

## THE ZAPORIZHZHIA NUCLEAR POWER PLANT TAKEN AS MILITARY TARGET: Legal and technical global challenges

**Alejandro Zurita**, former Head of International Nuclear Research Cooperation at the European Atomic Energy Community (Euratom), 2008-2016

*For the first time in history, a nuclear power plant (NPP) has become a military objective in the front line of a war. While previous military operations at the Iraqi Osirak reactor (1981), the Iranian Bushehr NPP (1987) and the Slovenian Krško NPP (1991) were somewhat ad hoc, the Zaporizhzhia nuclear power plant continues to be disputed as a military target in the frontline of the war in Ukraine, a new and unprecedented situation for which the international community was unprepared*

# 793

APRIL  
2024

The Zaporizhzhia nuclear power plant (ZNPP) was seized militarily on 4 March 2022 by Russia that decreed its ownership on 5 October 2022. Its six Russian-designed VVER-1000/320 reactors produced 27% of Ukrainian electricity before the war, but after September 2022 are in shutdown condition. Its location would be crucial for the electricity supply to Crimea and the Donbas region. The plant is under the command of the Russian state-owned Rosatom plus the regulator Rostekhnadzor. A new operating organization was implemented in October 2022 with part of previous Ukrainian Energoatom staff having signed contracts with Rosatom and lastly adopted Russian citizenship, together with additionally arrived Russian operators of Rosenergoatom.

With the takeover of the plant, many Ukrainian personnel left the plant. In February 2024, Zaporizhzhia had about 4,500 employees compared to 11,500 before the war. Therefore, there are doubts on the present capacity to fully carry out maintenance and in-service inspection programmes due to strong reduction in staff, external contractors and shortage of spare parts. Attacks to energy infrastructures make the Ukrainian electricity grid fragile and unstable, and ZNPP depends on its ten power lines to feed electricity to safety systems and to cool irradiated fuel. In the event of a complete external power outage, the plant must rely on emergency diesel generators as last defence, what has occurred for the first time in the plant lifetime already eight times representing a huge reduction of safety margins in the plant. That risk is not exclusive of the Zaporizhzhia plant, since a complete loss of off-site power occurred simultaneously to all four Ukrainian NPPs in November 2022. Moreover, the destruction of the Kakhovka dam in June 2023 represents a massive loss of water reservoir

available to cool the plant. Eleven groundwater wells were drilled within the perimeter of the site, but this is not a sustainable solution, especially if reactors should turn into operation. The dispute over the plant with military activity in the region, detonations, mines placed between the site's internal and external perimeter barriers, firing of rockets close to the plant, and even possible sabotage or terrorist actions, clearly increase the risk of accident.

*The Zaporizhzhia nuclear power plant needs to be protected since its gradual reduction in safety levels and margins is brewing a potential nuclear accident to the frustration of the international community.*

All these elements make the situation at ZNPP precarious and unsustainable in the medium term. The Zaporizhzhia nuclear power plant needs to be protected since its gradual reduction in safety levels and margins is brewing a potential nuclear accident to the frustration of the international community. Although a Chernobyl-type accident cannot occur for physical and technological reasons, if specific essential systems were to be affected, there would be risk of fuel meltdown scenarios with release of radioactive products, i.e. level 4 or higher on the international nuclear event scale (INES). Such release of radioactive elements could have, depending on its magnitude, a transboundary and indiscriminate impact affecting public health and environment in various countries. The world's reaction would have to be seen, but such a scenario would alter the course of the conflict, leading to possible outside humanitarian interventions and escalating the dimension of the war.

### **Without a ratified treaty on non-aggression to nuclear facilities**

The actual situation at ZNPP exceed nuclear safety and security aspects and address issues of global concern. The 1949 Geneva Conventions were extended by the 1977 Additional Protocol I referring to international armed conflicts. Its article 56 addresses protection of facilities with potential impact to population. The Russian Federation revoked in 2019 its previous ratification in 1989 of that Protocol. And among other countries, the United States never ratified that Protocol and explicitly rejects that Article 56 in its Law of War Manual of the US Department of Defence. Nor does the 1979 Convention on the Physical Protection of Nuclear Material and Nuclear Facilities of the International Atomic Energy Agency (IAEA) focused on illicit trafficking and sabotage of nuclear materials and facilities but not covering military attacks to such facilities.

These rules are ambiguous and confer a certain legal vacuum, which may formally mean that attacking a nuclear facility may not be illegal. Therefore, it is urgent to ratify a specific global convention or treaty on non-aggression against nuclear facilities to prevent them from being used as military targets. Even if in the madness of a war some country did not abide by such a norm, the very existence of ratified international

rules should prevent the normalization of other potential attacks and delegitimize the possibility of justifying warlike actions against nuclear facilities in other crisis and regions of the world.

*Attempts addressing the need to prohibit armed attacks on nuclear facilities failed in recent IAEA General Conferences and the Nuclear Non-Proliferation Treaty Review Conference. If conventional nuclear fission power should continue producing electricity for the world, the international community must ensure that its facilities remain strictly outside any armed conflict.*

Attempts addressing the need to prohibit armed attacks on nuclear facilities failed in recent IAEA General Conferences and the Nuclear Non-Proliferation Treaty Review Conference. If conventional nuclear fission power should continue producing electricity for the world, the international community must ensure that its facilities remain strictly outside any armed conflict.

### **Absence of international nuclear safety standards for armed conflicts**

In the same way that the Chernobyl catastrophe accelerated further development of IAEA nuclear safety standards, and the Fukushima accident triggered several nuclear safety action plans under IAEA and Euratom, this war should legitimise the IAEA to establish nuclear standards for armed conflicts, presently not included in its mandate from the United Nations.

After the outbreak of the war, the International Atomic Energy Agency established seven pillars of nuclear safety and security to assess risks in wartime contexts. When the IAEA —sent by the UN Security Council— arrived in Zaporizhzhia nuclear power plant in September 2022 concluded that all those pillars were compromised, recommended specific actions plus the establishment of a safety protection zone without military equipment around the plant and established shifts of nuclear safety inspectors. Since that demilitarised safety protection zone was not achieved, the UN Security Council further endorsed in May 2023 five concrete principles established by the IAEA, essential for averting a catastrophic incident at ZNPP. Even though the drone detonations to the ZNPP site on 7 April did not damage safety systems, they represent a clear violation of the referred essential principles and increase the risk of severe accident. Moreover, a full unrestricted access of IAEA inspectors to all equipment is not granted, which also limits the ability of IAEA to confirm the compliance of those five principles, being one of them that ZNPP cannot be used as storage or seating for heavy weaponry or military personnel.

It is considered that the mandate of the IAEA, should be rethought and adapted to fully develop safety and security standards for armed conflict environments. In this regard, the IAEA Safety Standards Commission is assessing the progress of a working group established in July 2022 analysing that issue.

The IAEA continues seeking greater engagement and commitment from the international community. In theory, nobody wants a nuclear accident, but both contenders accuse each other of misinformation and of even preparing sabotage or terrorist actions. With several safety margins decreasing, the International Atomic Energy Agency stated that the Zaporizhzhia nuclear power plant is in a kind of grace period that is not infinite, and that there is no place for complacency or to believe that everything is stabilized. Time is playing against nuclear safety, so that a possible slow-motion accident cannot be excluded and the international community must be able to act before it happens.