrogen as a fuel. A huge plus in favor of hydrogen is that it is now possible to obtain energy without negative consequences for the environment. This requires a special fuel cell, which is an electrochemical generator and directly converts chemical energy into electrical energy with the only by-product of the reaction - water [3, p. 34].

In conclusion, it should be noted that we can talk about the so-called triad of energy problems: the shortage of the main sources of energy caused by their exhaustion and uneven distribution around the planet, the deterioration of the ecological situation, constant conflicts over limited resources. The solution to the above problems is possible through the use of alternative energy sources, which will reduce environmental pollution and resolve issues related to "energy hunger".

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