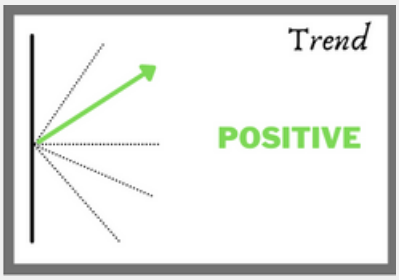
CAPS Nuclear Tracker

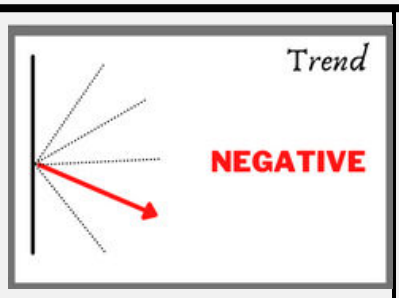
Issue 15: January - March 2025

The year 2025 began on a positive note for the nuclear energy sector, witnessing significant advancements and renewed interest, particularly in Asia and Europe. This growth occurred even amidst the backdrop of newly elected President Trump's administration, which has openly expressed its support for fossil fuels. However, the landscape is not entirely optimistic, as concerns surrounding nuclear proliferation, both horizontal and vertical, continue to cast a shadow. Furthermore, there has been no discernible positive progress regarding the nuclear programs in Iran and North Korea, adding to the existing anxieties. On the fronts of nuclear security and nuclear disarmament, the situation remains largely unchanged, holding a neutral stance.

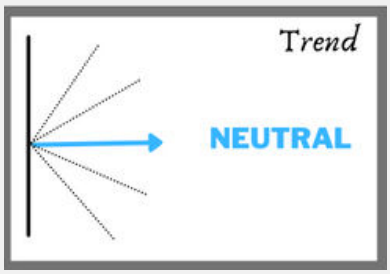
TREND OVERVIEW



- **Nuclear Energy**
  Dr Dhruba Tara Singh
  Ms Sanaa Alvira
  Ms Rishika Singh



- **Missile Developments**
  Dr Javed Alam
- **Vertical Nuclear Proliferation**
  Dr Javed Alam
  Mr Prahlad Kumar Singh
- **Horizontal Nuclear Proliferation**
  Dr Manpreet Sethi
- **North Korea**
  Dr Silky Kaur
- **Iran**
  Dr Silky Kaur

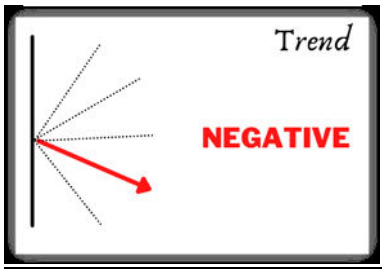


- **Nuclear Security**
  Ms Sanaa Alvira
- **Nuclear Disarmament**
  Dr Manpreet Sethi

Missile Developments

Javed Alam

Previous Trend: Negative



As it has become a norm for the Korean Peninsula, right at the start of the year 2025, **North Korea** on January 7, 2025, tested a new intermediate-range ballistic missile. North Korea claimed the new missile carried a hypersonic warhead and flew at Mach 12 covering 1,500 kms. However, **South Korea** doubted the claim and mentioned that the missile only flew 1,100 kms. On January 15, 2025, North Korea launched multiple short-range ballistic missiles towards the sea off its east coast. The launches were conducted right before the swearing ceremony of Donald Trump. Then, on January 27, 2025, the country also tested a sea-to-surface cruise missile. The test was conducted right after Donald Trump took over as the President of the U.S. While North Korea termed the test as a signal of its resolve against the joint military drills between the U.S., South Korea, and Japan, it also underscored North Korea's progress towards the submarine-launched ballistic missiles programme.

A month later on February 28, 2025, North Korea claimed the test-launch of a strategic cruise missile and ordered full readiness to use nuclear attack capability. North Korea again fired several short-range ballistic missiles on March 11, 2025. On March 21, 2025, North Korea test-fired a new anti-aircraft missile system. According to reports, it was stated that Pyongyang might be receiving assistance from Russia for the anti-aircraft missile system, particularly given the increasingly tangled nature of their security ties.

While North Korea has claimed hypersonic tests in 2024 and in January 2025, **Japan** has also followed suit. On January 25, 2025, Japan's ministry of defence announced that it conducted a live firing test of a new hypervelocity glide munition. With this test, Japan has now conducted four confirmatory tests of its hypersonic glide vehicle (HGV). All were conducted in California, one was completed in August 2024, two in November 2024 and one in January 2025.

India's Defence Research and Development Laboratory (DRDL) has taken the initiative in developing a long-duration Supersonic Combustion Ramjet or Scramjet powered Hypersonic technology. It demonstrated a cutting-edge Active Cooled Scramjet Combustor ground test for 120 seconds for the first time in India. In another development, the Indian Navy also conducted successful flight trials of a first-of-its-kind Naval Anti-Ship Missile (NASM-SR) from the Integrated Test Range (ITR) at Chandipur. The missile is developed by different labs of DRDO including Research Centre Imarat, Defence Research and Development Laboratory, High Energy Materials Research Laboratory and Terminal Ballistics Research Laboratory.

In a significant boost to its domestic ballistic missile capabilities, **Türkiye** on February 3, 2025, conducted the third test of its TAYFUN ballistic missile. According to the report, TAYFUN is produced domestically by Roketsan, which is the sole company specialising in rocket and missile propulsion system technologies in Türkiye. While the actual range of the missile is not known, some of the reports have mentioned that the missile flew more than 560 km. While Türkiye is now looking forward to its very first ballistic missile, Iran has tested its new anti-warship cruise missile with a range of 1,000 kms. The missile is named Ghadr-380 mile type L. According to the Iran's Revolutionary Guard, the missile has anti-jamming capabilities and can be launched from an underground missile facility.

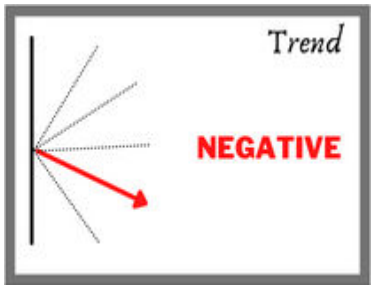
In order to further enhance its precision strike capabilities, the **U.S.** on February 14, 2025, conducted a successful Precision Strike Missile (PrSM) production qualification flight test. The U.S. has been carrying out these tests for a while and conducted two in November and December 2024. The PrSM is the U.S. Army's next generation long-range precision strike missile capable of neutralising targets out to more than 400 kilometers. On February 19, 2025, the U.S. test launched an unarmed Minuteman III intercontinental ballistic missile. The missile carried a single telemetered joint test assembly re-entry vehicle. The ICBM's reentry vehicle travelled approximately 6,700 kms.

Given the continuing war between Russia and Ukraine, Europe is seeing renewed interest in missile development. On March 10, 2025 it was reported that **France**, the **UK**, and **Italy** are planning to boost their existing missile defence capabilities. The contract has been granted to Eurosam, a Franco-Italian economic interest group (GIE) comprising MBDA France, MBDA Italy, and Thales, key companies in the European defence industry.

Vertical Nuclear Proliferation

Prahlad Kumar Singh & Javed Alam

Previous Trends: Negative



To further boost its nuclear gravity bomb capabilities, the **United States,** on January 7, 2025, completed its $9B B61-12 nuclear warhead upgrade. The work on the B61-12 had been ongoing for the past seventeen years by the National Nuclear Security Administration (NNSA). The B61-12 life-extension program consolidated the older B61-3, -4, -7, and -10 variants while incorporating newer technologies. Technically, B61-12 is not a "new" nuclear weapon that increases the stockpile, as the US is taking the warheads from the older bombs and placing them in new housings.

On January 13, 2025, the Bulletin of the Atomic Scientists released its flagship report, United States Nuclear Weapons, 2025, which put the US nuclear stockpile at approximately 3,700 warheads, which has remained unchanged since 2024. The report also mentioned that the pace of warhead dismantlement has slowed significantly in recent years. While the United States dismantled, on average, more than 1,000 warheads per year during the 1990s, in 2023, it dismantled only 69 warheads—the lowest number since the 1990s. The report also mentioned that the US is embarking on an ambitious plan to overhaul its nuclear weapons arsenal. However, it is also facing certain political, financial, and logistical challenges.

On January 24, 2025, the **UK** awarded Rolls-Royce an $11 billion, 8-year contract to design, build, and support nuclear reactors for the Royal Navy's submarines. This will strengthen UK's continuous at-sea deterrent, ensuring that at least one nuclear-armed submarine is always on patrol. It also supports the AUKUS defence pact with the U.S. and Australia. In another news, on March 8, 2025, it was reported that Britain's ability to rely on the US to maintain the UK's nuclear arsenal is now in doubt. A range of concerns had already emerged on the efficiency and effectiveness of the £3 billion-a-year programme, following a second embarrassing failed test launch in 2024.

On March 5, 2025, French President Emmanuel Macron hinted at the possibility of discussing the extension of protection offered by **France**'s nuclear weapons to its European partners. President Macron stated that responding to the historic call of the future German Chancellor. He said, "I have decided to open the strategic debate on the protection of our allies on the European continent through our (nuclear) deterrence.". German Chancellor-in-waiting Friedrich Merz has questioned whether NATO would remain in its "current form" by June and advocated talks with France and Britain about an expansion of their nuclear protection. On March 18, 2025, it was reported that France would modernise one of its main air bases in order to host nuclear weapons. According to reports, the Luxeuil air base will undergo an unprecedented upgrade to become part of France's nuclear deterrent. The Luxeuil-Saint-Sauveur base has hosted nuclear weapons for decades, until Rafale fighter jets were transferred to another location in 2011. Now, France will invest €1.5 billion and by 2035 the base will host F5 Rafale fighter jets as well as ASN4G air-launched hypersonic nuclear missiles. The staff will double to 2,000 people.

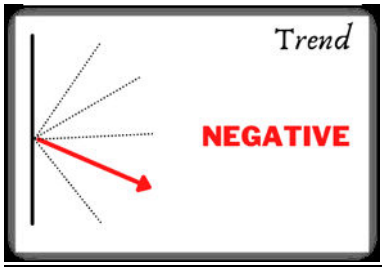
On March 8, 2025, **North Korea** announced it was building its first nuclear-powered submarine to strengthen its nuclear capabilities. State media showed leader Kim Jong-un inspecting a large new submarine. The announcement comes amid concerns that North Korea may be getting Russian military technology in exchange for supplying troops and weapons for the war in Ukraine.

On March 12, 2025, the Bulletin of Atomic Scientists published a report on "Chinese nuclear weapons, 2025". The report claims **China's** nuclear modernisation has rapidly expanded in recent years. It now has around 600 nuclear warheads, making it the fastest growing nuclear arsenal. Since its previous report in May 2024, China has developed three new ICBM silo fields, built additional silos for DF-5 ICBMs, and introduced new ICBM variants. The DF-26 has fully replaced the DF-21 in the nuclear role, and Type 094 submarines now carry JL-3 missiles. Additionally, some bombers now have a nuclear mission with air-launched ballistic missiles.

Horizontal Nuclear Proliferation

Manpreet Sethi

Previous Trend: Negative



Since his entry into the White House, President Trump's realignment of his country's relations with Ukraine, Russia and Europe have triggered much debate in Europe on the fate of NATO and extended deterrence. Even nations historically very close to the US are beginning to reconsider their security requirements. **Denmark** has expressed openness to hosting nuclear weapons on its soil. PM of **Poland**, Donald Tusk, said in his Parliament that a "profound change in American geopolitics" was putting both Poland and Ukraine into an "objectively more difficult situation". On 14 Mar 2025, the Polish president too repeated this call for the US to base nuclear weapons on Polish soil.

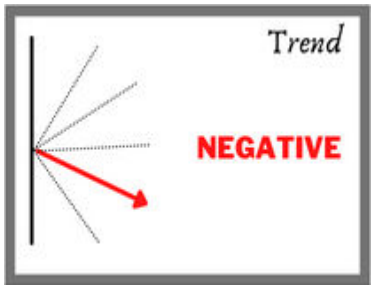
Meanwhile, on March 9, 2025, the **German** Chancellor-in-waiting Friedrich Merz said he would like talks with France and Britain about sharing their nuclear weapons. **France** has offered to extend the French nuclear weapons umbrella to other NATO states.

Meanwhile, in Asia, reports surfaced in early March that the U.S. Department of Energy (DOE) was reviewing whether to classify **South Korea** as a sensitive country on its internal list, a measure that will take effect on April 15. A "sensitive country" is one that requires "particular consideration for policy reasons, including national security, nuclear non-proliferation, regional instability, threats to national economic security, or support for terrorism," according to the DOE website. Such a move by the US to designate Korea as a "sensitive country" in the energy sector is seen as a subtle warning amid growing calls within Korea to develop its own nuclear arsenal. Calls for South Korea to obtain its own nuclear weapons have gained traction amid rising doubts about the effectiveness and commitment of U.S. extended deterrence against North Korea's growing nuclear threats, particularly among conservative politicians and researchers.

Iran

Silky Kaur

Previous Trends: Negative



On January 12, 2025, **Iran** initiated a significant air defense exercise named “Eqtedar” (Might), aimed at safeguarding vital nuclear installations, including the Fordow and Khondab sites, which are central to uranium enrichment and heavy water production. Conducted under the Army’s Air Defense Force within Iran's integrated air defense network, the drill involved advanced missile systems, radar, and electronic warfare units to counter simulated aerial and missile threats.

On February 4, 2025, **United States’** President Donald J. Trump signed a National Security Presidential Memorandum (NSPM) reinstating a policy of maximum pressure on Iran. This directive aims to prevent Iran from acquiring nuclear weapons and intercontinental ballistic missiles while curbing its support for terrorism and missile development. The NSPM instructs the Treasury Secretary to intensify economic sanctions, targeting Iran’s oil exports and those violating existing measures, and mandates cooperation with allies to restore international sanctions. This marks a significant escalation in U.S. efforts to counter Iran’s nuclear ambitions and regional influence.

On February 26, 2025, the International Atomic Energy Agency (IAEA) reported that Iran has significantly increased its stockpile of near weapons-grade uranium, reaching 274.8 kilograms enriched to 60% purity by February 8—an increase of 92.5 kilograms since November 2024. This escalation, detailed in a confidential IAEA document, occurs amidst rising tensions with the United States following President Donald Trump’s election and his reimposition of "maximum pressure" policies. The stockpile, just a technical step from weapons-grade 90% enrichment, heightens concerns about Iran’s nuclear intentions.

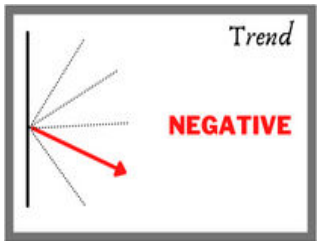
On March 07, 2025, President Trump's letter to Iran's Supreme Leader Ali Khamenei included a firm two-month deadline to negotiate a new nuclear deal, according to U.S. officials. The letter, delivered through diplomatic channels, warned of significant consequences if Iran refuses to engage and continues advancing its nuclear program.

On March 14, 2025, Senior diplomats from Iran, Russia, and China met in Beijing to discuss Tehran's nuclear program, signaling a potential shift toward renewed negotiations. China emphasized the need for diplomacy to prevent escalation, while the discussions covered shared concerns about the nuclear issue. The meeting followed President Trump's recent outreach to Iran's Supreme Leader, proposing talks but warning of possible military action. In response, Iranian President Masoud Pezeshkian rejected negotiations under U.S. threats. Meanwhile, a UN Security Council meeting on Iran's nuclear program and new U.S. sanctions have further strained tensions.

North Korea

Silky Kaur

Previous: Negative



On January 6, 2025, **North Korea** launched a midrange ballistic missile from near Pyongyang, traveling 1,100 kilometers before landing in the Sea of Japan. This event marked the continuation of its aggressive weapons testing into the new year, signaling no slowdown in its nuclear and missile ambitions. The launch coincided with U.S. Secretary of State Antony Blinken's visit to Seoul, where he condemned the test and raised concerns about North Korea's growing military ties with Russia.

On January 28, 2025, North Korean leader Kim Jong Un inspected a nuclear-material production facility and the Nuclear Weapons Institute, urging an increase in the nation's nuclear capabilities. He emphasized the necessity of a robust nuclear deterrent due to ongoing tensions with adversarial nations.

On March 8, 2025, North Korea revealed a nuclear-powered submarine under construction, marking a significant advancement in its naval capabilities. This development, showcased during Kim Jong Un's visit to key shipyards, was reported by the Korean Central News Agency. The submarine, estimated to be a 6,000- to 7,000-ton vessel capable of carrying approximately 10 nuclear-capable missiles, poses a substantial security threat to South Korea and the United States.

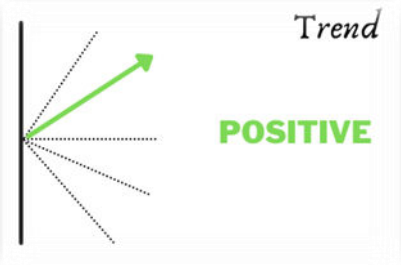
On March 12, 2025, North Korea warned that an accidental bombing by South Korean fighter jets demonstrated the risk of an armed conflict on the Korean Peninsula. The incident occurred on March 6, when two South Korean jets mistakenly dropped bombs on a village near the North Korean border, injuring 29 civilians. Pyongyang condemned the mishap as evidence of escalating military tensions, particularly amid ongoing U.S.-South Korea joint drills. In response, South Korea suspended live-fire exercises, though it maintained that the drills were defensive in nature.

On March 17, 2025, North Korea pledged to enhance and fortify its nuclear capabilities, explicitly rejecting a demand from the G7 foreign ministers issued on March 14, 2025, to dismantle its nuclear program. The Foreign Ministry, through the Korean Central News Agency, asserted that its nuclear forces are an enduring safeguard of national sovereignty and territorial integrity. This stance was framed as a counter to the G7's call for complete denuclearization in line with UN Security Council resolutions. The ministry emphasized that these capabilities ensure stability in the region and beyond, solidifying their legal permanence within North Korean law.

Nuclear Energy

Ngangom Dhruba Tara Singh, Sana Alvira, Rishika Singh

Previous Trend: Positive



Global energy landscape is witnessing a significant transformation with nuclear energy emerging as a pivotal component of decarbonization strategies. From announcement of India's ambitious capacity targets to Belgium's nuclear resurgence and Namibia's strategic partnerships, these developments underscore the growing recognition of nuclear power's role in addressing energy security and climate goals.

In Asia, **India**'s Union Budget 2025-26, outlines a substantial commitment to nuclear energy as a component of India's long-term energy transformation strategy. The government has established an ambitious objective of 100 GW nuclear power capacity by 2047, putting nuclear energy as a significant component of India's energy portfolio. This initiative corresponds with the overarching goals of Viksit Bharat, guaranteeing energy reliability and diminishing reliance on fossil fuels. The Nuclear Power Corporation of India Ltd (NPCIL), the nuclear power operator of India has released a Request for Proposals from 'visionary Indian industries' to fund and construct a planned fleet of 220 MW Bharat Small Reactors to facilitate the decarbonisation of Indian industry. On 17 March, 2025, Unit 7 of the 2 X 700 MW Rajasthan Atomic Power Project (RAPP) at Rawatbhata was connected to the Northern Grid. RAPS-7 is the third reactor of 700 MW series of sixteen indigenous Pressurised Heavy Water Reactors (PHWR) being set up in the country. In **China,** the China National Nuclear Corporation has announced that Unit 1 of the Zhangzhou nuclear power station in Fujian province, the inaugural Hualong One (HPR1000) reactor among six planned for the site, has commenced commercial operation. Rosatom, the **Russian** state-owned nuclear energy corporation, is negotiating the construction of an additional nuclear power facility in **Iran**. Alexei Likhachev, CEO of Rosatom, discussed the plan during the Future Technologies Forum in Moscow, Russia. In January, Iranian President Masoud Pezeshkian visited Moscow

to discuss a partnership agreement concerning energy between the two nations. In **Indonesia,** Thorcon Power Indonesia has filed documentation to Indonesia's nuclear regulatory authority, commencing the licensing procedure for the construction of a nuclear plant with its innovative molten salt reactor technology.

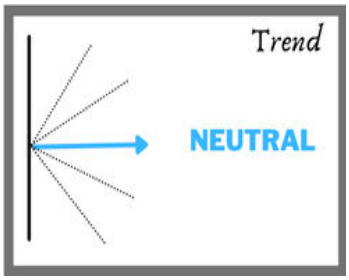
In Europe, the **Dutch** nuclear energy development and consultancy firm ULC-Energy BV has executed a Letter of Intent with the **UK'**s Chiltern Vital Group to partner in providing innovative clean energy solutions for CVG's business park properties. Électricité de France SA (EDF) of **France**, its Italian subsidiary Edison, and **Italy's** nuclear research body ENEA have executed a memorandum of understanding to cooperate on the industrial applications of small modular reactors. **Belgium**'s new administration has announced plans to strengthen the country's reliance on nuclear energy, aiming for a 4 GW share of the country's electricity mix as part of efforts to assure carbon-free baseload capacity. According to a coalition agreement, plans will attempt to "restart" Belgium's nuclear industry, extending the operating life of existing nuclear plants and building new reactors in the coming years.

In Africa, **Namibia,** a major global uranium producer, is establishing itself as a significant actor in the transition to sustainable energy. The government is looking for major investment from China to expand its nuclear power capacity and contribute to sustainable energy solutions. This project was highlighted during China's Foreign Minister Wang Yi's recent trip to Africa.

Nuclear Security

Sanaa Alvira

Previous trend: Neutral



Recent trends in nuclear security highlight the continued vulnerability of civilian nuclear power plants during armed conflicts, the associated security and safeguards challenges, and the security gaps in nuclear material trafficking. The following is an overview of recent incidents that highlight the need to maintain, and perhaps even increase, the momentum in strengthening the global nuclear security order to prevent these trends from taking a more negative turn.

On February 14, **Ukrainian** authorities reported that a Russian drone strike with a high-explosive warhead hit the former Chernobyl nuclear power plant overnight, damaging a shield built to contain radiation after the 1986 disaster. Russia has denied responsibility for the attack. Emergency crews arrived within minutes to extinguish a fire at the site, although flames were seen at times for several hours.

According to the International Atomic Energy Agency (IAEA), its team observed a breach in the outer layer of the New Safe Confinement (NSC) structure following the explosion. The IAEA was informed that radiation levels inside and outside the NSC remained normal and stable, with no reports of causalities.

Chernobyl's Unit 4 reactor was destroyed in the April 1986 accident. The original containment structure built to enclose the damaged unit was not designed for long-term use, leading to the construction of the NSC - the largest mobile land-based structure ever built - which was completed in 2019. The incident follows a recent increase in military activity near Ukraine's Zaporizhzhia Nuclear Power Plant (ZNPP). IAEA Director General Rafael Grossi emphasised the ongoing risks to nuclear safety amid the conflict: "There is no room for complacency, and the IAEA remains on high alert," DG Grossi said. "I once again call for maximum military restraint around Ukraine's nuclear sites."

In addition, new data released by the IAEA in February 2025 highlights ongoing concerns about nuclear security as incidents of illicit trafficking and radioactive contamination persist. While the overall number of reported cases remains consistent with previous years, the presence of illicit activities and contaminated materials continues to raise alarms. According to the IAEA, three of the incidents reported in 2024 were directly linked to illicit trafficking or malicious intent, while authorities were unable to establish criminal involvement in 21 other cases. Most incidents did not appear to involve organised crime, but experts warn that even a single case of nuclear material falling into the wrong hands could have serious global consequences.

A notable trend in 2024 was the increase in radioactive contamination in industrial materials, such as used pipes and metal components, that have unknowingly entered supply chains. 32 of the 145 participating States submitted reports to the IAEA, reflecting continued international efforts to enhance nuclear security.

The IAEA's Incident and Trafficking Database (ITDB), a key component of its nuclear security framework, compiles voluntarily reported information from participating States. All sensitive data provided remains strictly confidential. According to the latest ITDB factsheet, about 53% of all reported thefts of nuclear or radioactive materials since 1993 have occurred during authorised transport.

In the **United States**, the Trump administration has halted planned layoffs of hundreds of federal employees working on the nation's nuclear weapons programmes, reversing course after initial job cuts caused confusion and concern. More than 300 staff at the National Nuclear Security Administration (NNSA) had been sacked as part of cost-cutting measures led by Elon Musk's Department of Government Efficiency (DOGE).

The NNSA oversees the development, maintenance and dismantlement of nuclear weapons, provides nuclear reactors to the US Navy, and manages nuclear emergencies and counter-terrorism efforts. Some sources expressed concern that the DOGE was apparently unaware that the NNSA oversees the nation's nuclear stockpile when it laid off employees.

On a more positive note, **Kenya** has reaffirmed its commitment to strengthening security measures against threats such as terrorism and organised crime through increased international cooperation. At a regional meeting on 18 February attended by officials from at least 20 countries, the Kenya Nuclear Regulatory Authority (KNRA) stressed the need for

stronger prevention and response strategies, citing rapid technological advances and the transnational nature of modern security threats.

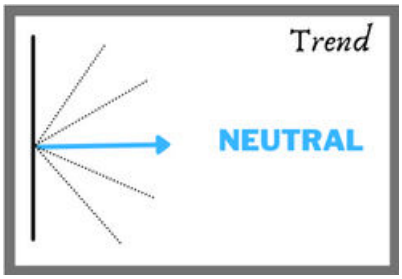
The two-day meeting is the latest step in ongoing efforts to strengthen regional security cooperation under a **European Union**-funded initiative. The programme has established chemical, biological, radiological and nuclear (CBRN) centres of excellence across the region to improve preparedness and response capabilities.

In other welcome news, **Tajikistan's** Chemical, Biological, Radiological and Nuclear Safety Agency has been officially designated as a new IAEA Collaborating Centre for nuclear security. Under a four-year agreement from 2025 to 2029, the Centre will support regional efforts to strengthen nuclear security frameworks. It will focus on assessing nuclear security needs and priorities, strengthening computer security, safeguarding nuclear materials and facilities, and addressing radioactive materials out of regulatory control.

Nuclear Disarmament

Manpreet Sethi

Previous trend: Neutral



Soon after taking office, on March 10, 2025, **United States'** President Trump warned that "monster" nuclear weapons are the biggest threat to humanity and could easily "end the world" tomorrow. He lamented the dangers of stockpiling nukes amid his push to kickstart arms control talks with Russia and China again with the hope that the two countries, as well as the US, could agree to cut their massive defense budgets in half. Just days before saying this, however, President Trump had already signed an Executive Order to modernise the US missile defence. In February, the US Missile Defense Agency asked the defence industry to identify technologies and capabilities available to construct the Iron Dome for America. While this is to shield the U.S. from aerial attacks and deter China and Russia from coercing the U.S. using nuclear weapons, but could drive a three-way arms race thereby nullifying any idea of denuclearisation.

The third meeting of states-parties to the 2017 Treaty on the Prohibition of Nuclear Weapons convened in March in New York. It was attended by 55 States Parties. 31 States attended as observers. A **report**, **declaration**, and a **set of decisions** for advancing the treaty's implementation were adopted.

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Centre for Air Power Studies (CAPS) was established in 2001 as an autonomous defence research and analysis body for research and focused analyses on issues related to national security, defence, and aerospace issues in the evolving strategic and international security environment. Its objective is to facilitate a greater understanding of these issues amongst the Armed Forces, the strategic community, and the public besides contributing to policy generation and decision-making.

CAPS research faculty comprises senior retired and serving Armed Forces officers from the three services besides academic scholars from national universities and retired members from the diplomatic community. CAPS also conducts nuclear strategy capsules for the Armed Forces and officers of security and technological organisations.