Ukraine: Current status of nuclear power installations

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Chernobyl News brief Radiation safety ...

Zaporizhzhia nuclear power plant, Ukraine. Image: Ralf1969, Wikimedia Commons

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More than two years after the war in Ukraine began, the NEA continues to collect information from verifiable and reliable sources to support its members' efforts to maintain an understanding of the state of nuclear safety and radiological protection in that country. The OECD has continued to further broaden, deepen and strengthen its engagement and co-operation with Ukraine. The NEA, in partnership with the United Kingdom, has launched an NEA-Ukraine Visiting Experts Programme, which has brought Ukrainian nuclear energy experts to the Agency.

Because our Ukrainian colleagues are faced with a highly uncertain, ever-changing and very challenging situation it is to be expected that obtaining detailed information on a regular basis may not be possible.

Electricity grid

- The electricity grids of Ukraine and Moldova were successfully synchronised with the Continental European Grid on 16 March 2022.

Nuclear power plants

- In Ukraine 15 pressurised water reactors of Russian VVER design are operated by the State Enterprise National Nuclear Energy Generating Company “Energoatom” at four plants. These plants operate under nuclear safety regulations implemented by the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU).

Zaporizhzhia nuclear power plant has six reactors.

- 27 June 2024: An external radiation monitoring station located 16 km southwest of the Zaporizhzhia Nuclear Power Plant (ZNPP) was confirmed to have been destroyed by shelling and fire.
- 23 June 2024: Sub-stations in the nearby city of Enerhodar, where most of the ZNPP staff live, were attacked on two separate occasions. The sub-station in Raduga was damaged on 23 June and that at Luch was destroyed on 19 June. The Raduga sub-station failure affected the electrical supply to the industrial zone next to ZNPP as well as the plant’s transport unit, a pump for its tap water and some of the external environmental radiological monitoring stations.

These resumed operating once power was restored after a 16 hour interruption.

- 23 May 2024: The Zaporizhzhia Nuclear Power Plant (ZNPP) lost connection to its sole remaining 750 kilovolt (kV) off-site power line at 1:31 p.m. This was due to a reported short-circuit, leaving it reliant on a single back-up 330 kV line until 4:50 p.m. local time when the connection was restored.
- 9 April 2024: IAEA team of experts stationed at ZNPP reported hearing bursts of small arms fire followed by an explosion at 11:05 a.m. They continue to report hearing military activities, including explosions, small arms fire as well as outgoing artillery fire from near the plant.
- 8 April 2024: The water levels in the reservoir that supplies Zaporizhzhia Nuclear Power Plant (ZNPP) with water for some of the site's needs not related to safety are currently at 15.61 metres.
- 7 April 2024: Drone attacks at ZNPP struck reactor Unit 6. Although there were no indications of damage to critical nuclear safety or security systems at the site, casualties were reported. IAEA inspectors at the site confirmed the physical impact of the drone detonations, which they reported appeared to target surveillance and communication equipment.
- 6 April 2024: The back-up 330 kV line which provides the electricity the ZNPP requires to cool its reactors and for other essential nuclear safety and security functions, was restored.
- 4 April 2024: The one remaining back-up 330 kV line to the ZNPP was cut, leaving the plant reliant on a single 750 kV

line and backup diesel generators, should the last remaining electricity line be cut. Before the conflict began, the ZNPP had four 750 kV and six 330 kV power lines available. The IAEA observers at ZNPP reported that they continued to be denied timely and appropriate access to all areas important to nuclear safety and security.

- 28 March: Draining one of the sprinkler ponds for the ZNPP Unit 5 to allow cleaning began, an operation that is expected to take around three weeks. The Unit 6 sprinkler pond will also be cleaned. Both units are in cold shutdown.
- 22 March 2024: ZNPP stopped receiving power from the external 750 kilovolt (kV) power line that provides the electricity needed to cool its reactors and for other essential nuclear safety and security functions around 6:10 a.m. local time. As there was no physical damage to the 750 kV line identified, it was reconnected at 11:02 a.m.
- 14 March 2024: The back-up 330 kV line which provides the electricity the ZNPP requires to cool its reactors and for other essential nuclear safety and security functions, was restored.
- 8 March 2024: IAEA experts observers at the site have continued to report explosions and other indications of military activity not far from the ZNPP. They heard explosions nearby in the morning and evening of 8 March and again in the morning and late at night the following day. On 6 March, the team heard around 13 rounds of outgoing artillery fire.
- 8 March 2024: The back-up 330 kV line which provides the electricity the Zaporizhzhia Nuclear Power Plant (ZNPP) requires to cool its reactors and for other essential nuclear safety and security functions, remained cut. As a result, the plant continued to rely on a single 750 kilovolt (kV) line to

power these functions and all scheduled preventative maintenance activities on safety-related equipment are suspended until it is reconnected. Routine testing of the safety systems, including the emergency diesel generators, continues. The SNRIU estimated that 75-90% of the equipment and systems on which repairs should have been carried out since the plant's occupation, depending on the specific power unit, have yet to be completed.

- 23 February 2024: IAEA observers stationed at the ZNPP reported hearing explosions daily for the last week, including one on 16 February that appeared to occur close to the plant itself. There were also several explosions on 22 February, one of them reported as unusually loud and indicating very close proximity to the site.
- 21 February 2024: The back-up 330 kV line which provides the electricity the ZNPP needs to cool its reactors and for other essential nuclear safety and security functions, was cut. As a result, the plant is currently relying on a single 750 kilovolt (kV) line to power these functions. Restoration of the 330 kV line connection is expected to be completed by 1 March.
- 13 February 2024: IAEA observers visited the ZNPP's training centre and its simulators where they observed staff training, including main control room operators receiving additional simulator training for other units than those where they were working. Before the conflict the ZNPP licensed main control room operators for units 1 to 4 and units 5 and 6 separately. The training centre reportedly has 119 of its original 260 instructors who provide training in such fields as radiation and fire protection. IAEA observers were once

again denied access to the western part of the turbine hall of Unit 2.

- 1 February 2024: Workers employed by Ukraine's national operator Energoatom are no longer permitted to access the site. IAEA observers were informed that there are currently 4500 staff employed by the Russian operating entity at the ZNPP and 940 applications under consideration. Prior to the start of the armed conflict there were approximately 11 500 staff.
- 26 January 2024: Water levels in the reservoir that supplies the ZNPP with water for some of the site's needs not related to safety are currently at 15.61 metres, around one metre below the level before the breach of the Nova Kakhovka dam downstream from the facility. The cooling water for the six shutdown reactors continues to be supplied by the 11 groundwater wells near the sprinkler ponds.
- 19 January 2024: Mines around the perimeter of the ZNPP that had been previously identified by IAEA observers at the plant and removed in November 2023, have reportedly been re-installed. The mines are in the buffer zone between the inner and outer fences of the facility.
- 4 January 2024: IAEA observers at ZNPP were not permitted access to all areas of the site - in particular to the reactor halls of units 1, 2, and 6. These are the areas where the reactor cores are located and spent nuclear fuel is contained. Access was also denied to some areas of the turbine halls of reactor units 3, 4, and 6, as well as to the roofs of these reactor buildings.
- 21 December 2023: IAEA observers at ZNPP reported hearing six powerful explosions outside the plant.

- 17 December 2023: ZNPP staff began installing four mobile diesel boilers to generate the steam needed for various nuclear safety functions at the site, including for waste treatment. The site currently has nine mobile boilers, eight of which are currently in operation to provide heating during the winter.
- 15 December 2023: The back-up 330 kV line to the ZNPP, which provides the electricity it needs to cool its reactors and for other essential nuclear safety and security functions, was restored. Since 2 December the plant had depended on a single 750 kilovolt (kV) line to power these functions.
- 7 December 2023: IAEA observers at ZNPP reported hearing explosions in the distance, likely from heavy artillery and rockets, and nine explosions closer to the site over the course of the day.
- 29 November 2023: ZNPP lost all off-site power and had to temporarily rely on emergency diesel generators for the electricity it needs to cool its reactors and for other essential nuclear safety and security functions. IAEA observers at the site reported that the ZNPP's connection to its sole back-up 330 kilovolt (kV) power line was cut around 10:26 p.m. local time due to an external grid fault. It was followed around five hours later by the loss of the plant's sole 750 kV line, its main supplier of external electricity. This was restored several hours later, but the 330 kV line remained unserviceable.
- 28 November 2023: The main 750 kilovolt (kV) power line supplying electricity to ZNPP was restored after a sudden interruption in the connection on 26 November.

- 26 November 2023: A short circuit some 100 kilometers north of ZNPP cut the connection to its sole remaining 750 kilovolt (kV) power line at around 10:30 a.m. local time. While the plant continued to receive external power from its 330 kV back-up power line, one emergency diesel generator also started operating to supply the Unit 4 reactor with the electricity needed for reactor cooling and other essential nuclear safety and security functions. This may indicate a possible issue with its electrical configuration, which the plant's staff were investigating. IAEA observers at the facility heard the sound of several rockets that appeared to have been fired from close to the plant. They also heard multiple artillery rounds which also seemed to have been fired from near ZNPP.
- 24 November 2023: ZNPP staff successfully conducted a full emergency exercise, based on a hypothetical break of a pipe containing radioactive wastewater and the disconnection of power from a reactor unit. Following the discovery of boron in the secondary cooling circuits of Unit 5, the unit was placed in cold shutdown state.
- 17 November 2023: Chemical boron was detected in the secondary cooling circuit of one of the steam generators of the ZNPP Unit 5 reactor, operating in hot shutdown mode. While reported measurements were relatively stable and within the limits permitted by the reactor's technical specifications, plant staff planned to keep Unit 5 in hot shutdown and reassess once all the boilers used for heating in the nearby town of Enerhodar have started operating.
- 15 November 2023: ZNPP Unit 6 experienced a 90-minute power outage that necessitated the use of an emergency diesel generator to provide the electricity it needed for cool-

ing and other vital functions until power was restored. None of the five other reactors at the site lost power; three are, like Unit 6, in cold shutdown mode and two are in hot shutdown to generate steam and heating.

- 3 November 2023: As part of winter preparations, the ground water wells that have been constructed near the water sprinkler pond area at ZNPP are being insulated. The wells provide an alternative source of cooling water following the earlier destruction of the Kakhovka dam in June. Eight of the plant's nine mobile diesel boilers were now in operation to generate more heating or steam as required at the plant and nearby Enerhodar.
- 27 October 2023: Four of the nine mobile diesel boilers that the ZNPP uses to generate more heating during the winter have been put into operation. Some 57 such boilers installed in Enerhodar, as well as two larger boilers at the ZTPP and one in its industrial area.
- 20 October 2023: The ZNPP Unit 3 reactor vessel, left open to use as a reservoir of borated water, was closed now that there were sufficient supplies on site. Borated water is used to cool nuclear fuel in the primary circuit of pressurised water reactors and spent fuel stored in pools.
- 13 October: ZNPP staff continued maintenance activities on Unit 6 following its transition to cold shutdown. Two of the unit's steam generators were tested due to boron being detected in the secondary circuit. Small water leaks in one tube of each steam generator were repaired and testing was ongoing to confirm the successful repair.
- 11 October: ZNPP Unit 5 began transition to a hot shutdown state to provide warm water and district heating for the plant and the town of Enerhodar.

- 4 October: The ZNPP Unit 4 was restarted to generate steam for safety systems, following repairs to address a water leak. Unit 4 had been shut down after a leak was found in a steam generator pipe weld. With the pipe now repaired and tested, Zaporizhzhia will transition Unit 4 from cold to hot shutdown, allowing it to produce steam again. Unit 6, which had been providing steam since mid-August, will now return to cold shutdown.
- 29 September: With the completion of an eleventh groundwater well, the ZNPP is now able to supply around 250 cubic metres of water per hour. This is the level estimated to be necessary to maintain the level of the 12 sprinkler cooling ponds used to cool the six reactors and spent fuel stored at the plant. The Ukrainian authorities report that the level of the cooling pond remains stable.
- 22 September: A tenth groundwater well was completed, bringing the plant closer to a longer-term solution for the provision of cooling water to reactors in a shutdown state. Over 200 m^3 of water per hour can now be supplied to the sprinkler ponds that cool the ZNPP's six reactors and spent fuel. The wells were bored following the destruction of the Nova Kakhovka dam downstream from the site on 6 June and the subsequent draining of water from the Kakhovka reservoir.
- 22 September: A significant number of staff are reported to have left the ZNPP since the start of the war, including licensed operators from the main control rooms. IAEA observers at ZNPP were informed that recruitment of additional staff from Russian nuclear power plants is ongoing and that these staff are being trained and licensed to operate the plant under Russian Federation regulations.

- 15 September: A further two groundwater wells to supply the sprinkler ponds that cool the six reactors and spent fuel were brought on line, bringing the total of new wells to nine. The water supply situation at the plant will be reassessed once a tenth well has been constructed in order to assess whether more will be needed.
- 8 September: ZNPP staff indicated that there were now seven wells operating at the site supplying just over half of the water currently needed (250 m^3 per hour) to maintain the cooling water in the plant's sprinkler ponds. The remaining volume of cooling water is currently pumped from the site's drainage system. As a result of the new wells, the ZNPP staff reported that the height of the groundwater had only declined by a very minor level.
- 4 September: Each ZNPP reactor has three separate and independent redundant systems (commonly called "safety trains") that together comprise the unit's safety systems. Safety trains are normally in stand-by mode, ready to activate if needed to maintain the reactor unit's safety. A single safety train is capable of maintaining the reactor unit's safety. A water leak was detected in a recirculation valve of one system of one safety train of the ZNPP Unit 5. In order to repair the valve, one safety train of Units 5 and Unit 6 had to be placed offline. Once the valve had been repaired, the Unit 6 safety train was returned to standby mode, while the Unit 5 safety train was kept offline for maintenance.
- 1 September: ZNPP staff reported that four groundwater wells were now in operation, out of a total of 10-12 wells planned to be drilled around the plant's sprinkler ponds. The wells are intended to become the main source of cooling water for the six shutdown reactor units and spent fuel

pools, following the destruction of the Nova Kakhovka dam downstream from the site.

- 22 August: ZNPP began pumping water from a new groundwater well to serve its cooling needs. The well was bored following the collapse of the Nova Kakhovka dam downstream from the site on 6 June and the subsequent draining of water from the Kakhovka reservoir. The new well was reportedly providing about 20 m^3 of water an hour. It is planned to drill an additional 10-12 wells at the site.
- 13 August: ZNPP reactor Unit 6 reached a hot shutdown state to generate steam for various nuclear safety purposes at the plant, replacing Unit 4.
- 11 August: ZNPP reactor Unit 4 was moved from hot shutdown to cold shutdown following the detection of a water leak in one of its four steam generators. To continue production of steam at the site preparations to move Unit 6 into hot shutdown mode were begun. The 750kV power line providing ZNPP with the electricity needed for reactor cooling and other essential nuclear safety and security functions was disconnected twice in the course of the day, meaning that the plant had to rely on its only remaining 330 kV backup power line to supply the required electricity.
- 29 July: The planned transition of ZNPP Unit 4 to hot shutdown was completed, while unit 5 transition to cold shutdown. The planned maintenance activities include inspecting and testing safety systems which protect the reactor and its fuel as well as cleaning of the heat exchanger.
- 12 July: Preparations to move the ZNPP reactor Unit 4 from a cold shutdown state to hot shutdown began. The ZNPP unit 5 is currently in hot shutdown, a state used to generate steam for various safety purposes that include the process-

ing of liquid radioactive waste collected in storage tanks. Once in cold shutdown preventive maintenance activities that can only be carried out while in cold shutdown will be performed. All other units remained in cold shutdown. The SNRIU, Ukraine's national regulator, issued regulatory orders on 8 June to limit the operation of all six units on the site to cold shutdown state only.

- 5 July: The main 750 kilovolt (kV) power line providing the ZNPP with the electricity needed for reactor cooling and other essential nuclear safety and security functions was disconnected at 01:21am local time on 4 July. A recently reconnected 330 kV line prevented full loss of external power until the restoration of the 750 kV line some 12 hours later.
- 3 July: A 330 kV line to help supply the ZNPP's external electricity needs for the ZNPP was reconnected to the plant on 1 July. This line supplements the existing 750 kV line currently meeting these needs. Before the war began in February 2022, four such 750 kV lines were available to the plant.
- 21 June: Some of the cooling water needs for the ZNPP were reportedly being met using a discharge channel of the Zaporizhzhia Thermal Power Plant (ZTPP). This water was used to supply the ZNPP's spray ponds which cool the six reactors in shut down mode and the plant's spent fuel storage. The ZNPP spray ponds have also been replenished using a drainage system fed by underground water near the ponds.
- 8 June: The SNRIU issued a regulatory order for the ZNPP reactor 5 to be placed into a cold shutdown state. The unit is currently in hot shutdown to produce process steam for such site operations as the treatment of liquid radioactive

waste. Such waste is collected from all six reactors, even when in cold shutdown.

- 6 June: Water levels in the reservoir that supplies the ZNPP fell throughout the day following the breach of the Nova Kakhovka dam downstream from the facility. Onsite back-up options remain available and are estimated to be sufficient for up to several months. Water is needed for residual heat removal from the reactors and used fuel ponds, as well as to cool emergency diesel generators when they are in operation.
- 22 May: The National Nuclear Energy Generating Company Energoatom reported that the 750 kV main external power line providing the electricity needed for reactor cooling and other essential nuclear safety and security functions at ZNPP was cut. Power supply to the safety systems was provided by emergency diesel generators until the connection to the electricity grid was restored some five hours later.
- 12 May: IAEA observers at ZNPP noted fewer on-site staff, but confirmed that essential personnel working in the main control rooms continued to be available and present during each shift.
- 6 May: Both the IAEA and the National Nuclear Energy Generating Company "Energoatom' reported that the evacuation of residents from the nearby town of Enerhodar, where most of the ZNPP staff live, had begun. Operating staff were not being evacuated and site management stated that it has sufficient staff for the safe operation of the plant. IAEA observers at ZNPP reported hearing shelling on a regular basis.

- 21 April: ZNPP Unit 6 was placed in cold shutdown, with only Unit 5 in hot shutdown to produce hot water and steam for the site.
- 8 April: IAEA observers at ZNPP reported two landmine explosions outside the perimeter fence.
- 22 March: The monthly test performed at ZNPP Unit 4 for the loss of off-site power saw the emergency diesel generators successfully started.
- 9 March: The ZNPP suffered a complete loss of external power between 5 a.m. and 4 p.m., forcing it to rely on emergency diesel generators for reactor cooling and other essential nuclear safety and security functions during this time.
- 26 January 2023: IAEA observers at the plant reported they heard eight strong detonations at around 10am local time, causing office windows at the plant to vibrate.
- 19 January: IAEA estimates of the number of employees now working at the plant are around 3 000 – down from around 10 000 before the conflict.
- 7 January 2023: The ZNPP 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.
- 30 December 2022: Nine mobile diesel-fuelled boilers with power in the range of 1-6.5 megawatts (MW) have been 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.

- 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.
- 24 November, 2022: Zaporizhzhya Nuclear Power Plant (ZNPP) reported that the facility's external power connection had been re-established, a day after it was disconnected.
- 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.
- 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.
- 28 October, 2022: Negotiations by the International Atomic Energy Agency with Russia and Ukraine, to establish a nuclear safety and security protection zone around the facility, are ongoing.
- 19 October, 2022: According to reports from Ukraine's State Enterprise National Nuclear Energy Generating Company "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.

- 18 October, 2022: The Zaporizhzhia nuclear power plant's last remaining operating 750 kilovolt (kV) power line was re-connected on October 18. The connection has been disrupted three times in ten days.
- 4 October, 2022: Ukraine's State Enterprise National Nuclear Energy Generating Company "Energoatom" have confirmed that Director-General of Zaporizhzhia Nuclear Power Plant (ZNPP), Ihor Murashov, who had previously been detained on Friday, 30 September by Russian personnel, has been released.
- 3 October, 2022: According to reports from Ukraine's State Enterprise National Nuclear Energy Generating Company "Energoatom", the Director-General of Zaporizhzhia Nuclear Power Plant (ZNPP), Ihor Murashov, has been detained by Russian personnel. No further information is yet available about this matter.
- There have also been reports of landmine explosions at the ZNPP. A blast on 30 September 2022 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.
- 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.
- 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.

- 13 September, 2022: The last reactor at the Zaporizhzhia nuclear power plant that had continued operating has now 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 International Atomic Energy Agency (IAEA) reports that the two restored lines can both receive power from the grid through the switchyard of a nearby thermal power station.
- 12 September, 2022: Based on information provided by Energoatom NAEC to the SNRIU, in the early hours of 11 September Unit No. 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.
- 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.
- 6 September, 2022: The IAEA published **a report** on the current state of the plant's safety and security.
- 29 August, 2022: An IAEA mission to the Zaporizhzhia nuclear power plant took place.
- 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.

- 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.
- 25 August, 2022: Subsequent reports have highlighted 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 offsite 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. This line was damaged on 25 August.
- 25 August, 2022: Ukraine's nuclear operator, 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.
- 4 March, 2022: The Zaporizhzhia nuclear power plant was shelled on the night of 4 March but the resulting fire was extinguished and had no impact on essential equipment. The plant management is now under orders from the commander of the Russian forces that took control of the site.

Khmelnytskyi nuclear power plant has two existing reactors and two reactors under construction.

- 4 April 2024: Maintenance in the unit 2 turbine hall at the Khmelnytskyi Nuclear Power Plant (KhNPP) was completed and the reactor returned to nominal power.
- 15 March 2024: The first nuclear fuel from the United States company Westinghouse arrived at KhNPP as part of efforts to convert all its reactors to non-Russian fuel. State nuclear operator Energoatom said all the country's nuclear power

plants would be “completely converted to Westinghouse fuel assemblies”.

- 13 March 2024: KhNPP reactor unit 2 was manually shut down to investigate an issue with the turbine shaft. Nuclear safety and security were not affected by this event.
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- 9 February 2024: IAEA monitors at the Khmelnytskyi Nuclear Power Plant (KhNPP) had to take shelter during an air raid alarm.
- 29 November 2023: IAEA monitors at the KhNPP reported hearing several explosions in close proximity, over a 20-minute period during the night of 28 November.
- 25 October 2023: Powerful explosions shook an area near KhNPP at 1:26 a.m. local time, shattering windows at the site and temporarily cutting power to some off-site radiation monitoring stations. The explosions did not affect the KhNPP’s operations or its connection to the national electricity grid but windows of several buildings at the site, including the passageway to the reactor buildings, an integrated auxiliary building, a special equipment building, the training centre, as well as other facilities, were all damaged.
- 23 January 2023: the IAEA and Ukrainian authorities announced that the IAEA Support and Assistance Mission in Khmelnytskyi (ISAMIK) had begun its work at the plant.
- 20 January 2023: the IAEA announced that its Support and Assistance Mission in Khmelnytskyi (ISAMIK) will begin its work at the plant in the coming days.
- 23 December 2022: The IAEA announced plans to deploy a team to the plant to provide technical support and assistance as needed.

- 9 December 2022: An IAEA delegation visited the plant to assess its nuclear safety and security situation as well as any material needs.
- 23 November, 2022: National operator Energoatom reported that due to a decrease in the frequency in the power system of Ukraine the Rivne, South Ukraine and Khmelnytskyi nuclear power plants were all automatically disconnected from the grid.
- 15 November, 2022: Khmelnytskyi nuclear power 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.
- September 26, 2022: The Khmelnytsky nuclear power plant was inspected between 24-25 September by the IAEA within the framework of the Agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons. The inspection of the absence of undeclared nuclear material was carried out by the Agency's inspectors with the participation of the State Nuclear Regulation inspector. 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.
- 13 September, 2022: Two reactors were in operation on 13 September
- 12 September, 2022: The Khmelnytsky nuclear power plant was inspected by the IAEA within the framework of the Agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons. The inspection was carried out by the IAEA with

the participation of the inspector of the State Atomic Energy Regulatory Commission. 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.

- 11 March, 2022: Khmelnytskyi NPP was inspected by the International Atomic Energy Agency on 11 March under the agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons. The inspection was carried out by inspectors of the Agency with the participation of an SNRIU inspector. 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.

Rivne nuclear power plant has four reactors.

- 6 June 2024: One reactor unit at the Rivne Nuclear Power Plant was in shutdown for planned maintenance and refuelling.
- 28 March 2024: Unit 4 at the Rivne Nuclear Power Plant was in planned outage.
- 16 February 2024: IAEA monitors at the Rivne Nuclear Power Plant had to take shelter during an air raid alarm.
- 2 February 2024: Oleh Korikov, Head of the State Nuclear Regulatory Inspectorate of Ukraine and Chief State Inspector for Nuclear and Radiation Safety of Ukraine, visited Rivne Nuclear Power Plant to discuss the state of implementation of the Integrated (Consolidated) Program for Increasing the Level of the Safety of Power Units of Nuclear Power Plants, as well as other issues including the introduc-

tion of Westinghouse nuclear fuel at power units with WWER-440 reactors.

- 16 November 2023: An emergency exercise was conducted at the Rivne Nuclear Power Plant on 15 and 16 November with support from staff at the South Ukraine and Khmelnytskyi nuclear power plants. Staff followed the different aspects of the exercise at Rivne from both the plant's onsite and offsite emergency control rooms, with communication to the IAEA's Incident and Emergency Centre in Vienna.
- 11 October 2023: IAEA inspectors at Rivne NPP reported that staff at the plant had completed scheduled maintenance of Unit 2, which included the successful loading of a new type of fuel into the reactor. The reactor was reconnected to the grid on 11 October.
- 10 March 2023: The Rivne nuclear power plant was inspected between 8-9 March by the IAEA within the framework of the Agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons.
- 3 February 2023: the first rotation of the IAEA Support and Assistance Mission in Rivne (ISAMIR) was completed.
- 25 January 2023: Rivne Nuclear Power Plant was inspected by the IAEA under the agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons. The inspection was carried out by inspectors of the Agency with the participation of an SNRIU inspector. 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.

- 17 January 2023: the IAEA Support and Assistance Mission in Rivne (ISAMIR) began its work at the plant.
- 23 December: The IAEA announced plans to deploy a team to the plant to provide technical support and assistance as needed.
- 9 December: An IAEA delegation visited the plant to assess its nuclear safety and security situation as well as any material needs.
- 24 November, 2022: The facility's connection to the electricity grid was re-established.
- 23 November, 2022: National operator Energoatom reported that due to a decrease in the frequency in the power system of Ukraine, the Rivne, South Ukraine and Khmelnytskyi nuclear power plants were all automatically disconnected from the grid.
- 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.
- 13 September, 2022: Three of these reactors were in operation as of 13 September.
- 22 July, 2022: Rivne NPP was inspected by the IAEA under the agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons. The inspection was carried out by inspectors of the Agency with the participation of an SNRIU inspector. 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.

South Ukraine nuclear power plant has three reactors.

- 6 June 2024: One reactor unit at South Ukraine Nuclear Power Plant (SUNPP) was in shutdown for planned maintenance and refuelling, while one other unit was in planned outage.
- 16 May: Preparatory work for the construction of two new units began at the SUNPP.
- 22 March 2024: IAEA experts at SUNPP reported that it temporarily lost connection to one 750 kV and one 330 kV power line. It continued to have access to other power lines and remained in operation, albeit it at a reduced power output until the 750 kV line was reconnected.
- 29 September 2023: Spare parts for the emergency diesel generators of the South Ukraine nuclear power plant, provided under arrangements agreed on 5 May between the IAEA, France and Energoatom, arrived at the site. The spare parts are essential for the maintenance and functionality of the diesel generators, which provide the electricity essential for the plant's safety systems should the site to lose offsite power. The first delivery took place in June.
- 2 June 2023: Following a disturbance in the electricity grid one reactor unit at South Ukraine NPP experienced an emergency shutdown on 22 May. The plant continued to receive off-site power and by 2 June had returned to full power.
- 16 January 2023: The IAEA Support and Assistance Mission in South Ukraine (ISAMISU) began its work at the plant.

- 23 December: The IAEA announced plans to deploy a team to the plant to provide technical support and assistance as needed.
- 2 December: An IAEA delegation visited the plant to assess its nuclear safety and security situation as well as any material needs.
- 25 November, 2022: The facility's connection to the electricity grid was re-established.
- 23 November, 2022: National operator Energoatom reported that due to a decrease in the frequency in the power system of Ukraine, the Rivne, South Ukraine and Khmelnytskyi nuclear power plants units were all automatically disconnected from the grid.
- 15 November, 2022: South Ukraine nuclear power plant's connection to the Ukrainian power grid was completely lost as a result of missile strikes.
- 3 November, 2022: South Ukraine nuclear power 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%.
- 19 September, 2022: Shelling caused an explosion near the plant, impacting three power lines, but not those connecting the plant to the grid, and damaging windows at the site. All three reactors remained in operation.
- 13 September, 2022: Three of these reactors were in operation .

Chernobyl exclusion zone

The Chernobyl nuclear power plant consisted of 4 operating units and 2 under construction at the time of the accident in April 1986 in Unit 4. It is also the site for an Interim Spent Fuel Facility and a Central Spent Fuel Facility.

- 23 February 2023: The Chernobyl nuclear power plant site was inspected between 20-22 February by the IAEA within the framework of the Agreement between Ukraine and the IAEA in connection with the Treaty on the Non-Proliferation of Nuclear Weapons.
- 20 February 2023: the first rotation of the IAEA Support and Assistance Mission in Chornobyl (ISAMICH) was completed.
- 18 January 2023: the IAEA Support and Assistance Mission in Chornobyl (ISAMICH) began its work at the 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.
- 11 May, 2022: Remote transmission of safeguards data from the plant to the IAEA was fully re-established and radiation detectors were once again transmitting data from the area around the plant.
- Ukraine 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.
- 31 March, 2022: The Russian forces that had been in control of the Chernobyl Nuclear Power Plant (NPP) since 24 February had, in writing, transferred control of the NPP to Ukrainian personnel.

- 13 March, 2022: The State Enterprise National Nuclear Energy Generating Company Energoatom announced that two of the damaged electricity lines were now repaired and delivering all required off-site power to the Chernobyl plant.
- 9 March, 2022: The 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.
- 27 February, 2022: No increase in ambient dose rate has been detected in European countries, via the European Radiological Data Exchange Platform (EURDEP).
- 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.
- Unit 1 is being decommissioned; Unit 2 was closed in March 1999; Unit 3 was closed in December 2000; Unit 4, the site of the accident, was initially protected by a Sarcophagus. A New Safe Confinement was built to enclose the existing sarcophagus and moved into position in 2016; Units 5 and 6 were under construction at the time of accident, but were never finished.
- Construction was completed of an Interim Spent Fuel Storage Facility in 2017. The facility stores and processes spent fuel assemblies from Units 1, 2, and 3.

- The Central Spent Fuel Storage Facility (CSFSF), is a dry storage site for used nuclear fuel assemblies from the reactors at Khmelnytskyi, Rivne and South Ukraine.

Kharkiv Metrology Institute

- 27 May: The State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) reported that the area around the Kharkiv Metrology Institute laboratory facilities in the village of Lyptsi, where a number of radioactive sources are stored, was now the scene of active conflict. The building's external structures were reportedly damaged and it was impossible to ensure the safety and security of the radioactive sources due to threats to the lives of personnel. The area had been intensely shelled in April 2024.

National Science Center, Kharkov Institute of Physics and Technology

The Kharkov Institute of Physics and Technology is the site of an experimental nuclear reactor used for research and to produce isotopes for medical and industrial use. The installation was placed in a deep subcritical state ("long-term shutdown") mode on 24 February 2022.

- 22 March 2024: The Institute lost off-site power due to shelling and was relying on emergency diesel generators, as it did during a previous week-long outage, from 22-29 March 2024. On-site radiation was within the normal limits, the SNRIU reported.
- 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.

- 6 March, 2022: Information received from the State Nuclear Regulatory Inspectorate of Ukraine is that the facility was damaged by shelling on 6 March and 25 June but did not cause any increase in radiation levels at the site. Initial reports were that a substation was destroyed; cables for the air conditioner cooling systems of the linear accelerator cluster gallery were damaged, and that heating of the entire complex was damaged.
- 25 June, 2022: Additional damage to the buildings and infrastructure of the site occurred affecting the ventilation systems of the special ventilation system 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.

State Interregional Specialised Plants for Radioactive Waste Management (SISP) of UkrDO *Radon* – Kyiv Branch

The Kyiv Branch of SISP is used to store disused radioactive sources that had been applied in medical treatments, industrial uses, and scientific research.

- 26 February, 2022: News organisations reported that this facility was struck by a bomb or missile; however it is now confirmed that the facility has not been damaged and operation of the its automatic monitoring system has been restored. There are no reports of radiological releases.

Contact

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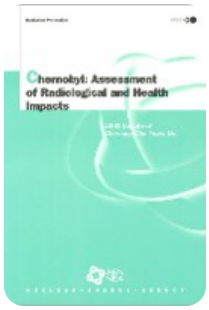

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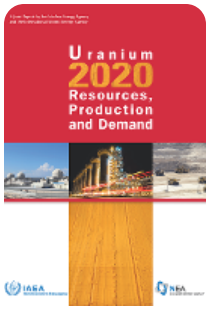

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