Republic of Tajikistan

The issues and challenges in the national capacity building regarding sustainable energy supply and development and how Tajikistan addresses them

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Energy potential of the Republic of Tajikistan

The main energy potential of the Republic of Tajikistan is hydropower. The total volume of hydropower resources is estimated at 527 billion kWh, including 202 billion kWh technically feasible for use, and 172 billion kWh economically viable for construction. This makes the state one of the most endowed with this renewable energy source in the world. So absolute potential Tajikistan ranks 8th in the world.

But with the development of modern technology, the Republic of Tajikistan can develop nuclear power. Since during the winter season and when the rains decrease, hydroelectric power plants will not be able to function efficiently.
Relevance of nuclear energy in the Republic of Tajikistan

Tajikistan has large promising uranium deposits. According to the latest data, the republic accounts for 14% of the world's uranium reserves, but some experts believe that this figure is much higher. No one can give exact data, since this requires additional research, which is currently being carried out. Previously, geological exploration revealed several uranium ore deposits in the north, east and center of Tajikistan - in the areas of Mogoltau-Karamazar, Gissar-Karategin and Pamir. Experts are confident that there is every chance to discover new industrial deposits, especially promising is the central zone, in which Soviet geologists have discovered more than 60 ore fields and five deposits that require additional survey.
Relevance of nuclear energy in the Republic of Tajikistan

The development of uranium mining in Tajikistan began in the mid-1940s in Taboshar and Chkalovsk, when plant No. 6 (now the state enterprise Vostokredmet) was launched. He worked for more than 50 years, using not only local ore, but also imported from neighboring countries - Kyrgyzstan, Uzbekistan and Kazakhstan, as well as from Europe. The company is currently idle. During the existence of the uranium industry in Tajikistan, about 55 million tons of waste have accumulated, which are concentrated in 10 tailings located in the Sughd region of the country. Over the past 20 years, work has been carried out to rehabilitate tailings both on their own and with the help of foreign organizations. The National Concept for the Rehabilitation of Tailings of Uranium Ore Processing Wastes for 2014-2024 was adopted. However, most of the programs and projects in this area are still at the initial stage of implementation, so the threat of radioactive contamination for northern Tajikistan continues to be one of the most acute environmental problems.
For Tajikistan, this is all the more relevant because the largest importers of uranium – China and India - are very close by. China is already actively developing Tajikistan's gold mines and is looking into other types of minerals. China is actively implementing the National Nuclear Power Development Program, which has built about 30 nuclear reactors over the past decade in addition to the existing nine nuclear units. Sufficient uranium must be available for their successful operation.

The Chinese government is currently pursuing a policy aimed at building up natural uranium reserves. Since 2010, Chinese nuclear companies have dramatically increased the volume of uranium purchases from abroad. During this period, China's natural uranium reserves grew annually by an average of 45 million pounds. At the same time, a significant proportion (up to 50%) of China's own uranium reserves are considered a "national strategic reserve. Therefore, Tajikistan will have no problems selling the uranium it receives.
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However, there is one complication: the water of Lake Sasyk-Kul is very salty. The Agency for Nuclear and Radiation Safety of the Academy of Sciences explains that it is a multicomponent brine with a total mineralization of 150-300 g/l. Dissolved elements prevent uranium extraction. In order to get pure uranium it is necessary to conduct a cycle of chemical reactions, consisting of 7-8 steps. Soviet and Tajik scientists have worked on this for many years and have found the best options.

The last such study was conducted by specialists from the Agency for Nuclear and Radiation Safety of the Tajik Academy of Sciences in 2010. Without going into technical details, we can only say that many methods of uranium extraction from multicomponent salt solution have been developed to date: sorption, precipitation, co-precipitation, method of carbonate removal, membrane technology and others. The percentage of uranium extraction is quite high and reaches 97-100%.
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Another problem is the absence of a source of electricity not only in the immediate vicinity of the lake, but also the shortage of it in the nearest settlement - Murghab. The great rarefaction of air and severe frosts in winter in the vicinity of Lake Sasyk-Kul would seriously complicate the operation of any production facilities here. Therefore, there is no talk of building production facilities at Sasyk-Kul itself for the time being.
Future plans for the development of nuclear power in the Republic of Tajikistan

For the right approach, you need to proceed according to the following plan:

1. Personnel training in foreign countries where nuclear technology is developed.
2. Conduct exploration expeditions in mountainous terrain.
3. To develop scientific ties between scientific organizations of the Republic of Tajikistan and countries where nuclear technology is developed.
1. Personnel training in foreign countries where nuclear technology is developed.

Measures have already been taken by the country's leadership to achieve this plan. Commitment 2020-2040 to the years of development of mathematics and science. Thus, schools give more attention to the subjects of mathematics, physics, chemistry, biology, computer science, and others.
2. Conduct exploration expeditions in mountainous terrain.

For expeditions in mountainous areas it is required to attract grants, as the expedition is costly for scientists. On the part of various scientific organizations scientific exploration expeditions are carried out, but it would be more effective if their number is increased.
3. To develop scientific ties between scientific organizations of the Republic of Tajikistan and countries where nuclear technology is developed.

For this purpose, for the past few years, school and university graduates have been going to Russia, China, and Belarus to study nuclear technology for bachelor's, master's, and PhD degrees. But we still need to allocate more funds and increase the number of students. Then we need to allocate funds for more participation of scientists in various conferences and forums on nuclear technology.