

Rosatom's role in the war in Ukraine

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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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Rosatom's role in the war in Ukraine

As the Russian invasion of Ukraine lurches into its second year, Moscow's troops and artillery continue their all-out assault on Kyiv's energy infrastructure, causing continued blackouts and general instability. That this is the precisely the Russian military's intention has been widely reported.

What has been less discussed is the role that Rosatom, Russia's powerful state nuclear corporation, has played in these assaults. From the early war seizure of the Chernobyl site to the full takeover of the Zaporizhzhia nuclear power plant in Ukraine's southeast, to occasional threats from the Kremlin to consider using the nuclear arsenal Rosatom has a hand in building and maintaining, the corporation is complicit in some of the most startling development the war has thus far produced.

This is a role the corporation at first resisted. In the early days of the war, when Russian troops overran Chernobyl, shelled a research reactor in Kharkiv, and waged a campaign to besiege Ukraine, and Europe's, largest nuclear power plant, Rosatom was at pains to create distance between itself and the war — stating several times that its staff was uninvolved in any of these events.

But as more and more Ukrainian nuclear sites came under attack, Rosatom's fingerprints on the aggression have grown more detectable. By now, the putatively civilian corporation has cosigned the world's first-ever military takeover of a nuclear power plant, creating,

at the order of President Vladimir Putin, a subsidiary to run the besieged station from Moscow despite Kyiv's continued claim on it. Throughout, Ukrainian and Western media have reported that plant workers have been detained and tortured by Russian occupiers as part of an effort to induce them to sign work contracts with Rosenergoatom, Rosatom's nuclear utility wing.

The rank and file who don't join the Russian state firm are fired or threatened with conscription into the Russian army, while higher level officials, like the plant director, have been kidnapped and forced to confess to collaborating with Ukrainian partisans on Russian national television — if, indeed, they are heard from again.

The plant's latest director, Yuriy Chernichuk, who was formerly the complex's chief engineer, was elevated to the top post by Rosatom and has been hailed by Renat Karchaa, a shadowy Rosatom advisor in Ukraine, as a "courageous" choice. But it is impossible to say whether Chenrichuk took the post voluntarily or is doing the job with a literal gun to his head.

Last summer, the plant was the focus of particularly heavy shelling that repeatedly cut it off from outside power, leaving it to rely on diesel backup generators to keep its reactor cooling and safety systems operating. Witness reports from Ukrainian workers have since suggested that Rosatom staff at the plant helped guide those attacks as part of an effort to permanently isolate the plant from the Ukrainian grid.

By December Rosatom was being less coy about its involvement at the plant. In a New Year's video address, Rosatom CEO Aleksey Likhachev congratulated the corporation's 289,000 employees for volunteering their help to the residents of Enerhodar, the company settlement of the Zaporizhzhia plant's formerly-11,000 strong staff. It was a winking inclusion of the hostage city's residents among the corporation's number.

There is also reason to believe that Rosatom is helping weapons makers in Russia evade western sanctions by supplying them with materials they used to procure internationally. A January report in the *Washington Post* suggests that numerous Rosatom subsidiaries are able to supply components to missiles, tanks and other weaponry that are otherwise embargoed from the Russia market.

Indeed, in his address on the 15th anniversary of Rosatom, Putin himself hailed Rosatom for its "huge contribution [...] to developing advanced weapons systems and military hardware and putting them on combat duty."

More recently, the plant has been visited by a host of high-ranking Rosatom officials, the most of senior of these being Sergei Kiriyeenko. A former CEO of Rosatom, Kiriyeenko now heads the corporation's nine-member supervisory board, to which Likhachev and other executives answer. He also serves in the administration of Vladimir Putin, where he is the first deputy chief of staff — all evidence that Rosatom's involvement in the war is far from accidental. Clearly, questions about what will happen with Ukraine's nuclear industry should Moscow's war effort prove to be victorious are being discussed at the highest levels in the Kremlin.

In this sense, it is not surprising that a corporation as politically important as Rosatom would be deeply enmeshed in Moscow's war effort. What is surprising is how reluctant the West has been to place Rosatom on the same footing as other Russian energy giants that have been the target of sanctions and other forms of political redress from governments supportive of Ukraine.

For it is important to bear in mind that the attempted-theft of an entire nuclear power plant, the holding hostage of its employees, the sacking of the Chernobyl site, and the brute dismantlement of other energy infrastructure necessary for Ukraine's nuclear power plants to safely function, is all being undertaken by — or with the complicity of — one of the largest and most successful nuclear corporations in the world.

There are currently 18 Russian or Soviet designed nuclear power plants running in the European Union, giving Moscow considerable leverage over their continued operation. For instance, Soviet-built VVER 440 reactors supply more than half the power consumed in Slovakia and Hungary. The vast majority of these Europe-based plants depend on Rosatom for fuel deliveries, as well as reprocessing of that fuel when it has been used. The United States, for its part, depends on Rosatom for about one-quarter of its enriched uranium supplies.

Overall, Rosatom controls about 30 percent of the global market for uranium enrichment and 17 percent of the market for reactor fuel, and out of the approximately 450 nuclear power plants around the world, about 20 percent of them are Russian- or Soviet-designed.

And there are yet more plants on the way. The corporation is currently building 23 nuclear power units across the globe, including in Hungary, India, Turkey and Egypt, with its foreign order book standing at \$200 billion. All the while, Rosatom is holding an entire nuclear power plant hostage while advancing the fiction that it is a purely civilian entity.

Indeed, the only country where Rosatom traditionally does business that has entirely turned its back on Russian-supplied nuclear technology since the war began is Ukraine. In March of 2022, Kyiv resolved to refuse any further orders for Rosatom produced nuclear fuel, and has since worked to develop the cooperation it has with Westinghouse for any future fuel orders. Likewise, the World Association of Nuclear Operators has also transferred Ukraine's Energoatom from the Moscow Center to the Paris Center.

But it's important to bear in mind that sanctions against Rosatom are neither impossible nor opposed by many nations. The many of those in the European Union seem inclined to pursue them, but that goal has been repeatedly thwarted by Hungary. That, however, shouldn't prevent nations within the bloc from imposing sanctions on their own. In fact, Finland, before sanctions against Rosatom were even being discussed, managed to cease all interactions with Rosatom on its own by withdrawing from the Hanhikivi nuclear power plant project it was undertaking with Moscow.

Still, the web of dependence on Rosatom, its fuels and its services remains complex. But as the current circumstances illustrate, dependence on them will be fragile and morally fraught so long as the current war continues — if not for far longer.

Our Goal with this report

It will be the purpose of this report to document Rosatom's participation in increasing the nuclear threats throughout the war in Ukraine, beginning with the earliest incursions against Chernobyl and Zaporizhzhia through the present day. We will examine these events chronologically and analyze how each contributes to the portrait of Rosatom in its newly militarized role.

It must be said that with this chronology we are only presenting evidence of Rosatom's presence in the events described. Rosatom is not, for instance, directly responsible for the shelling that has plagued Ukraine's energy infrastructure or that has isolated the Zaporizhzhia plant on the war's front lines, and we do not believe that Rosatom had a hand in Putin's decision to attack.

But there is value in noting where Rosatom has benefitted from or facilitated such events. Far from being an innocent bystander, Rosatom has played a clear role in securing the Zaporizhzhia station, and should the plant ever be connected to the Russian grid, it will be Rosatom personnel that oversee it. While Rosatom may not have fired any weapons in the conflict, it is reaping the spoils of that violence.

It is our hope that this report will give Western governments a better understanding of Rosatom's wartime activities — as well as their own interactions with the corporation as the nuclear threats become more dire.

Brief overview of nuclear installations in Ukraine

Ukraine operates 15 Soviet- and Russian-built nuclear reactors arrayed across four nuclear power plants — the Rivne, South Ukraine, Khmelnytsky and Zaporizhzhia — which prior to the outbreak of war supplied about 52–55 percent of electricity used in the country. This made Ukraine second only to France among European countries in terms of the total share of electricity generated by nuclear. The widescale destruction of Ukraine's electrical infrastructure, combined with hot and cold shutdowns of many reactors, has significantly reduced that output.

All of Ukraine's reactors are Russian-designed VVER types, two being upgraded 440 MWe V-312 models and the rest the larger 1000 MWe units — two early models and the rest V-320s.

In addition to those there are three decommissioned RBMK reactors at the Chernobyl nuclear plant, site of the world's worst nuclear disaster. The remains of Unit 4 reactor, which exploded in 1986 and was subsequently protected by a cement sarcophagus, has been covered by an enormous shelter called the New Safe Confinement, since 2016. This hermetically sealed building allows engineers to remotely dismantle the remains of the reactor, enabling the eventual removal of the fuel-containing materials in the reactor building and accommodate their characterization and packing for disposal.

Chernobyl's Unit 1 is in the process of being decommissioned; Unit 2 was closed in March 1999 and Unit 3 was closed in December 2000. Units 5 and 6 were under construction at the time of accident but were never finished.

The Chernobyl site also houses three storage facilities for spent nuclear fuel — the ISF-1, an interim cooling pool for spent fuel from the derelict plant's Units 1–3 reactors; ISF-2, which provides 100 years-worth of dry storage for those spent fuel assemblies; and the Centralized Spent Fuel Storage Facility, designed to hold in dry storage used fuel from the Rivne, Khmelnytsky and South Ukraine nuclear power plants.

Though Energoatom says the facility is ready to accept fuel, prohibitions on transporting nuclear materials within Ukraine imposed as a result of the war have delayed the CSFSF's opening. The site also houses a treatment facility for treating liquid radioactive waste, as well as an industrial complex for solid radioactive waste management.

Ukraine also operates two research reactors — one at the Kyiv Nuclear Research Institute and the other at the Kharkiv Institute of Physics and Technology. A third, located in Sevastopol, ceased operations in 2014 following Russia's annexation of Crimea, though is still recognized by the IAEA as a Ukrainian facility.

Chronology

From the earliest days of the invasion, capturing or attacking Ukrainian nuclear infrastructure seemed to be a priority for Moscow. We have here compiled a chronology of these incursions, as well as corresponding interventions by the IAEA, for each of Ukraine's most important nuclear installations. To avoid confusion, the events are grouped according to the site where they occurred.

Chernobyl

24 February 2022 — Ukraine informs the International Atomic Energy Agency that Russia troops have occupied the Chernobyl site.

25 February 2022 — Following reports of higher radiation measurements at the Chernobyl site, Ukraine's regulatory authority stated that they may have been caused by heavy military vehicles stirring up soil still contaminated from the 1986 accident. The readings reported by the regulator – of up to 9.46 microSieverts per hour – are low and remain within the operational range measured in the Exclusion Zone since it was established, and were therefore judged by the IAEA to not pose any danger to the public.

27 February 2022 — No increase in ambient dose rate was detected in European countries, according to European Radiological Data Exchange Platform (EURDEP).

5 March 2022 — The State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) reported to the IAEA that staff at the Chernobyl nuclear plant has been onsite since 23 February without being able to rotate shifts for either technical personnel or guards.

9 March 2022 — SNRIU informed international partners that the Chernobyl plant had been disconnected from the electricity grid and lost its supply of external power. The SNRIU reported that backup diesel generators were running and had 48 hours of fuel.

13 March 2022 — The Ukrainian state nuclear operator Energoatom announced that two of the damaged electricity lines were now repaired and delivering all required off-site power to the Chernobyl plant.

20 March 2022 — The SNRIU confirmed that around half of the staff at Chernobyl nuclear plant, who had been forced to work a marathon shift after the invasion, had been able to rotate and return to their homes for the first time since 23 February.

31 March 2022 — The Russian forces that had been in control of the Chernobyl plant since 24 February had, in writing, transferred control of the NPP to Ukrainian personnel. Ukraine subsequently informed the IAEA that during the occupation the site's analytical laboratories for radiation monitoring had been destroyed and analytical instruments stolen, broken or otherwise disabled.

Upon their departure it was discovered that Russian troops had also dug trenches in the so-called "Red Forest," a stand of woods in the most radioactively contaminated part of the Chernobyl exclusion zone, causing spikes in radiation.

26 April 2022 — IAEA Director General Rafael Mariano Grossi arrived in Ukraine with experts from the agency to "conduct nuclear safety, security and radiological assessments, deliver vital equipment and repair the agency's remote safeguards monitoring systems at the Chernobyl site."

2 December 2022 — An IAEA delegation visited the site during the week of 25 November to provide on-site assistance and support in nuclear safety and security.

18 January 2023 — the IAEA "Support and Assistance Mission in Chornobyl" began its work at the site.



Chernobyl. Packages of Russian field ration left at the Red Forest
Photo: State Border Guard Service of Ukraine

https://en.wikipedia.org/wiki/Capture_of_Chernobyl

Zaporizhzhia

2 March 2022 — Russian officials inform the IAEA that their forces have taken control of the area surrounding the Zaporizhzhia nuclear plant in Southeastern Ukraine.

4 March 2022 — The Zaporizhzhia nuclear power plant was shelled but the resulting fire was extinguished and had no impact on essential equipment. The plant management was now under orders from the commander of the Russian forces that took control of the site. There was no reported change in radiation levels at the plant and the six reactors were not affected.

18 May 2022 — On a visit to Russian-occupied territories in eastern Ukraine, Russian Deputy Prime Minister Marat Khusnullin declares that Ukraine would be made to pay for electricity produced by the Zaporizhzhia plant. Should Ukraine oppose that, Khusnullin added, the plant's electricity would be used in Russia instead.

27 June 2022 — The first reports emerge in Western media alleging possible torture of staff at the Zaporizhzhia plant by Russian troops as they ferret out supposed saboteurs. "People are being abducted en masse," Orlov the ousted Ukrainian mayor of Enerhodar, the plant's home city, told the Wall Street Journal. "The whereabouts of some of them are unknown. The rest are in very difficult conditions: They are being tortured and physically and morally abused."

25 August 2022 — Energoatom reports that its staff continue to operate the facility, but under extremely stressful conditions. Additionally, the nuclear safety regulator SNRIU has indicated that it is no longer in a position to oversee nuclear safety at the site.

25 August 2022 — Reports highlight that two of the four high voltage (750 kV) offsite power lines to the site were damaged. Another high voltage line is on standby. The operator informed the IAEA that the plant's off-site power needs could be provided with one power line and that diesel generators were also ready and functional to provide back-up power if required. Plant staff continued carrying out work on connecting power units No. 5 and No. 6 of the Zaporizhzhia nuclear power plant to the electricity grid, connecting one on 26 August.

26 August 2022 — As a result of the power outages, the last two operating reactor units were disconnected from the electricity grid and their emergency protection systems were triggered; all safety systems remained operational.

1 September 2022 — A team of inspectors from the IAEA arrived at the Zaporizhzhia plant. The IAEA assessed the physical damage to facilities, determined the functionality of the main and back-up safety and security systems, evaluated the working conditions of the control room staff, and undertook safeguards activities. IAEA Director General Rafael Mariano Grossi said that it was "obvious that the plant and the physical integrity of the plant has been violated several times." Four IAEA inspectors remain onsite.

6 September 2022 — The IAEA published a report on the current state of the plant's safety and security. The IAEA noted: "The presence of Russian military personnel, vehicles and equipment at various places [at the plant] including several military trucks on the ground floor of the unit 1 and unit 2 turbine halls and military vehicles stationed under the overpass connecting the reactor units."

7 September 2022 — Renewed shelling in and around Zaporizhzhia damaged a back-up power line between the power plant and a nearby thermal power station.

12 September 2022 — Based on information provided by Energoatom to the SNRIU, in the early hours of 11 September Unit 6, the last operating reactor at the site, was disconnected from the power grid. Shortly afterwards, a back-up power line was restored, allowing for an external electricity supply to enable the cooling and transition to the "cold stop" state.

13 September, 2022 — The last reactor at the Zaporizhzhia nuclear power plant that had continued operating entered a cold shutdown state. The reactor was shut down after the restoration of a 330 kilovolt (kV) power line which enabled the plant to access electricity from the grid. A 750/330 kV line has now also been restored and it is being used to provide the plant with power required for its safety functions, with the restored 330 kV line held in reserve. The IAEA reports that the two restored lines can both receive power from the grid through the switchyard of a nearby thermal power station.

15 September 2022 — The IAEA passes a resolution demanding that Russia cease its occupation of the Zaporizhzhia plant, which Russia and Rosatom ignored.

16 September 2022 — A regular 750/330 kilovolt (kV) power line to the national grid was restored and was being used to provide the plant with power required for its safety functions.

18 September 2022 — A backup power line to the Zaporizhzhia nuclear power plant was disconnected for reasons as yet unknown. The line is used to supply the plant with the electricity necessary for the cooling of the units in cold shutdown, should the regular line fail.

30 September 2022 — A blast from an apparent land mine damaged a 6 kilovolt (kV) cable, which provides power for some plant operations, just outside the ZNPP perimeter fence. According the IAEA, the explosion did not directly affect the plant's safety systems.

3 October 2022 — According to reports from Energoatom, the Director-General of the ZNPP, Ihor Murashov, was detained by Russian personnel.

4 October 2022 — Energoatom confirms that Murashov has been released after being forced to record a confession for Russian state television, in which he said he was collaborating with Ukrainian intelligence. The IAEA later reports that Murashov was allowed to leave Enerhodar and join his family in Ukraine-controlled territory.



Zaporizhzhia nuclear plant

Photo: Maxim Gavrilyuk at Ukrainian Wikipedia

https://commons.wikimedia.org/wiki/File:Zaporozhje_AES.jpg

5 October 2022 — Russian President Vladimir Putin signed a decree declaring the ZNPP to be Russian federal property and ordered Rosatom to take over its operation. Rosatom subsequently created the Joint Stock Company Operating Organization of the Zaporozhye Nuclear Power Plant. Rosatom in a statement on its website said that the new company would be headed by Oleg Romanenko, who was previously chief engineer of Russia's Balakovo nuclear power plant. Ukraine's Ministry of Foreign Affairs described the statement as an "illegal attempt" to transfer operational control of the plant and said it was the latest in "a long line of crimes and violations of international law committed by Russia." It added that it considered the decree to be "null and void".

6 October 2022 — IAEA Director General Rafael Grossi says that the "position of the IAEA is that [the Zaporizhzhia nuclear] facility is a Ukrainian facility," setting the stage for international rejection of Moscow's claims to the plant.

18 October 2022 — The ZNPP's last remaining operational 750 kilovolt power line was reconnected. The connection had been disrupted three times in ten days.

19 October 2022 — According to reports from Energoatom, the Zaporizhzhia nuclear power plant's Head of Information Technology, Oleh Kostyukov, and Assistant to the plant's Director, Oleh Oshek, were detained by Russian personnel on Monday 17 October.

27 October 2022 — The IAEA reported that the Zaporizhzhia plant had over the past ten days been receiving power from the national grid without interruption. It also said that a second backup power line connecting the plant to a nearby thermal plant had been restored in recent days. The IAEA also highlighted changes to the operational command at the facility since Putin's October 5 decree claiming the plant as Russian federal property. The Agency said that the number of Russian technical staff at the site had increased and that they were now involved in "taking significant operational decisions". For example, Ukrainian operating staff had planned to restart unit 5, but it currently remains in a hot shutdown mode as Russian officials have not agreed to start it up again.

28 October 2022 — Negotiations by the IAEA with Russia and Ukraine to establish a safety and security protection zone around the facility begin and are still ongoing.

3 November 2022 — The plant's connection to both its main 750 kilovolt (kV) power line and its back-up off-site power supplies from a 330 kV line were cut. Diesel generators started operating automatically to supply the plant with the electricity it needs for the cooling of the units in cold shutdown.

19 November 2022 — Shelling caused damage in several places at ZNPP, including a radioactive waste and storage building, cooling pond sprinkler systems, an electrical cable to one of the diesel generators, condensate storage tanks, and to a bridge between a reactor and its auxiliary buildings.

24 November 2022 — The ZNPP reported that the facility's external power connection had been re-established, a day after it was disconnected.

30 November 2022 — Officials with Rosenergoatom, the Rosatom-controlled nuclear utility wing that oversees the operation of all Russian nuclear power plants, announced the installation of Yuriy Chernichuk as the Zaporizhzhia plant's new director. Whether this is a voluntary posting for Chernichuk remains in question. Since at least May, according to Energoatom, Chernichuk had been forbidden from leaving Enerhodar.

14 December 2022 — IAEA observers at ZNPP reported that the plant's 330 kilovolt (kV) back-up power line to the electricity grid, which had been disconnected the previous day due to shelling, was now restored.

28 December 2022 — Sergei Kiryenko, deputy chief of Putin's staff and head of Rosatom's supervisory board visits the Zaporizhzhia plant for "safety checks" and to check working conditions for what Russian media now call "Rosatom staff."

30 December 2022 — Nine mobile diesel-fueled boilers with power in the range of 1-6.5 megawatts (MW) were delivered to the plant to provide heating to the ZNPP site and to Enerhodar. The plant also has 20 diesel backup generators to supply the site with the electricity needed for all safety related equipment.

7 January 2023 — The ZNPP's 330 kilovolt (kV) back-up power line, which had been disconnected once more due to damage caused by shelling on 29 December, was reconnected. The plant continued to receive the electricity it needed for essential safety and security functions from a 750 kV main external power line.

3 February 2023 — IAEA Director General Rafael Mariano Grossi raised concerns over a recent reduction in water level of the Kakhovka Reservoir, which forms part of the Dnipro river and provides cooling water for the Zaporizhzhia plant. The large cooling pond next to the Zaporizhzhia plant is designed to stay above the level of the Kakhovka reservoir, meaning that the decreased water level does not pose an immediate threat to plant operations.

7 February 2023 — Rosatom's Ukraine-based official Renat Karchaa announces that a Russian-built safety structure meant to protect key facilities at the plant from shelling is "nearing completion."

10 February 2022 — IAEA Director Grossi met with senior Russian government officials in Moscow as part of ongoing efforts to establish a nuclear and physical safety protection zone at Zaporizhzhia. It was also reported that water levels in the Kakhovka Reservoir had fallen to their lowest in 30 years, with Ukraine's hydroelectric company, Ukrhydroenergo, claiming that Russian military forces are deliberately discharging water from the reservoir.

Also on 10 February 2023 — Energoatom issues the first reports that an unspecified number of nuclear workers from Russia's Kalinin nuclear plant have arrived to work at the Zaporizhzhia plant. Energoatom also says that Ukrainian workers at Zaporizhzhia are refusing to train the Kalinin workers to work on local systems. In the same release, Energoatom warned the Ukrainian workers that signing contracts with Rosatom would be construed as "direct aid" to the Russian occupants and would "destroy their own futures."

May 11 2023 — Russian forces announced plans to evacuate some 3,000 personnel from Enerhodar, most of which had signed contracts with the subsidiary of Rosatom that is operating the plant. The move ahead of a long-anticipated Ukrainian counteroffensive in the region was labelled as "potentially dangerous" by IAEA Director Grossi, and Energoatom said it would lead to a "catastrophic lack" of qualified personnel at the plant.

The Kharkiv Institute of Physics and Technology

6 March 2022 — The Kharkiv Institute of Physics and Technology, the site of an experimental nuclear reactor used for research and to produce isotopes for medical and industrial use, was damaged by shelling on 6 March and again on 25 June, but did not display any increase in radiation levels. The installation had been placed in a deep subcritical state ("long-term shutdown") mode on 24 February 2022.

25 June 2022 — Additional damage to the buildings and infrastructure of the site occurred affecting the ventilation systems and the main building of the installation, the cooling system of the accelerator's klystron gallery, the emergency power supply system diesel generators and the cladding of the installation's main building.

10 November 2022 — An IAEA mission to the Institute found that while it had been heavily damaged by shelling, there was no indication of any radiological release or diversion of declared nuclear material.



The Kharkiv Institute of Physics and Technology

Photo: Serhii Bobok

https://www.wikidata.org/wiki/Q4496359#/media/File:NSC_KIPT_2021_-_02.jpg



Khmelnytsky nuclear power plant

Photo: RLuts

https://upload.wikimedia.org/wikipedia/commons/f/f2/Khnpp_2013_-_2.jpg

Khmelnytsky nuclear power plant

12 September 2022 — Khmelnytsky NPP, which has two operational VVER-1000 reactors and two of the same model under construction, was inspected by the IAEA under the existing non-proliferation treaty between Kyiv and the UN. The inspection was carried out by inspectors of the agency with the participation of the SNRIU. The purpose of the inspection was to verify the absence of undeclared nuclear material and information on the design of the nuclear installation provided to Ukraine in accordance with the non-proliferation agreement.

15 November 2022 — Khmelnytsky plant's connection to the Ukrainian power grid was completely lost as a result of missile strikes. Units 1 and 2 were shut down and switched to providing their own needs from the backup diesel generators.

23 November 2022 — Energoatom reported that due to a decrease in the frequency in the power system of Ukraine the Rivne, South Ukraine and Khmelnytsky NPPs were all automatically disconnected from the grid.

9 December 2022 — An IAEA delegation visited the plant to assess its nuclear safety and security situation as well as any material needs.

23 December 2022 — The IAEA announced plans to deploy a team to the plant to provide technical support and assistance as needed.

20 January 2023 — The IAEA announced that its Support and Assistance Mission in Khmelnytsky will begin its work at the plant.



Rivne nuclear power plant

Photo: Yanat

https://commons.wikimedia.org/wiki/File:Rivne_NPP_-_2011.jpg

Rivne nuclear power plant

22 July 2022 — The Rivne NPP, operating two VVER-1000 and two older model VVER-440 reactors, was inspected by the IAEA under the non-proliferation agreement between Ukraine and the UN. The inspection was carried out by inspectors of the agency with the participation of SNRIU. The purpose of the inspection was to verify the absence of undeclared nuclear material and information on the design of the nuclear installation provided to Ukraine in accordance with the Agreement.

15 November 2022 — Rivne nuclear power plant's connection to one of its 750 kV power lines was lost. As a result, the plant reduced its power output and one of its four units was automatically disconnected; the plant increased the power of one of its other units to continue supplying electricity to the Ukrainian network at the same rate.

23 November 2022 — Energoatom reported that due to a decrease in the frequency in the power system of Ukraine, the Rivne, South Ukraine and Khmelnytsky nuclear power plants were all automatically disconnected from the grid.

24 November 2022 — The facility's connection to the electricity grid was re-established.

9 December 2022 — An IAEA delegation visited the plant to assess its nuclear safety and security situation as well as any material needs.

17 January 2023 — the IAEA Support and Assistance Mission in Rivne began its work at the plant.

South Ukraine nuclear power plant

19 September 2022 — Shelling caused an explosion near the South Ukraine plant, which operates three VVER-1000 reactions, impacted three power lines, but not those connecting the plant to the grid, and damaged windows at the site. All three reactors remained in operation.

3 November, 2022 — The plant lost its connection to one of three 750 kV lines used to provide power to the grid. As a result, the site reduced the power of one of its three operating reactors by 50%.

15 November 2022 — The plant's connection to the Ukrainian power grid was completely lost as a result of missile strikes.

23 November 2022 — Energoatom reported that due to a decrease in the frequency in the power system of Ukraine, the Rivne, South Ukraine and Khmelnytsky nuclear power plants units were all automatically disconnected from the grid.

25 November 2022 — The facility's connection to the electricity grid was re-established.

16 January 2023 — An IAEA support and assistance mission began its work at the plant.



South Ukraine nuclear power plant.webm
Russian rocket strike on 19 September 2022
https://en.wikipedia.org/wiki/South_Ukraine_Nuclear_Power_Plant

Rosatom's isolation of Zaporizhzhia

Circumstances that disrupt the entire nuclear power structure of one of the most nuclear power- reliant countries on the planet are clearly reckless and dangerous, threatening populations far beyond the battlefield. And where these acts against Ukraine's nuclear structures may at first have appeared random, the longer the war rages on, the more coordinated they appear.

Indeed, numerous interviews with former Zaporizhzhia workers in Western and Ukrainian outlets support the notion that Rosatom officials have helped direct Russian artillery fire targeting parts of the facility and its territory, including its transmission lines, to cut it off from supplying the Ukrainian electrical grid while blaming Ukraine for the fire.

"[Rosatom officials at the plant] were studying the electricity circuits, the transmission lines, our equipment and the communication systems. They were studying them closely over a week," Oleh Dudar, a former head of operations for the Zaporizhzhia plant's nuclear reactor and turbine unit, told the Washington Post. "And then the next week, the objects they'd been studying were shot at and the equipment went offline. It seems to me they were looking. I had the impression that they directed and managed this."

The timeframe of the particularly intensive shelling around the Zaporizhzhia plant beginning in late August and stretching into early autumn would seem to support Dudar's claims. It was in mid to late summer that the Rosatom staff presence at the plant became widely known through media reports and via accounts from the IAEA. By September 12, shelling around the plant had become sufficiently intense that Energoatom and the IAEA judged it safer to simply put all reactors at the plant into shutdown mode.

While the primary purpose of the shutdowns was to reduce the possibility of a severe radiation accident should the reactors get hit by a large weapon, they nonetheless accomplished the presumed goal of the Russian military — that of isolating the plant, which produced one fifth of Ukraine's electricity, from the electrical grid. Whether Russia would be able — or indeed currently plans — to reroute the plant's electricity to the Russian grid remains in question. Such a technically demanding feat would be nearly impossible to accomplish in an active war zone. But for now, the Zaporizhzhia plant's electricity is unavailable to Ukrainians — a state of affairs that is far from accidental, and which takes a step toward fulfilling Rosatom's apparent goals.

Further afield, grid connections at the Khmelnytsky, Rivne and South Ukraine plants have also been disrupted by Russian bombardments. Though these strikes are unlikely to be guided directly by Rosatom, they nonetheless serve a similar purpose to the strikes around Zaporizhzhia — that of isolating nuclear plants from the Ukrainian grid.



Escorted by Ukrainian officials, IAEA Director General Rafael Mariano Grossi together with his senior staff and the IAEA expert mission team tours Zaporizhzhya Nuclear Power Plant and its surrounding area during his second official visit to Ukraine. 29 March 2023

Photo: Fredrik Dahl / IAEA

[https://commons.wikimedia.org/wiki/File:Rafael_Mariano_Grossi_tours_Zaporizhzhya_NPP_\(02011534\)_52780479312.jpg](https://commons.wikimedia.org/wiki/File:Rafael_Mariano_Grossi_tours_Zaporizhzhya_NPP_(02011534)_52780479312.jpg)

Ukrainian nuclear expert Olga Kosharna has likewise written on her Telegram channel and stated in interviews that Rosatom employees at the Zaporizhzhia plant are involved in Russian military decisions to amass weapons on plant territory, turning it into a de facto fortress protected not by walls, but by the fear of its own destruction and the radiation disaster that could entail.

There are also questions about whether Rosatom staff may have been involved in the summary detentions of hundreds of the plant's Ukrainian workers, who, according to Dudar and other witness accounts appearing in Western and Ukrainian media, were held for weeks in cellars and tortured by FSB officers, sometimes with electricity. The detentions

first occurred over the plant workers' pro-Ukrainian sentiments, but increasingly they were used as a mechanism to force workers to sign contracts to work for Rosatom, as detailed by Dudar, Energoatom and others.

Using reactors as leverage

In a more general sense, Rosatom's role in the war, specifically at the Zaporizhzhia plant, provides a stark warning for other countries that rely on Rosatom for nuclear power plant construction, reactor fuel and other technical services. For years, many in the environmental community, including Bellona, have warned that Rosatom's aggressive expansion abroad threatened to make the countries where the corporation is building nuclear power plants hostage to Moscow's politics.

It has long been clear that Rosatom — which loans foreign governments the money they need to pay for the reactors that it builds — is a major force in extending Moscow's spheres of influence and works to cement the technological and economic dependence of the countries where it builds its reactors. The consistent refusal of Hungary — which is building a pair of Russian VVER-1200 reactors on a \$10 billion loan from Moscow — to approve EU sanctions against Rosatom is an example of this influence at work. EU sanctions may eventually do much to hobble Russia's income from cheap natural gas. But, thanks to Hungary, the 18 Russian and Soviet built nuclear plants within EU territory will continue to provide profit to Rosatom.

Now that Rosatom is holding a Russian-designed Ukrainian plant literal hostage in a war, its willingness to use other reactors it builds or services as leverage should no longer be in question. These reactors are, in fact, shackles.



Rosatom's role in the war in Ukraine