
<https://doi.org/10.47669/ISER-1-2021>

Scientific and Engineering Analysis of the Risks and Controversies related to the Modernization of the Armenian Nuclear Power Plant

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The article examines the multifaceted challenges and controversies associated with the Armenian Nuclear Power Plant (ANPP). This scientific and engineering analysis explores the historical context, current developments, and future implications of the ANPP, shedding light on critical issues related to modernization, safety, and risks.

The article begins by recounting negotiations between the European Union and the Armenian government in the early 2000s, aiming to decommission the ANPP with a promised 200 million euros. Despite initial agreements and strategic plans, the decommissioning process faced continuous delays.

Notably, the article addresses the extension of the operational lifetime of the ANPP's second power unit, highlighting the pivotal role it plays in Armenia's electricity production. This extension, facilitated by agreements with the Russian state-owned "Rosatom" Corporation, is discussed in detail, including financial arrangements and their impact.

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Furthermore, the article touches on the relationship between the ANPP's operational extension and the construction of a new power unit in Armenia.

Key words: nuclear power plant, Modernization, safety, risk, Armenia, nuclear power, nuclear energy, plant modernization, operational lifetime extension of nuclear power plant, scientific and engineering analysis

In the early 2000s, the European Union was negotiating with the Armenian government to decommission the two power units of the ANPP and promised to provide 200 million euros. As a result of negotiations with the European Union, on October 12, 2006, the Government of Armenia approved Resolution No. 1637-N on decommissioning the NPP. An extra-budgetary account was opened for this purpose. On the same year, on November 29, 2006, the strategy of decommissioning the ANPP was adopted by the protocol decision of the government No. 48. The strategy was to start work in 2016, when the NPP was supposed to exhaust its technical resources. However, this was not done.

The government has been constantly delaying the consideration of issues related to the decommissioning of existing power units. And only in 2017, the draft law on the decommissioning of the first power unit of the ANPP, which has been idle since 1989, was developed [1]. As for the existing 2nd power unit, its exploitation period was extended until 2026 by the protocol decision of the RA Government on March 27, 2014. One of the reasons is that the NPP, providing 35-38% of the entire electricity production in the country, is the base in the round-the-clock

load schedule of electricity production and consumption. Another reason is the actions of the Russian state "Rosatom" Corporation, which currently controls the extension of the operational period of the 2nd power unit of the NPP. Here is the series of government decisions that ensure the agreements reached between Armenia and Russia:

1. In December 2014, an agreement was signed between the Government of the Russian Federation and the Government of the Republic of Armenia on cooperation in the field of extending the operation period of power unit No. 2 of the Armenian Nuclear Power Plant.
2. In February 2015, an agreement was signed on providing a loan to the RA government for financing the works aimed at extending the operation period of the ANPP. In June 2015, an agreement was signed between "Rosatom Service" and "Armenian Nuclear Power Plant" CJSC on the implementation of works, supplies and services for the extension of the 2nd power unit of the ANPP. Financial allocations are made by the Russian Federation with credit funds [2].

The issue of extending the ANPP operation period is directly related to the construction of a new power unit. The RA law "On the construction of a new nuclear power unit in the Republic of Armenia" was adopted on 27.10.2009 [3]. The law remained on paper due to lack of own financial resources and insufficient investment. In addition, it was later found that the specified capacity of 1060 MW is incompatible with the power system

of Armenia, where the maximum load in winter is 1240 MW, taking into account all sources of electricity: thermal plants, hydroelectric plants. In the 2017-2022 plan of the Government of the Republic of Armenia, nothing is said about the construction of a new NPP [4].

Thus, the issue of building a new power unit was quickly replaced by the decision to extend the term of the 2nd power unit of the NPP.

The risks and safety issues of extending the operation period of the NPP were not discussed with the interested society, the local population, and no environmental and health impact assessment expertise was conducted.

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