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Nuclear Power

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Nowadays people are looking for additional sources of energy that can tackle the problem of the conservation of fossil fuels and the reduction of waste. One of the solutions is to use nuclear energy. Nuclear energy is generated by splitting the atoms in the reactor, the released energy heats the steam, and the steam already turns the turbine that generates electricity. Nuclear power plants do not emit harmful substances into the atmosphere, because reactors use uranium as fuel, not oil and gas, unlike thermal power plants that operate on the same principle. In addition, modern nuclear power plants are much safer than classical thermal power plants. All that power and potential comes from a tiny atom.

Now let us consider the advantages of this type of energy. Nuclear energy provides large amounts of 24/7 carbon-free electricity now, which is irreplaceable in protecting the environment. The question on the radioactive waste disposal tops the agenda. The waste from the plant is collected in special capsules, which are stored for a certain time, and later is disposed of in a safe way for production and the environment.

Having considered the issues on the radioactive waste we should turn to the economic and social question. Due to the high efficiency of a nuclear plant and relatively cheap raw materials and, as a consequence, the efficiency of the plant to produce large amounts of energy, both for consumers and great production, energy produced by a nuclear station will be much

cheaper than similar energy produced in thermal or electric power stations.

Having pointed out the advantages let us consider the disadvantages of nuclear power plants. Firstly, it is the high cost of design, construction and operation. Nuclear plants provide cheap energy but not free. The huge amount of energy generated at the station must be covered by the presence of a large number of consumers, as people and large enterprises, if they are not present, the station will become unprofitable and useless. Also, unlike a thermal power plant, a nuclear power plant does not generate the thermal energy needed to heat homes. Since this huge object is of state value, it requires a lot of competent specialists, whose work and knowledge should be paid well.

As for our country the government is encouraging the implementation of this type of energy. The idea of building the first Belarusian nuclear power plant arose in the mid-80s of the last century, a few years later the idea turned into reality, the first stages of construction began. But after the tragedy at the Chernobyl nuclear power plant, the project of the Belarusian nuclear power plant was frozen, and a little later resumed, but with multiple changes, including in the design, which led to changes in the project from the Belarusian nuclear power plant to the Minsk TPP-5. A decade later, it was decided to build the first Belarusian nuclear power plant. This decision had several prerequisites: the banal need of the country's energy system for a powerful facility capable of generating enough energy to operate the main industries of Belarus; independence from energy raw materials supplied from other countries, in the absence of them in the Republic of Belarus; the ability to sell electricity to neighboring countries; and, of course, this is the flagship of the energy industry of the Republic. After comparing all the above, a firm decision was made on the construction. Several options were proposed as the construction

site: Krasnopolyanskaya site, Kukshinovskaya site, Verkhnedvinskaya site, Ostrovetskaya site. Eventually, the choice fell on Ostrovets. This decision is due to several factors, namely the close location of the main electricity markets in the form of Lithuania, Latvia and Poland. Another explanation on the choice of this site is the safety associated with the absence of serious seismic activity, and the movement of tectonic plates in this area.

To understand the operation of a nuclear plant we should deal with its units. Oddly enough, this is quite simple, even a person far from the topic of energy can easily understand the purpose of the main units and units of nuclear power plants and the principle of their operation, comparing these units with their counterparts in the figure below (Figure 1).

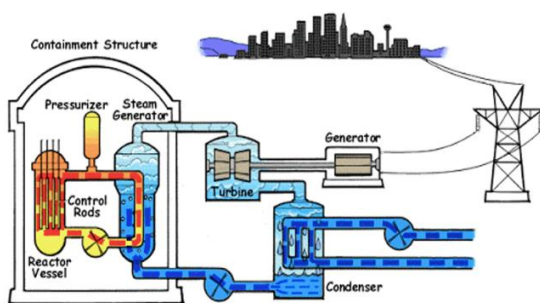


Figure 1 – The principles of the operation of nuclear power plant units

In Figure 1 we can see that the first step is the main circulation pumps pump water through the reactor core, where it is heated to a temperature of 320 degrees due to the heat generated during the nuclear reaction. The heated heat carrier gives its heat to the water of the second circuit (working fluid), evaporating it in the steam generator. After that the cooled coolant reenters the reactor. At this time the steam generator produces saturated steam at a pressure of 6.4 MPa, which is fed

to the steam turbine. In consequence of this the turbine drives the rotor of the electric generator. The spent steam is condensed in the condenser and refed to the steam generator by the condensate pump. To maintain a constant pressure in the circuit, a steam volume compensator is installed. The heat of steam condensation is removed from the condenser by circulating water, which is supplied by a feed pump from the cooler pond. Both the first and second reactor circuits are sealed. This ensures the safety of the reactor operation for the personnel and the public.

To sum up, it is essential to point out that nuclear power is really the future of all mankind, no alternative energy sources can compete with nuclear power plants in terms of reliability of power, durability, safety and, of course, cheap energy. As in conclusion, alternative energy is more expensive and, as a rule, no more harmful than nuclear energy.

References:

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