



BULLETIN

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In the Shadow of Russia? Nuclear Power in Ukraine

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While the recent discussion about Ukrainian energy dependence on Russia has focused on the question of gas, in reality the nuclear industry in Ukraine is equally sensitive and vulnerable to external pressures. Historical and technological conditions mean that Ukraine is and will continue to be forced to cooperate with Russia in the field of nuclear energy. However, Ukraine can take the initiative to move out of the shadow of Russia through the consistent implementation of their nuclear strategy and strengthening relations with Western partners. Furthermore, support for Ukraine's nuclear energy development can bring benefits to European and Polish energy security.

A Problematic Relationship. The Ukrainian nuclear industry was established in the seventies as part of the Soviet nuclear programme. After the collapse of the USSR, Ukraine inherited 16 reactors, including four RBMK-1000 reactors in Chernobyl (currently closed due to structural defects), and 12 VVER reactors. After Ukraine's declaration of independence in 1991, Ukrainian-Russian relations in the field of nuclear energy remained relatively stable. As a consequence, a further three reactors were also built under Russian licence. To this day, Ukraine remains a valuable partner for Russia, constituting the biggest external market for Russian nuclear technology.

Nevertheless, the gas crises of 2006 and 2009, and especially the current destabilisation of the country, have highlighted Ukraine's excessive and problematic dependence on energy from Russia. While Ukraine is 60% dependent on Russian gas, its nuclear industry is virtually dominated by Russia. Russians provide most of the equipment to Ukrainian nuclear power plants, and participate actively in the Ukrainian fuel cycle. This almost monopolistic position allows Russia to exert strong pressure on price in its dealings with the Ukrainian state nuclear company Energoatom. During the past nine years, the cost of supply of Russian fresh fuel to Ukraine has increased from approximately \$350 million to \$600 million per year; the cost of removal of spent nuclear fuel from Ukraine to Russia has also increased, reaching its current level of \$150–200 million annually. Simultaneously, Russia is trying to gain more and more interests in Ukrainian nuclear companies.

In addition to economic pressure, Russia also resorts to the use of propaganda, such as discrediting its competitors on the Ukrainian market. The American company Westinghouse, currently the only rival for the Russian firm Rosatom in production of fuel for VVER reactors, has been accused of producing defective nuclear fuel. In addition, due to the ongoing crisis, the Russian media has been highly critical of Ukraine for its alleged incompetence in the management of nuclear power plants, the lack of adequate protection against terrorist attacks and, as a result, posing a threat to Europe.

Consistent Development and Safety Improvement. Almost half of the electricity in Ukraine comes from four nuclear power plants: Khmelnytsky (2 reactors VVER-1000), Rivne (2 VVER-1000 and 2 VVER-440), Zaporizhzhya (6 VVER-1000) and South-Ukraine (3 VVER-1000), which combined have more than 400 cumulative reactor-years of operation. The total capacity of the reactors amounts to 13.8 GW, which represents approximately 20% of the primary energy balance. This share will increase with the reduction of gas consumption in Ukraine and the expected increase in demand for electricity. As a result, the development of the nuclear industry (assuming the expansion of the sector and safety improvements) is of strategic importance for the Ukrainian energy sector.

The primary purpose of this strategy is to maintain the dominance of nuclear energy in electricity production. The Ministry of Fuel and Energy (MFE) assumes in its “Energy Strategy 2030” that, by 2030, between two and seven new reactors will have been built, and the operational lifetime of the existing ones will have been extended by 10 to 20 years. The natural location for two future reactors will be Khmelnytsky, where construction of units three and four was stopped in 1990 due to the moratorium on construction of nuclear power plants in Ukraine. In 2005, the Council of Ministers of Ukraine approved their construction and preparatory work is ongoing, yet the new reactors will not be connected to the grid in time to meet the original deadline, which was 2016.

Due to the Chernobyl disaster in 1986, the safety of the Ukrainian nuclear reactors is a priority. The Ukrainian State Nuclear Regulatory Inspectorate (SNRI) implements higher and higher safety standards, and attempts to comply with the requirements of international nuclear organisations (such as the IAEA, WENRA and ENSREG). The EU-model stress-tests shown that safety measures implemented in the last 15 years in the Ukrainian nuclear blocks greatly minimised the risk of core damage and emergency release of radioactive substances into the environment. In addition, in March 2013, the European Bank for Reconstruction and Development, and Euratom, each granted a €300 million loan for the comprehensive modernisation of Ukrainian reactors by 2017. Today, assessing external threats and the risk of sabotage, SNRI maintains protection of nuclear power plants at a higher level.

Gradual Emancipation. Although the nuclear technology used in Ukraine determines the need for cooperation with Russia, Ukraine seeks to increase its control over the sector. This task is facilitated since Ukraine possesses its own uranium resources, constituting approximately 2% of world reserves. Although the 225,000 tonnes of uranium (tU) located in 12 deposits would cover the total demand of Ukraine for the next 100 years, the current annual production (1,000 tU) allows Ukraine to meet only 30% of its domestic needs. According to SkhidGZK, Ukraine’s uranium mining and processing company, the goal is to achieve self-sufficiency and, in the longer term, export of uranium surpluses. But this will only be possible with increased funding for the domestic industry, the opening of the Ukrainian market for international investment, and cooperation with foreign companies.

In order to diversify the supply of fresh fuel derived so far exclusively from Russia (but prepared using Ukrainian uranium and zirconium), Energoatom started implementation of the Nuclear Fuel Qualification Project in 2007, assuming use of the Westinghouse fuel in three Ukrainian reactors. Ukrainian–American cooperation prompted the Russian company TVEL to propose, in 2010 new, more favourable conditions for a long-term contract for the supply of fuel from Russia to Ukraine. Although TVEL also won the tender on a joint venture that aims to build a nuclear fuel production plant in Smolino, the contract secured for Ukraine access to fuel manufacture technology. Such concern for Ukraine’s interests is an expression of a change in strategy towards Russia and the desire to make the nuclear industry independent.

Ukraine also seeks to reduce its dependence on Russia in the field of spent nuclear fuel management. Although Ukraine has two storage facilities for spent fuel (dry, at the Zaporozhye plant, and wet, at Chernobyl), the fuel from other power plants is exported to Russia. Therefore, Ukraine wants to invest in the long-term storage of spent fuel on its own territory. Thus Energoatom has, since 2005, been cooperating with the U.S. company Holtec International on a project to build a centralised spent fuel storage facility in the Chernobyl exclusion zone. It is expected that an integrated system of radioactive waste management will also be constructed.

Perspectives. It can be expected that Kyiv will lean towards the development of intensive cooperation with Western nuclear regulators and companies. Although the change of priorities in Ukraine’s foreign policy will involve additional pressure from Russia on the Ukrainian nuclear industry, it is likely that Russia will limit itself to threats to discontinue the fuel supply. However, Ukraine fulfills its financial obligations to Russia in this sector, and in any case it is too large market for Russia to risk losing. Russia also needs to sustain an image as a trustworthy partner, as it wishes to develop nuclear cooperation with EU countries including Hungary, Finland, and the United Kingdom.

Political problems and Ukraine’s growing debt may delay the modernisation of reactors and the implementation of some essential investments. Given that the security of the nuclear sector directly affects the security of neighbouring countries, the involvement of the European authorities and institutions in support of planned projects in Ukraine is of great importance. In comparison to other sectors of the Ukrainian energy industry, the nuclear industry is, due to strict supervision, less corrupt, which can help to ensure international control over how funds are spent. In addition, investment in the development of the Ukrainian fuel cycle can promote, in the long term, the diversification of nuclear fuel supplies to European VVER-type reactors (in, for example, Bulgaria, the Czech Republic, Slovakia, and Hungary).

The further development of nuclear energy in Ukraine will also have an impact on Poland. Due to the proximity of the power plant in Khmelnytsky, about 185 km from the Polish border, as well as the possible reconstruction of the Khmelnytsky–Rzeszów connection, Poland may import or transit Ukrainian electricity. Due to the technical conditions of the Polish energy system, Ukrainian electricity will not be competition for the planned Polish nuclear power plant, and at most it could offer a serious alternative to buying electricity from emerging nuclear power plants in Kaliningrad and Belarus. For Kyiv, reconstruction of the Khmelnytsky–Rzeszów connection might be an incentive for the synchronisation of the Ukrainian national electricity system with that of the EU.