



Bellona Nuclear Digest. November 2023



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About Bellona:

The Bellona Foundation is an international environmental NGO working on the major climate and environmental problems. Founded in 1986 as a direct action protest group, Bellona has become a recognised technology and solution-oriented organization with offices in Oslo, Brussels, Berlin, and Vilnius, and representatives in USA and several EU Member States.

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After Russia's full-scale invasion of Ukraine in February 2022, Bellona ceased its activity in the aggressor country. On 18 April 2023 the Russian general prosecutor's office declared Bellona to be an [undesirable](#).

However, we continue to monitor events in the field of nuclear and radiation safety relating to Russia and Ukraine, which we believe are of interest to foreign readers. We analyze the situation in order to assess the degree of Russia's international influence on other countries and the risks connected with this. We present you with a survey of these events for November 2023.

Follow the links to read the last three digests for [October](#), [September](#) and [August](#). [Subscribe](#) to our mailing list to make sure you don't miss the next digest.

NUCLEAR RISKS AND THE WAR IN UKRAINE

Zaporizhzhia NPP. Event timeline for November 2023

After the reactor vessel of unit 3 was [closed](#) in October, which had been left open for almost one and a half years after technical maintenance was carried out in 2022, in November pressure tests [continued](#) of the unit's steam generators. After tests were completed, [sealing](#) was carried out. Repair works were then carried out on [the primary cooling circuit](#), and pressure testing. On 17 November, it was planned to complete pressure testing of the secondary circuit in the coming days (but unit 3 was not mentioned again in November updates). At the ZNPP, IAEA experts were informed that after pressure testing, unit 3 [remains in cold shutdown](#).

On 17 November, IAEA reported that in unit 5, which was in "hot shutdown", [boron](#) had been detected in the second cooling circuit (boron is only supposed to be contained in the primary cooling circuit and in the emergency system). The site therefore increased the frequency of boron measurements in the secondary cooling circuit of unit 5, and measurements remained relatively stable and within the limits permitted by the reactor's technical specifications. Radioactivity in the second circuit was not detected. The ZNPP [stated](#) that the unit will remain in hot shutdown until all the mobile boilers which provide heating in Enerhodar have started operating, after which repeat assessments of the state of the unit will be made.



Locations around the Zaporizhzhia NPP site from which artillery rounds were allegedly fired from the Russian side from July 2022 to May 2023.

Source: Greenpeace Report "A Nuclear Power Plant as Launch Pad. Analysis of the occupation of Zaporizhzhia NPP by Russian armed forces and Rosatom and the role of the IAEA"

On 21 November, the IAEA published a report that, after all, on 20 November unit 5 had begun to be [switched to cold shutdown mode](#), and that the ZNPP intended to [determine the cause](#) of boron detected in the secondary cooling circuit. The decision was taken after one of the three 17.4 MW [diesel boilers](#) located on the territory of the Zaporizhzhia TPP was put into operation on 17 November. (Previously it was reported that it was planned to [convert](#) these boilers to gas in December). But several days later the IAEA group [was informed](#) that there would not be an immediate investigation of the causes for boron appearing in the second cooling circuit.

Thus, [at the end of November](#) all units apart from unit 4 were in cold shutdown mode. Unit 4 remains in hot shutdown mode to provide steam for the needs of the ZNPP, and is also used to heat the plant and Enerhodar. Additional heat is provided by 9 mobile [diesel boilers](#), installed at the ZNPP, and also boilers located in the nearby industrial zone (the IAEA [reported](#) that in the industrial zone 21 gas boilers with a total capacity of 57 MW of heat were installed). Also, 50 mobile boilers are installed in [Enerhodar](#) itself.

IAEA director general Rafael Grossi [expressed concerns](#) that because of the reduction in experience service personnel after the capture of the plant, the NPP would be unable to support of comprehensive program of systematic technical maintenance, and that some works on servicing the safety system of reactors might not be complete. The detection of boron in the second circuit was not the first incident. In August there was a leak in the primary cooling circuit of the reactor of [unit 4](#), and in October small leaks were detected in the primary circuit of the reactor of [unit 6](#). Additionally, in September at [unit 5](#) there was a water leak in the recirculating seal of the main technical water system, and the safety channels of unit 5 and 6 were shut down for repairs.

In November, the ZNPP once more encountered glitches in the electricity supply of the power units. On [14 November](#), power was [cut off](#) for one and a half hours at unit 6, and it was switched to the emergency diesel generator. The next day the IAEA group was informed that part of the security system of unit 6 was scheduled for repairs. A [search for the cause](#) of the power cut continues. (We should note that in November [technical maintenance](#) of the main transformers of all six units was carried out).

On [26 November](#), as a result of a short circuit that took place approximately 100 km to the north of the plant, the plant lost power from the main 750 kV power line and was switched to the single 330 kV reserve line. However, one [emergency diesel generator](#) which powers unit 4 was also switched on, which may show problems with the electrical configuration of the unit. The generator was switched off manually, and power to the plant from the main line was restored on the same day.

[On 2 December](#) at the ZNPP a total blackout took place that lasted several hours, the eighth since the war in Ukraine began. The plant lost its connection with both external power lines and temporarily switched to the emergency diesel generators. Initially, because of damage to the external grid on the evening of 1 December the 330 kV [reserve line](#) was cut, and five hours later during an air raid, the main 750 kV power line was cut. During the power outage, operation of the four main coolant pumps of the reactor of unit 4 was interrupted, and during this time the reactor was switched to semi-hot shutdown. By the morning of 2 December, power from the 750 kV line was restored.

The IAEA reports that the IAEA group at the ZNPP can hear explosions almost every day. On 26 November, experts heard the [sound of several rockets](#), which evidently were launched not far from the plant. The IAEA group did not see the rockets because of cloud cover, but the distinctive sound showed that they had been launched from a multiple-launch rocket system (MLRS) located nearby. On 28 November, distinctive sounds of rockets were heard for a [second time](#).

The IAEA group also heard multiple artillery rounds, which also seemed to have been fired from near the ZNPP. The [information circular](#) of the permanent representative of Ukraine at the IAEA reported that according to an [analysis](#) of satellite images commissioned by Greenpeace, firing positions of the Russian military were discovered within a range of 1-18 km from the occupied ZNPP. From these locations, since March 2022, shelling has been conducted from MLRS, particularly BM-21 Grad and BM-30 Smerch.

Not only military activity around the ZNPP has been observed. On 29 November it was reported that there were explosions near the [Khmelnitsky NPP](#), though the plant was not damaged.

In November, experts continued to carry out walkdowns of the buildings and territory of the plant. During a walkdown of the perimeter of the plant on 3 and 5 November, the group did [not detect](#) any mines or explosives, including in regions where they were observed earlier.

The team of experts [continues to request](#) access to the rooftops of the reactor buildings of units 1, 5 and 6 (in October the team was able to visit roofs of three other units of the ZNPP). The team also requests access to all six turbine halls for continuous inspection in the course of one day. But so far the team was only able to inspect all six [main reactor control rooms](#) on 15 November, which allowed experts to gather more information about the personnel and confirm the status of each reactor.

On 23 November, two-hour [emergency training exercises](#) were held at the ZNPP, which members of the IAEA mission had the opportunity to observe. They involved actions which should be taken in response to a hypothetical break of a pipe containing radioactive wastewater, and the disconnection of power from one reactor unit.

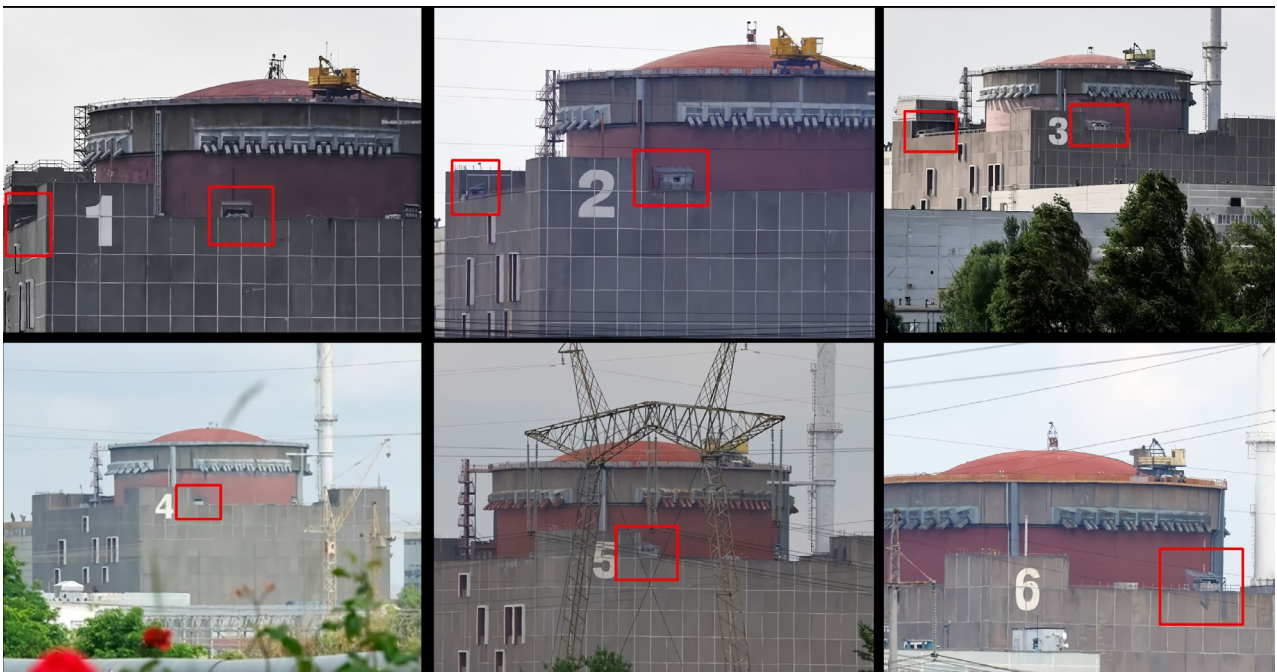
Emergency training exercises were also carried out at the Rivne NPP and at the radioactive liquid waste treatment plant at the Chernobyl site.

Commentary by Bellona: *The situation at nuclear sites of Ukraine will remain complex and unpredictable until the end of the war. The danger may be that Russia, after waiting for low temperatures to arrive, will intentionally or accidentally attack the NPP or system maintenance sites, with the aim of intimidating or destroying the energy system of Ukraine, which for a number of reasons is already on the brink of extinction.*

The occupied ZNPP is in a special mode. Real danger may arise here from the actions of both warring sides. Most of the information on events at the ZNPP from Russia has no alternative independent confirmations, which cast doubt on its veracity, while most of these reports are filled with propaganda clichés and

only have the purpose of blaming Ukraine. The Ukrainian side tries to comment on each event at the ZNPP and in Enerhodar to emphasize that the situation of the nuclear plant is unacceptable, which is quite understandable and correct.

In the information coverage of events at the ZNPP, for the first time the IAEA mission at the ZNPP detected and stated in [information report 197](#) on 26 November that rockets had been launched from the territory near the plant, which practically shows that the Russian side launched the rockets. Previously, the IAEA avoided directly accusing the sides of involvement in specific military actions of both a defensive and attacking nature.



Equipped firing positions of concrete blocks on the roofs of reactor sections 2, 4 and 5 of the Zaporizhzhya NPP filmed by journalists on 15 June during a visit to the plant by IAEA director Rafael Grossi.

Credit: Collage by Bellona comprised of frames from the video.

In May this year, IAEA director general Rafael Grossi [announced](#) a change of functions in the mission's task, with increased attention by IAEA inspectors, to aspects of military actions around the ZNPP. However, previously this policy was only reflected in increased inspections of plant buildings and detecting military equipment and mines. The launch of rockets near the plant were recorded for the first time.

From the standpoint of the expert community, at present and in the foreseeable future the ZNPP will continue to face a number of serious problems which may have a negative impact on the plant's safety. They are:

- the uncertain technical state of systems, mechanisms, aggregates and various structures which during operation of the NPP require constant technical maintenance and strict implementation of all regulations stipulated by technical and operation documents. The long shutdown mode for NPP units requires special measures for their safe operation, as these modes are not used in practice;*
- the moral and physical state of the operating and servicing personnel at the NPP, which may be heavily influenced by the situation in which they and their families find themselves;*
- regular blackouts at the ZNPP, which have been taking place with increasingly frequency of late;*
- the uncertain future of the ZNPP, which already shows that even if conditions arise for switching NPP units into power mode, this will be impossible without a complete overhaul of all equipment, which will require a great deal of time and resources;*
- and finally, the military and political situation, which may at any moment turn the nuclear power into a dirty nuclear radiation bomb.*

Thus, despite the optimistic reports and assurances from Energoatom that everything is under control at nuclear facilities (except for the ZNPP), Bellona believes that the situation in the energy sector of Ukraine, including in the nuclear sector, may change practically overnight. It all depends on the military and political situation and events on the frontline.

International nuclear news and its connection with Russia

French President Emmanuel Macron visits Kazakhstan and Uzbekistan to strengthen cooperation in the nuclear sphere

In early November, Emmanuel Macron made official visits to Kazakhstan and Uzbekistan. According to sources at [Bloomberg](#), the goal of Macron's visit to these countries was to strengthen the energy security of France.

On 1 November, Macron [visited Astana](#). Kazatomprom reports that during his visit the Kazatomprom's Chief Executive Officer Meirzhan Yussupov and the Framatome's Fuel Business Unit, Sales & Marketing Vice President Vincent Mercier signed an agreement on developing cooperation in the nuclear fuel cycle. French companies already have experience of cooperation with the Kazakhstan nuclear sector, with [the Ulba Fuel Assembly plant](#) launched in 2021 for the manufacture of fuel assemblies for China, and the countries intend to develop cooperation in the nuclear sector further.

Additionally, the French company Orano is developing a uranium field in Kazakhstan through a joint enterprise with Kazatomprom (TOO SP KATKO). During Macron's visit, the Kazakhstan energy minister Almasadam Satkaliyev [reported](#) that Kazakhstan was examining the possibility of working with Orano, including prospects for obtaining technologies for uranium conversion and enrichment.

On 2 November, Macron visited [Uzbekistan](#). The Uzbekistan presidential office reported that President Shavkat Mirziyoyev had met with a number of French managers visiting together with Macron. At a [meeting](#) with the CEO of Orano Claude Imauven, the parties "supported initiatives for expanding cooperation in surveying and producing uranium".

Commentary by Bellona: *The French authorities are trying to strengthen and increase the volume of uranium deliveries from Kazakhstan and Uzbekistan, after complications in the situation with the largest supplier, Niger. In 2022 these two Central Asian nations accounted for 27% and 4.4% of uranium deliveries to Europe respectively, where the main consumer is France. Taking into account the recent [agreement](#) on development of uranium fields in Mongolia, France is trying to ensure future deliveries of uranium that bypass Russia.*

However, Rosatom's presence in these countries and the close cooperation in many production areas carries the risks that French projects will be realized in cooperation with Russia to one degree or another.

Additionally, besides uranium production, France is developing cooperation in Kazakhstan for increased participation in the nuclear fuel cycle, has already opened a plant for manufacturing nuclear fuel in the country, and is discussing the possibility of cooperation in uranium enrichment as well. As the Kazakhstan government not only plans the future construction of an NPP, but also to provide it with its own fuel, all of this increases France's chances to win the future tender for construction of this NPP, or to play a significant role in this project in cooperation with other participants.

However, Russia also has a large chance of winning this tender. There is a risk of increased dependence of the French nuclear industry on Russia if the project for the future NPP in Kazakhstan is awarded to a joint project of companies from Russia and France. For example, if the project for the nuclear section is awarded to Rosatom, and the turbine delivery project is awarded to France, as is already the case in NPP projects in Turkey, Egypt and Hungary (see the section below on turbines for VVER-1200 reactors).

French nuclear fuel plant in Germany continues cooperation with Rosatom and intends to send enriched uranium to Russia

In early November, European and Russian-language independent media outlets reported that according to [German environmental groups](#) a plant for the manufacture of fuel rod elements in Lingen, owned by the French group Framatome, was planning to export enriched uranium to Russia. The German environmental ministry [confirmed](#) that the plant was examining an application to “export nuclear fuel waste” to Russia. Enriched uranium is planned to be transported from Germany to the Machinery Manufacturing Plant (JSC MSZ) owned by Rosatom. Transportation [will be carried out](#) by trucks from Lingen to a port in the Netherlands and by ship to Russia, and from there to the final destination, the town of Elektrostal in the Moscow Oblast.

Judging from [licenses](#) for transportation issued by the Netherlands, this may involve the return of scrap metal of fuel rods back to the Russian supplier.

The environmental groups which reported this transportation [state](#) that the export of enriched uranium from Lingen violates EU sanctions, which prohibit the export of dual-purpose goods to Russia if the production “may have ultimate military use”. Nuclear material and enriched materials (even of fuel enrichment under 5% in the form of scrap metal of fuel rods) is classified as such production.

In a report by [Radio Liberty](#), a representative of the German economic ministry Nina Marie Güttler notes the prohibition on transporting enriched uranium according to the EU decree on dual-purpose goods. However, she cites article 2, point 4a, which allows for exceptions to this ban. These exceptions are possible for “production, guaranteed maintenance, and enrichment of uranium for fuel rods and the safety of nuclear facilities, and also for peaceful nuclear cooperation, especially in the field of science and development”. Each individual case should however be examined separately.

Commentary by Bellona: *The deliveries in question probably reflect the existing practice of many years of cooperation between Rosatom and European companies: the Russian MSZ plant, one of the two major nuclear fuel plants in Russia, delivers fuel rod elements for the plant in Lingen, where fuel cartridges for NPPs of foreign design are assembled from them.*

This scheme is one way for delivering fuel materials to the EU from Russia, which accounts for around a quarter of such deliveries in various proportions – both natural and enriched uranium, and fuel elements and final fuel. The return of nuclear fuel waste described by the media from Germany to Russia clearly constitutes a very insignificant percentage compared with deliveries of these materials from Russia to the EU.

Therefore, it is difficult technically to classify these operations as deliveries of critically important goods of dual purpose for Russia, which may assist Russia in continuing the war in Ukraine, especially that existing juridical procedures evidently do indeed make an exception for them.

Nevertheless, such operations are an example of the extensive network of close cooperation ties between Rosatom and the European nuclear industry. The very existence of this mutual dependence is undoubtedly a factor that restrains the EU from applying sanctions against the Russian nuclear sector and supporting Ukraine.

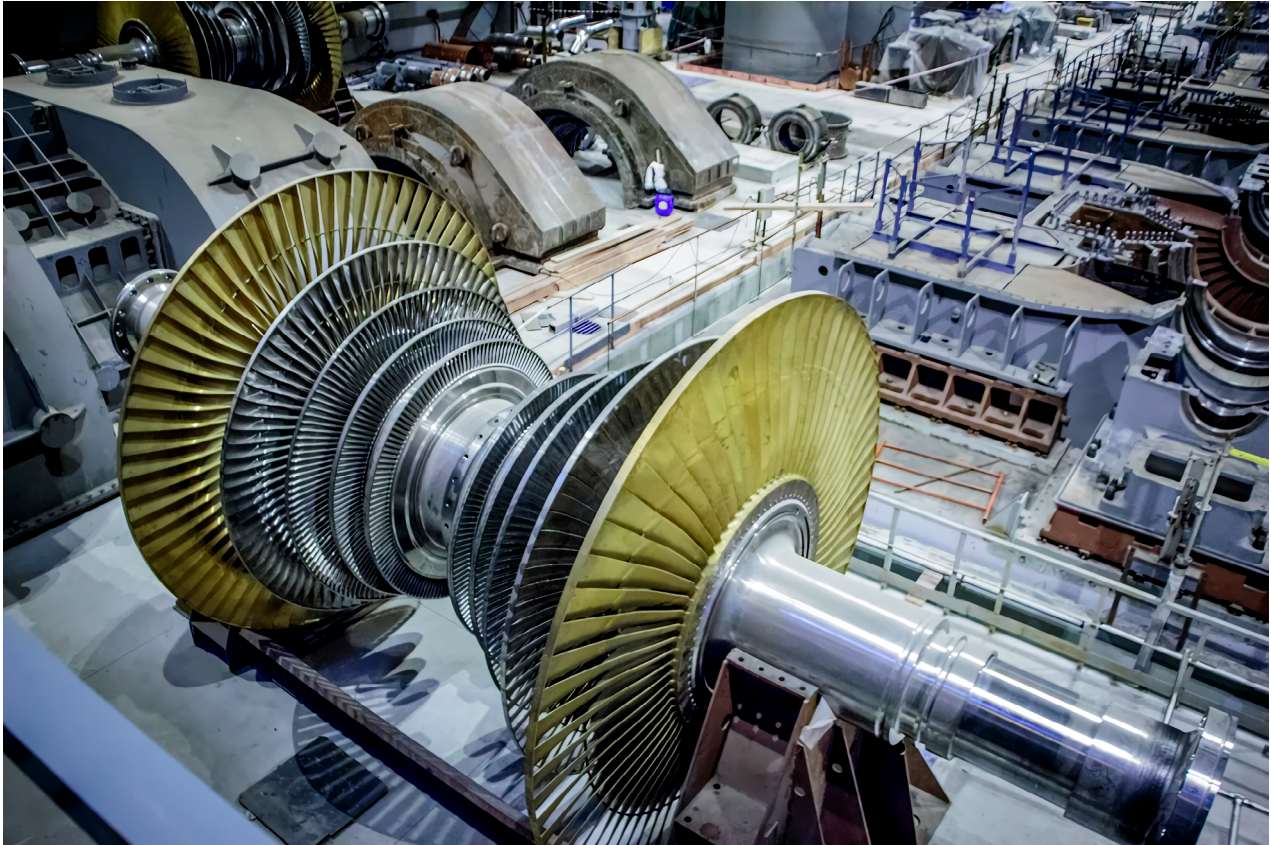
Bellona believes that this dependence should be stopped, as it presents a clear threat for the EU against the backdrop of the Kremlin's aggressive policies.

Events in the Russian nuclear industry and in Rosatom projects abroad

Problems with Russian turbines for VVER-1200 reactors, and Russian tensioners instead of German ones

On 12 November, unit 5 of the Leningrad NPP was disconnected from the grid automatically as part of the turbogenerator protection system. This is the second time the unit has shut down this year, and the cause was damage to the low pressure cylinder blades of the high-speed steam turbine manufactured by “Silovye Mashiny”. After the first shutdown in summer, the blades in the turbine were replaced, but the situation repeated itself. At other NPPs there have not been any problems with these turbines.

In Russia, a total of four high-speed K-1200 turbines are in operation, manufactured in 2010–2013. These turbines were installed on two new units of the Leningrad NPP-2 and put into operation in 2018 and 2020, and at two units of the Novovoronezh NPP-2 (VVER-1200): unit six has worked since 2016, and unit seven since 2019. Additionally, two K-1200 turbines manufactured in 2015 and 2017 are installed on two units of the Belarussian NPP. A total of eight such steam turbines have been manufactured (two are intended for the Rooppur NPP).



Rotor and blades of the low-pressure cylinder of the turbine of unit 2 of the Leningrad NPP-2 during assembly, 2018

Credit: Rosatom

In 2024, the KMZ holding (Kingisepp Machine Building Plant) plans to make the first Russian model of a [stud tensioner](#) – a mechanism for sealing nuclear reactor vessels – for NPPs built according to Russian projects. These items were previously purchased from the German company [Siempelkamp](#), and in Soviet times were manufactured at the Izhorsky plant (from 2012, the Izhorsky plant produced [tensioners for VVERs](#) of joint development with the German firm Siempelkamp Tensioning Systems (STS)).

"At present modernization of the German tensioner is underway. This involves full re-engineering, replacement of software and switching to our own components," the managing director of the KMZ holding Mikhail Danilenko stated in an interview. He says that for nuclear reactors the holding is presently manufacturing tensioners of several types: from a main tensioner with a diameter of five meters to an auxiliary one-meter. For the development and manufacture of tensioners, which could replace the production of the German company Siempelkamp, KMZ has signed [contracts](#) with the Russian Export Center and the Ministry of Industry and Trade.

At present around half of Russian NPPs have equipment from the German firm installed. The cost of tensioners that are planned for export to nuclear power plants in Turkey, Kudankulam (India) and Buzher (Iran) are valued at 2.4 billion rubles. Contracts should be implemented in the next four years. The KMZ has also signed an [agreement](#) with the Elektrokhimpribor combine, part of Rosatom, for delivering tensioners for NPPs build by Atomstroieksport abroad. According to a preliminary assessment, the sum of contracts for the affiliated company of Rosatom will be 10 billion rubles over the next 10 years.

Commentary by Bellona: *The Russian nuclear industry is capable of manufacturing practically all components for NPPs independently, but is not so strong in manufacturing steam turbines for NPPs. In the Soviet period and even until recently (such as the Rostov NPP, with its four units put into operation in 2001-2018), a significant percentage of turbine equipment was manufactured at the Turboatom plant in Ukraine.*

Export projects of Russian NPPs, primarily the VVER-1200 project, allow the customer to choose turbine equipment of both Russian and foreign models. The first option is used within Russia and in a number of NPPs abroad in countries with difficult relations with the West – such as NPPs in Iran and Belarus. Additionally, Russian turbines were delivered to NPPs in India and to early projects of Russian NPPs in China.

However, for most foreign NPPs built by Rosatom, foreign turbines are delivered, mainly Arabelle turbines of French productions – for NPPs in Turkey, Egypt, Hungary. China, where Rosatom is building 4 VVER-1200 reactors, has preferred to use its own turbines.

Thus, the involvement of the western company Alstom Power Systems (owned by the French Alstom, previously owned by General Electric from 2016-2022) allowed Rosatom to increase the competitive advantages of its foreign projects and win tenders for new NPPs in third-party countries, including those with good relations with the West.

Attempts by Rosatom to create its own high-quality world-class equipment without the use of western technologies will take time, if it is even possible at all. The same goes for tensioners, which it plans to manufacture in Russia completely independently, without the involvement of German companies.

Rosatom consolidates assets for expanding transport capabilities on the Northern Sea Route and beyond

On 8 November, Russian President Vladimir Putin signed a [decree](#) to transfer to Rosatom 92.4% of assets in the [Far East Shipping Company](#) (DVMP), the head company of the [FESCO](#) group, one of the largest logistic transport companies in Russia with assets in port, railway and integrated logistic business.

In early 2023, this share package was confiscated by the state after the co-owner of FESCO Ziyavudin Magomedov was sentenced to 19 years in a maximum-security prison on 1 December 2022 on [charges](#) of creating a criminal group and embezzling billions in budget funds. In his turn, Magomedov [accused](#) his partners and management of a “hostile takeover of the group”. In September 2023, Magomedov filed a [lawsuit](#) in a British court against the former managers of FESCO, its present and former shareholders, and also Transneft and Rosatom, accusing the plaintiffs of a “global conspiracy” with the aim of appropriating their property for the state and for themselves.

Rumors on FESCO [joining](#) Rosatom were first heard three years ago, but at that time this only concerned [agreements](#) on joint management of the Vladivostok sea trade port (part of the DVMP) through a managing company. At that time Rosatom was already the [operator](#) of the Northern Sea Route (NSR), and FESCO provided over 30% of cargo transportation (or over 10,000 tons) for NPPs under construction abroad.

This is not the first asset of Rosatom connected with container transportation. Since 2022, Rosatom has also [owned](#) 49% of assets in the Delo Group, which manages sea container terminals in the Azov-Black Sea, Baltic and Far East basins, a network of railway container terminals, and a depot of containers and fitting platforms.

The transport and logistic side of the group’s business includes the intermodal container operator Transcontainer and the multimodal transport operator Ruskon. On 8 November it was [reported](#) that the head company of the group, Delo Management Company, would be headed by Rosatom business development director Ekaterina Lyakhova, and that Transcontainer, one of the group’s key assets, would be run by a manager with a long history of working in Rosatom structures.



The first transit shipment with cargo from the FESCO group of 65 containers dispatched on the nuclear light carrier ship "Sevmorput" on the route St. Petersburg – Vostochny port – Petropavlovsk-Kamchatsky by the Northern Sea Route. June 2023
Credit: Fesco Group

Additionally, on 20 October Rosatom and DP World (Dubai, UAE), one of the main international operators of sea terminals and a supplier of logistic and other services, [created the joint enterprise](#) International Container Logistics. 51% of the enterprise will be owned by the Rosatom subdivision and 49% by the Russian division of DP World. In June 2023 Rosatom and the DP World company signed an [agreement](#) on joint development of Euro-Asian transport logistics and container transportation on the Northern Sea Route.

Commenting on the transfer of DVMP shares on Russian television, Rosatom general director Aleksey Likhachev [stated](#) that Rosatom was carrying out the functions of the single infrastructural operator of the NSR, responsible for icebreaker support of the fleet, and that it also had the task to manage all sea movement on the NSR and take responsibility for a section of northern transportation. He noted that Rosatom had been entrusted with the task of creating a new global logistics corridor on the NSR, which would compete with other world logistic chains.

"Our task is to reassign a considerable amount of global sea transportation between the growing economies of Asia, South East Asia, and the conservative but sufficiently large market of Europe," he added. "This is difficult to achieve without our own logistic asset. We have this experience, and the company Delo has a very serious alliance with us, but this mainly involves land transportation. But for sea transportation, FESCO occupies a very large percentage of the global market, it is an absolutely dominant [company] in the interests of Russian transportation".

For 2023 Rosatom expects to set a [record](#) for transit cargo on the NSR. The previous record was set in 2021, when transit cargo reached 2 million tons, but in 2022 it dropped by 90%. Rosatom therefore held "systematic work with companies", for example with Gazprom Neft, proposing that it move part of its cargo flow to the NSR, especially as it is moving into Chinese markets. At the same time, transportation on the Northern Sea Route is on average [more expensive](#) than by other routes.

Commentary by Bellona: *Ongoing events and Rosatom's active work on the Northern Sea Route show that the Arctic region and everything that takes place amounts to a geopolitical task and goal which Russia intends to realize in the near future. For Rosatom, which has been entrusted with practically all management and the majority of the Arctic resources, these decisions are a sign of maximum trust on Putin's part.*

It is noteworthy that, there are practically no major "nuclear tasks" that need to be solved in the Arctic. Plans to build a floating NPP on the Arctic coastline so far only remain on paper. The increase in construction of nuclear icebreakers against the background of climate change and the reduction in ice cover raises many questions. The coastal nuclear legacy over the past 20 years has significantly decreased.

For a long time, discussions were held about who should be entrusted with raising and eliminating the sunken and submerged nuclear legacy. Rosatom initially refused to take a leading role in this project, but international interest and financing became decisive factors for its participation in the project.

However, now that international partners have left all Arctic projects, it is likely that the emergency ministry in cooperation with the navy may be entrusted with raising and eliminating these objects. Rosatom at present is mainly dealing with logistical tasks of global and regional sea transportation.

It is notable that Rosatom is increasingly interested in the prospect of its involvement in mineral production in the Arctic zone. This is shown by activation of the project for mining lead-zinc ores at the Pavlovskoe field on Novaya Zemlya, Rosatom's interest in acquiring a gold-mining product in the Irkutsk Oblast, the agreement signed by the Rosatom structure with the government of Chukotka on cooperation in developing the Savino field, and others.

Rosatom reports completion of scrapping Lapse nuclear service ship

Rosatom has [announced](#) the end of the ten-year procedure of scrapping the Lapse nuclear service ship, which provided support for the first nuclear icebreakers, and which contained spent nuclear fuel which had presented a considerable environmental risk to the region for many years. The last block containing deactivated fragments of the vessel was placed in the storage facility for reactor sections in Saida Bay.

The Lapse cargo ship, built in 1934, was [reequipped](#) as a floating maintenance base in 1961. Until 1981, the base carried out recharging of nuclear fuel for reactors of nuclear icebreakers. Since 1981, Lapse was used only for storage of spent nuclear fuel and radioactive waste. In 1988, the base was decommissioned. A study of the vessel and development of a [project for scrapping](#) it began in 2005.

Realization of this project was [financed](#) both by the federal budget and with international technical assistance. In 2012, radiation and engineering inspection of the vessel and its storage facility was carried out, and the vessel was also towed from the Atomflot enterprise to the Nerpa coastal ship repair yard for subsequent scrapping.

The main [source](#) of radioactive hazard of the Lapse floating base is its storage facility of spent nuclear fuel (SNF). Work on unloading and removing SNF from the base – 639 fuel assemblies, some of which were damaged (which means they could not be extracted from the vessel by ordinary means) – required special technical solutions from specialists of the nuclear sector. From 2012 to 2017, the Lapse floating base was gradually dismantled, and SNF was removed for processing.



Lapse floating maintenance base on the staple slab of the ship repair yard, 2014

Credit: Bellona Archive

The head of projects of international technical assistance at Rosatom, Anatoly Grigoriev, [commented](#) that scrapping Lapse had cost around 60 million Euros; "55 million came from the European Bank of Reconstruction and Development, and we provided the rest".

The Bellona Foundation (Oslo, Norway) and the Russian offices of Bellona (St. Petersburg, Murmansk) [paid great attention](#) for over 25 years to the "Lapse Project", which was initiated in 1994.

Commentary by Bellona: Indeed, for almost 20 years Rosatom has been cleaning up the Arctic coastline, and the project for scrapping Lapse continued for almost 30 years. It may be considered that the project began in 1994, when Bellona wrote its "black report", and at the Murmansk maritime shipping department (which was at that time in charge of the Lapse floating base) a conference was organized on board the Sibir nuclear icebreaker.

The conference was attended by the commissar for the European society for environmental protection issues Ioannis Paleokrassas, the Norwegian environmental minister, and experts of the European Community, including representatives of the European Foundation for Technical Assistance to CIS countries (TACIS) and the European Commission Directorate General XI (DG XI).

Rosatom believes that practical implementation of the project for scrapping Lapse began only in 2010, i.e. from 1994 to 2010 negotiations and agreements were conducted. It should be noted that during this time (1994-2010) around one hundred submarines were scrapped that had been decommissioned from the Northern and Far Eastern fleet, including nuclear-powered submarines with damaged reactors with melted cores.

Lapse continued to be moored in the waters of densely-populated Murmansk and waited its turn to be scrapped. It is not clear how scrapping Lapse differs technically from scrapping many nuclear submarines with problematic cores, icebreakers and other such objects.

The completion of scrapping Lapse was accompanied by ceremonial speeches and events. Bellona was not present at these events, but many people, including in Rosatom, know and remember Bellona's role and involvement in this project.

Last fuel unloaded from RBMK-1000 reactor of unit 1 of Kursk NPP

On 21 November 2023, the first stage of preparation was [completed](#) for decommissioning unit 1 of the Kursk NPP with a RBMK-1000 reactor: the last spent fuel assembly was removed from the reactor core. Unit 1 of the Kursk NPP was [shut down](#) on 19 December 2021, and spent fuel began to be [removed](#) in July 2022. Part of the unloaded fuel was sent for "afterburning" to reactors of the operating units 3 and 4 of the Kursk NPP, and the rest will be sent to a stationary storage facility for spent nuclear fuel.

Previously, in 2021 and 2023 at the [Leningrad NPP](#) specialists extracted the last fuel assemblies from reactors of units 1 and 2 with RBMK-1000 reactors (the units themselves were shut down after 45 years of operation in 2018 and 2020).

Commentary by Bellona: RMBK reactors of the first generation from the first units of the Leningrad and Kursk NPPs are being gradually shut down after they have completed their resource of 45 years. At present, there is no plan or technologies for decommissioning such uranium-graphite high-capacity reactors. This nuclear legacy of the USSR still remains to be eliminated safely. Reactors of the same type were shut down some time ago at the Chernobyl NPP in Ukraine and at the Ignalina NPP in Lithuania. Bellona experts are observing the process of decommissioning the latter reactor and visited it in 2023. Experience of this work may be useful for all the countries concerned, but during the war in Ukraine cooperation of these countries with Russia is not possible.

We may add that the Russian NPPs with RMBK reactors are the closest ones to Europe, 60-70 km from the borders of Ukraine (Kursk NPP) and Estonia (Leningrad NPP). At these NPPs, operation of the newer units continues, with two RMBK-1000 reactors of the second generation. In early 2023, Rosatom decided to [extend](#) their service period by another 5 years to 50 years, as it will [not manage](#) to put replacement facilities into operation in time.



Final shutdown of unit 1 of Kursk NPP with a RMBK-1000 reactor after 45 years of operation on 19 December 2021.

Credit: Rosenergoatom

Development of the Paks-2 NPP project in Hungary: visit by the head of Rosatom, new suppliers of fuel and delivery routes

On 14 November, Rosatom general director Aleksey Likhachev and the Hungarian minister of foreign affairs and trade Peter Szijjártó [visited](#) the construction site of the Paks-2 NPP. At their meeting, the construction schedule was determined for the power units at Paks-2 in the coming years. Szijjártó noted that Paks-2 is an international project, "besides the Russian general contractor, 94 Hungarian companies, and many US, German, French, Swedish and Austrian contractors are involved."

On 20 November, Vitaly Polyanin was [appointed](#) director of the Paks-2 NPP project – the vice-president of the Atomstroieksport company, who was in charge of construction of the Belarussian NPP.

Meanwhile, deputies of the Hungarian national parliament supported an according amendment to the [strategy](#) for nuclear energy proposed by the Hungarian government, where it was decided if the need arises to examine possible options for substituting fuel from Russia, which is now the sole supplier for the Paks NPP. For this purpose, a provision was added to national legislation stating that "the nuclear power plant may use new, alternative fuel from another manufacturer, including in the time of the extension of its operation period."

Speaking at a parliament session, state secretary of the energy ministry Attila Steiner noted that only Rosatom enterprises could currently manufacture fuel assemblies for NPPs, so Hungary was interested in their not being subject to sanctions. At the same time, Steiner confirmed that in accordance with the general policy of the EU, Hungary would strive to diversify deliveries of energy sources, and that this principle also applied to nuclear power. Guided by this approach, the Hungarian Energy Ministry signed a [Memorandum on Cooperation](#) with the French corporation Framatome in September for the operation and fuel supply of nuclear power plants.

Historically, all fuel for the Paks NPP has been supplied by Russia. However, the war in Ukraine made changes to the routes of these deliveries. Before the war nuclear fuel was delivered to Ukraine by railway through Ukraine. But after the outbreak of the war, fuel was delivered by air, even after a ban on air transportation for Russian airlines, and then a [Black Sea route](#) was agreed on with transit through Romania.

On 8 November, Peter Szijjártó [reported](#) after a meeting in Bucharest with Romanian Energy Minister Sebastian Burduja that Hungary would continue to transport nuclear fuel for the Paks NPP through Romanian territory. Fuel is transported by special boat under the guard of military vessels to the Bulgarian port of Varna, where it is loaded on to a train and transported through Bulgaria and Romania to Hungary.



Paks-2 NPP construction site.

Credit: Peter Szijjártó's Facebook page

Commentary by Bellona: Paks-2 remains Rosatom's sole ongoing project for building an NPP in the EU. The project, despite a delay of at least two years during the war in Ukraine and a number of changes arising from agreements within the EU and solved to a large degree with the assistance of France, is nevertheless moving to the active construction stage. Nevertheless, Hungary, perhaps under pressure from other EU members, is making a number of concessions. Previously, despite statements by Hungarian officials that no sanctions against the Russian nuclear sector were acceptable, Hungary has still agreed on a number of sanctions against Rosatom enterprises (including Atomflot).

The decision of the Hungarian parliament on the possible use of an alternative to Russian fuel at the Paks NPP may be one of these concessions. However, the parliament has only granted the plant the legislative right to select another supplier in future. Whether the NPP operator will make use of this right remains in question.



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