

PROBLEMS AND PROSPECTS OF NUCLEAR POWER IN THE MODERN WORLD

E. O. Lazarenko, A. V. Balastov
Tomsk Polytechnic University

The modern nuclear industry

The problems connected with power generation are the most acute today. Nowadays nuclear energy is the fastest growing sector of the power industry, both in Russia and abroad. According to the IAEA by the end of 2007 in 32 countries around the world there were operating 439 nuclear power reactors with a total installed capacity of 372.202 GW (e). Nuclear electricity generation share in the average of the countries that use nuclear power accounted for 27%. In four countries (France, Lithuania, Slovakia and Belgium) it exceeded 50%.

Energy consumption in the world is growing much faster than its generation. There is a real problem connected with the fossil fuels shortage. The possibility of building new hydropower plants is also very limited. Do not forget about the fight against the greenhouse effect and imposed restrictions on the burning of oil, gas and coal in thermal power plants. On increasing the share of nuclear energy in the global energy balance may affect factors such as reliability, an acceptable level of cost compared with other industry of energy, a relatively small amount of waste, the availability of resources.

Problems of nuclear energy

No matter how great the benefits of nuclear energy are, there are still many world's energy problems. The main of them are the potential danger of radioactive contamination of the environment with fission products of nuclear fuel for nuclear power plant accident and the problem of recycling of used nuclear fuel. In the late 20 - early 21st century there were two terrible accidents: the Chernobyl in 1986 and Fukushima-1 in Japan in 2011. They focused people's minds on the fact that the peaceful atom capable of destroying all life. And if in the first case, the main culprit was the human factor, which tried to eliminate all operating nuclear power plants in the world, in the second case of natural cataclysms practically didn't leave chance to people somehow to affect a situation.

The accident at Fukushima has opened a new problem to the people the use of nuclear energy. If you try to cover all possible environmental factors, so they can not cause an accident, it is practically eliminates the advantage of using the atom as cheapness.

Another acute problem of nuclear energy is the nuclear non-proliferation. Nuclear industry development in Islamic States can lead to the fact that radical Islamists will sooner or later get in their hands a terrible weapon. In this case, the world will be saved from disaster is very difficult. In this case, the world will be save from disaster is very difficult. The ongoing intense negotiations on the Iranian nuclear program show that this problem can significantly inhibit the development of nuclear power in the world.

One of the problems of nuclear power is also a so called thermal pollution. According to some experts, nuclear power plants per unit of electricity produced,

released into the environment more heat than comparable power TPP.

Nuclear power has other significant shortcomings, without which it cannot become a guarantor of energy security of the society in the future. This large amount of work on the extraction of uranium, expensive enrichment and isotope separation, a small fraction of use in nuclear reactor fuel, a large amount of radioactive waste, the irradiation of the personnel of nuclear power plants, etc.

Prospects for the development of nuclear energy

Experts estimate that by the middle of the 21st century the power consumption on the planet as a result of economic development and population growth will double in comparison to today's. Despite all the problems of the use of the atom, most resources such as oil, gas, coal, and of such renewable energy sources with low efficiency as wind, solar radiation, etc., make people to develop the nuclear energy industry.

In Russia in 2000, there was approved by the Government of a long-term strategy for the development of nuclear power, according to which by 2020 the capacity of Russian nuclear power plants can be increased by 75%. There will be build 12 new reactors at existing nuclear power plants and the construction of nine new nuclear power plants.

The main role in this program is given to the fast reactors. By the most conservative forecasts of the IAEA in 2030 on the planet there will be built up to 600 new units, and the share of the nuclear component in the global energy balance will rise to 40%.

The increase in generating capacity will increase the demand for nuclear fuel and its components, including natural uranium. By 2030, with the implementation of the announced rate of increase of global nuclear capacity demand for natural uranium will be 98 thousand tons per year.

Development and implementation of new technologies in nuclear power will overcome or substantially reduce its current shortcomings. This, when the widespread use of fast neutron reactors with a closed fuel cycle will significantly decrease the amount of radioactive waste.

It is clear that, although nuclear power will not cause the public's trust, does not stand up to test for safety and efficiency. Its future depends on how effectively and reliably is monitored for construction and operation of nuclear power plants, as well as how successful will be solved other problems of using the atom. In addition, the future of nuclear energy depends on the development of alternative energy sources: wind, solar, biofuels, etc. Perhaps mankind will have time to come up with something completely new, before nuclear energy takes place, which it takes.

REFERENCES

1. Dement'ev, B. A. Nuclear power reactors. M., 2007, page 256
2. Samoilo O. B., Usynin G. B., Bakhmetiev A. M. The safety of nuclear power plants. Moscow, 2011, page 324
3. "Nuclear power in alternative energy scenarios", Energy, Moscow, 2001, p. 228.