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Environmental Problems of Energy

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Energy is a branch of production that is developing at an unprecedentedly fast pace. If the population in a modern population explosion doubles in 40-50 years, then in energy production and consumption this happens every 12-15 years. With such a ratio of population and energy growth rates, the power-to-weight ratio increases like an avalanche not only in total terms, but also per capita.

Currently, energy needs are provided mainly by three types of energy resources: fossil fuels, water and the atomic nucleus. The energy of water and atomic energy are used by a person after turning it into electrical energy. At the same time, a significant amount of energy contained in fossil fuels is used in the form of heat and only part of it is converted into electricity. However, in both cases, the release of energy from fossil fuels is associated with its burning, and consequently, with the entry of combustion products into the environment.

Ecological problems of thermal energy

By burning fuel (including coal, firewood and other biological resources), about 90% of energy is currently produced. The share of heat sources is reduced to 80-85% in electricity production. At the same time, in industrialized countries, oil and oil products are mainly used to meet the needs of transport.

Burning fuel is not only the main source of energy, but also the most important supplier of pollutants to the

environment. Thermal power plants are most “responsible” for the growing greenhouse effect and acid precipitation. Together with transport, they supply the main part of technogenic carbon (mainly in the form of CO₂), about 50% sulfur dioxide, 35% - nitrogen oxides and about 35% dust to the atmosphere [1].

Thermal power plant emissions are a significant source of such a strong carcinogen as benzopyrene. An increase in oncological diseases is associated with its action. Emissions from coal-fired TPPs also contain silicon and aluminum oxides. These abrasive materials can destroy lung tissue and cause diseases such as silicosis.

A serious problem near the TPP is the storage of ash and donkeys. This requires significant areas that have not been used for a long time, and are also centers of accumulation of heavy metals and increased radioactivity.

Ecological problems of hydropower

One of the most important impacts of hydropower is related to the alienation of significant areas of fertile (floodplain) land under the reservoir.

In reservoirs, the heating of water sharply increases, which intensifies their loss of oxygen and other processes caused by thermal pollution. The latter, together with the accumulation of nutrients, creates the conditions for the overgrowing of water bodies and the intensive development of algae, including toxic blue-green (cyan). For these reasons, as well as due to the slow renewal of waters, their ability to self-purify sharply decreases. Deterioration of water quality leads to the death of many of its inhabitants. The incidence of fish herds, especially worming, is increasing. The tastes of the inhabitants of the aquatic environment are reduced. The migration routes of fish are being violated, fodder land, spawning grounds, etc. are being destroyed [2].

Reservoirs have a significant effect on atmospheric processes. For example, in arid (arid) regions, evaporation

from the surface of reservoirs exceeds evaporation from an equal surface of the land ten times. With increased evaporation, a decrease in air temperature and an increase in foggy phenomena are associated. The difference in the thermal balances of the reservoirs and the adjacent land determines the formation of local winds such as breezes. These, as well as other phenomena result in a change of ecosystems (not always positive), a change in weather.

Ecological problems of nuclear power

Nuclear energy until recently was considered as the most promising. This is due both to the relatively large reserves of nuclear fuel, and to the gentle effect on the environment. The advantages also include the possibility of building nuclear power plants without being tied to resource deposits, since their transportation does not require significant costs due to small volumes.

In general, we can name the following environmental impacts of nuclear power plants:

- destruction of ecosystems and their elements (soils, soils, aquifers, etc.) in places of ore mining (especially with open pit mining);
- land acquisition for the construction of nuclear power plants. Especially significant territories are alienated for the construction of facilities for supplying, discharging and cooling heated water. For a power plant with a capacity of 1000 MW, a cooling pond with an area of about 800-900 ha is required. Ponds can be replaced by giant cooling towers with a diameter at the base of 100-120 m and a height equal to a 40-story building;
- withdrawal of significant volumes of water from various sources and discharge of heated water. If these waters get into rivers and other sources, oxygen loss is observed in them, the probability of flowering increases, and the phenomena of heat stress in aquatic organisms increase;

- radioactive pollution of the atmosphere, water and soil is not ruled out during the extraction and transportation of raw materials, as well as during the operation of nuclear power plants, waste storage and processing, and their disposal [3].

In conclusion, we can conclude that the current level of knowledge, as well as available and under development technologies, provide the basis for optimistic forecasts: humanity is not facing a deadlock neither in terms of exhaustion of energy resources, nor in terms of environmental problems generated by energy. There are real opportunities for switching to alternative energy sources (inexhaustible and environmentally friendly). From these positions, modern methods of energy production can be considered as a kind of transitional. The question is what is the duration of this transition period and what are the possibilities for reducing it.

References:

1. Ecological energy problems [Electronic resource]. – Mode of access: https://vuzlit.ru/1268947/ekologicheskie_problemy_energetiki. – Date of access: 26.03.2020.
2. Ecological energy problems [Electronic resource]. – Mode of access: <https://ecoportal.info/ekologicheskie-problemy-energetiki/>. – Date of access: 02.04.2020.
3. Environmental problems of the electric power industry in the context of the implementation of the concept of sustainable development [Electronic resource]. – Mode of access: <https://moluch.ru/archive/57/7951/>. – Date of access: 11.04.2020.