**The Russian Empire: Rosatom as a Geopolitical Tool [El imperio ruso: Rosatom como herramienta geopolíca]**

*Marco Siddi, Università degli Studi di Cagliari / Finnish Institute of International Affairs*

Article published in Spanish in: Vanguardia dossier (ISSN 1579-3370), Nº. 98, 2026 (Ejemplar dedicado a: La nueva era atómica), págs. 16-21

On 9 September 2019, after a 5,000-kilometre trip across the Arctic Ocean with icebreaker Dikson, the world's first floating nuclear power plant 'Akademik Lomonosov' reached its permanent location in Pevek, in the northernmost region of Russia's far East. A few months later, the plant was fully operational, providing energy to one of the country's remotest regions. By early 2025, Akademik Lomonosov had delivered 1000 GWh, supplying 60% of the energy for the region. Its story is one of the latest successes of Russia's State Atomic Energy Corporation Rosatom, which has now fully revived the country's nuclear energy sector – nearly 40 years after the Chernobyl nuclear accident – and taken a leading position on the world stage.

Rosatom was established in 2007, inheriting the role of the Federal Agency on Atomic Energy, which had been under the control of the Ministry for Atomic Energy. It is a vertically integrated corporation controlling either directly or via subsidiaries the full cycle of competences in the nuclear sector, from uranium mining to the construction and operation of nuclear power plants, including processing and storage of spent fuel. In Russia, Rosatom operates - via its subsidiary Rosenergoatom - 38 nuclear power reactors in 11 nuclear power plants, most of which are located in European Russia. Rosatom is also responsible for Russia's nuclear weapon division, nuclear-powered icebreaker fleet and nuclear research institutions, and for ensuring nuclear and radiation safety. In recent years, the company has expanded its domestic activities to the renewable energy sector, notably wind power. Most significantly, Rosatom is also the nuclear energy company with the world's largest portfolio of foreign orders, including reactor construction, the provision of enriched uranium and fuel and other services in over 50 countries.

The current successes of Russia's nuclear sector have their roots in a much earlier time than the establishment of Rosatom in 2007. Already during the Second World War, Soviet military plans drove the development of the industry. In the 1950s the Soviet Union developed nuclear energy for civilian purposes, with the opening of the world's first nuclear power plant, Obninsk, in 1954 and the launch of the first nuclear icebreaker, Lenin, in 1959. By the 1980s, the Soviet Union had installed 37 GW of capacity in nuclear power, deploying two types of reactors, the pressurised-water reactor VVER (*vodo-vodyanoi enyergeticheskiy reaktor*) and the graphite-cooled reactor RBMK (*reaktor bolshoy moshchnosti kanalnyy*); modern versions of the former are the anchor of Russian nuclear industry today. In addition, it built plants and reactors in fellow socialist countries Bulgaria, Czechoslovakia, East Germany and Hungary and in then neutral Finland.

For some time, the legacy of the Chernobyl nuclear disaster in 1986 and the economic crisis of the 1990s hindered the development of the Russian nuclear industry. However, in the late 1990s and 2000s new projects were launched both in Russia and abroad, allowing the industry to retain its capabilities and human resources.

Today, Rosatom's plants account for approximately 20% of Russia's electricity generation. The latest Federal Target Programme envisages a 25-30% nuclear share in electricity supply by 2030, rising to 45-50% by 2050 and 70-80% by the end of the century. Critics argue that such an expansion of nuclear power, which includes replacing the capacity that will progressively end its lifespan, can only be achieved with substantial state intervention. However, most VVER reactors are expected to receive 30-year license extensions, while RBMK reactors will see their lifespan extended by 15 years (for a total service of 60 and 45 years respectively). While license extensions are granted after monitoring and maintenance, they have elicited protests by Russian environmental groups. Moreover, Russia does not yet have a solution to the problem of storing radioactive waste from nuclear power plants, and most spent fuel is kept in cooling ponds close to plants; only part of it is reprocessed and reused.

The expansion of nuclear power also aimed at 'freeing' gas that is currently used domestically for lucrative exports abroad, but this strategy is now called into question by Western price caps and decoupling from Russian gas. Under pressure from the West, Russia's response has been to reroute its gas exports increasingly towards China through the Power of Siberia pipeline, launched in 2019, and through the planning of further eastbound infrastructure. Oil exports have been redirected to Asia, most notably China and India, from which substantial volumes continue to reach Western markets. In this context, Russia's nuclear energy sector has retained its strategic importance, both for domestic purposes and for commercial goals and power projection abroad.

Indeed, nuclear technology is one of the few high-tech sectors where Russia is a world leader. The country is investing in the development of new reactor technologies, most notably safe plants using fast neutron reactors, MOX (a blend of oxides of plutonium and uranium) and a closed fuel cycle, which would allow eliminating the production of radioactive waste from power generation. Currently, Russia is the only viable commercial supplier of high-assay, low-enriched uranium (with 5-20% concentration of the isotope U-235, instead of the 3-5% concentration that fuels the existing fleet of light water reactors), which will be needed to power the new generation of advanced reactors. Thanks to its leadership in proven technology, flexible business models, attractive financial packages (through Russian state support) and diplomatic tools, Rosatom has acquired a large portfolio of overseas orders.

Rosatom's portfolio of foreign orders spans over 50 countries. Its projects are at very different stages of development: plants in operation; ongoing, contracted or planned construction of reactors; invitations to partnerships; memoranda of understanding for services and general development of nuclear energy. Between 2009 and 2018, the company received 23 of 31 global orders and was responsible for half of the reactors under construction worldwide. Moreover, through its subsidiary TVEL, Rosatom controls 20% of global uranium conversion and 46% of uranium enrichment capacity. Many Western and Asian states, including the United States, the United Kingdom, France, Japan and South Korea, have contracts with Rosatom for enrichment services. Western production capacity is limited in the short term. The United States relies on Rosatom and Russian-controlled supply chains for nearly half its enriched uranium supply; 40% of the EU's imports come from Russia.

Russia's key role in the Western nuclear fuel market is the result of two main factors. Firstly, Russian engineers developed a system to enrich uranium that is significantly less energy-intensive and thus much cheaper than the method used by French and American engineers. Secondly, in

1993 Russia and the United States agreed to the so-called “megatons to megawatts” program, in which the highly enriched uranium from former Soviet nuclear warheads was transformed into low-enriched uranium and shipped to the US for civilian nuclear plants. As a result, the US industry could not compete against Russian fuel.

The strength of Rosatom’s export strategy for reactors and whole nuclear power plants lies in its ability to provide all-inclusive packages comprising plant construction knowhow, training, support related to safety, non-proliferation regime requirements, flexible financing options (including Russian government loans) and handling of spent nuclear fuel. Rosatom can take back to Russia spent fuel from overseas clients for temporary storage and reprocessing; it then returns the radioactive waste to the country of origin while keeping the separated plutonium. This makes it particularly attractive to newcomers in the civilian nuclear power sector, which explains Rosatom’s surging business in Africa, the Middle East, Asia and South America. Its business model enabled it to outclass Western competitors such as Framatome, Mitsubishi, Siemens and Westinghouse, which normally require robust financial guarantees and partnership arrangements with clients as part of their corporate business standards. Currently, Rosatom is building reactors in China, India, Bangladesh, Turkey, Egypt and Hungary.

Rosatom’s foreign activities receive full support by the Russian government, including during bilateral meetings between representatives of the partner country and the Russian president or senior members of government. Cooperation on the peaceful use of nuclear energy is included in the agenda, mentioned in public speeches and sometimes codified in memoranda of understanding. When cooperation is at an advanced stage, the Russian president or senior Russian government members attend official ceremonies with their foreign counterparts and celebrate landmarks in the construction of new projects.

Rosatom also makes special offers to strategic partners, as in the case of Turkey’s Akkuyu nuclear power plant. This is the first plant where the company offered a Build-Own-Operate model, under which it retains majority ownership and a guaranteed price on electricity sales, but bears all the financial, construction and operational risks. It is, however, questionable whether this model can be easily replicated. Russian experts have highlighted high costs for the constructor, estimated to be at least $22 billion; meanwhile, Western critics fear the security implications of the plant, which has extraterritorial status and creates a “Russian island” within a NATO member. Yet, the project is going ahead; construction of the first of the four planned reactors has been completed, and it is expected to go into operation in 2026. When all four units or the plant will be ready, which according to plans should be in 2028, they will provide 10% of Turkey’s electricity needs. The project has consolidated the strategic energy partnership between Turkey and Russia.

In the EU, Finland and Slovakia cancelled contracts with Rosatom to build new nuclear power plants following Russia’s invasion of Ukraine, whereas Hungary has not cancelled its plans. Hungary is receiving a $10 billion loan from Russia for the construction of two new reactors at its Paks plant. Rosatom also supplies nuclear fuel to plants in Hungary, Czech Republic, Slovakia, Bulgaria and Finland; these countries operate 18 Soviet- and Russia-designed reactors that have to be reloaded with fuel approximately every two years. While these reactors have so far operated only with Russia-produced fuel, Western companies have developed fuel that can replace Rosatom’s supplies. This limits vulnerability to disruptions in the supply of Russian fuel, which has however continued despite the ongoing conflict. Indeed, recent research by French scholar Teva

Meyer has shown that Russia's capability to 'weaponize' the uranium enrichment market is limited; despite Russia's current war in Ukraine and broader assertive stance in international politics, it appears that Moscow does not want to extend confrontation to this field.

Nonetheless, the West is preparing for the possibility of disruptions in supplies, or simply for decoupling from undesired Russian imports. This is not an easy task, due to both the specificities of Russia/USSR-built reactors and to the difficult state of the Western nuclear industry. In January 2023, the EU started co-funding the 'Accelerated Program for Implementation of Secure VVER Fuel Supply' (APIS), which should develop and deliver a fully European nuclear fuel supply for Russian-designed VVER reactors. At the moment, however, Western capacity to produce fuel for Soviet/Russia-designed plants remains limited, especially for the oldest Soviet and the most recent Russian designs.

Overall, current and projected dependence on Russian nuclear services varies substantially in Rosatom's partner states. Norway-based scholars Indra Overland and Kacper Szulecki have calculated estimates based on prognosed national electricity supply coming from Rosatom reactors operating or planned until 2040. According to them, dependence will be high in Armenia (100%), Hungary (42%), Bulgaria (37%), Belarus (34%) and Uzbekistan (20%), and larger than 10% also in Uzbekistan and Bangladesh. Reliance on Russian reactors is particularly significant in countries that base their decarbonisation efforts primarily on nuclear energy (i.e. Hungary and Slovakia) and where the power system is inflexible and overreliant on a single large nuclear power plant. Conversely, dependence on Rosatom appears marginal in China and India, which already have domestic nuclear industries and expect to receive only a small share of their electricity from Rosatom-built reactors.

A key question for the West – the United States and the European Union in particular – is whether they want to challenge the preeminence of Rosatom and of other currently leading actors, such as China National Nuclear Corporation and Korea's KEPCO. A central factor in the success of the Russian, Chinese and Korean nuclear sector has been strong state support and a statist approach to the energy market. Conversely, market liberalization and the reduction in state support have left the Western nuclear industry in a difficult state. This is reflected also by the enormous delays and increase in costs of new projects, such as Olkiluoto 3 in Finland, Flamanville 3 in France and Hinkley Point C in the United Kingdom, all of which deploy the Franco-German European Pressurized Reactor.

Rebuilding the competitiveness of the Western nuclear industry on the world's stage, especially in terms of building new reactors, would require very large investments and efforts. The EU has made the first tentative steps in this direction by including nuclear power in its green taxonomy, which makes receiving (public) funding for new projects easier. However, nuclear is just one of the many presumed 'net-zero' technologies that the EU is advocating, and possibly the most controversial one across the Union. The reduction in the cost of renewable energy and its decentralized production – which makes it more resilient to disruption – make it a formidable competitor to nuclear power in the context of decarbonization. By contrast, nuclear energy requires very large upfront investments, highly centralized production and presents serious issues in terms of safe and permanent storage of spent fuel. In areas such as Southern and Central Europe, climate change poses an additional challenge to the operation of plants in the summer, when the temperature of water in rivers used to cool reactors often exceeds allowed limits. This adds to the serious

challenge of replacing old reactors that are reaching their end-of-life, for instance in France, with many requiring frequent maintenance.

While nuclear industry advocates have been arguing for years that small modular reactors (SMRs) may provide the answer, they have not been deployed at scale. Furthermore, while having more limited capacity and thus smaller costs, SMRs have many of the same environmental issues as larger plants. Therefore, tales of a ‘nuclear revival’ in the West continue to be far-fetched. In this context, great powers that have invested in the nuclear sector consistently for the last few decades have the upper hand in the global market. Rosatom constitutes a prime example.

It remains unclear whether Russia’s confrontation with the West and Western sanctions will eventually extract a higher toll from Rosatom. The company has also been accused – notably by the Bellona Foundation. an international environmental NGO headquartered in Norway – to be an active participant in Putin’s aggression of Ukraine, for example by claiming control of the Zaporizhzhia nuclear power plant in Southeastern Ukraine, occupied by the Russian army. For the time being, however, the Russian company has managed to navigate the difficult waters and continues to retain its leading position and status in the global nuclear sector.