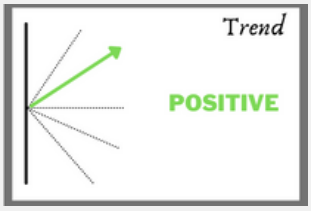
CAPS Nuclear Tracker

Issue VI: October-December 2022

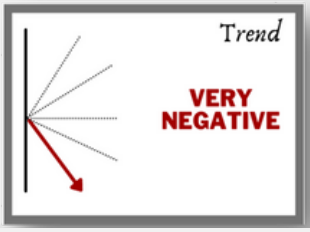
The last quarter of 2022 continued down the same gloomy path on most nuclear issues as was observed in the last nine months. Except for nuclear energy which followed a positive trajectory through the year, on other nuclear issues, the trend lines, at best, remained neutral; most, in fact, turned negative over the course of the year. Russia-Ukraine conflict has contributed to a positive perception of nuclear weapons; stressed inter-state relations are fuelling an offence-defence spiral; concerns persist around the safety and security of nuclear facilities in war zones; and, nuclear arms control and the possibility of nuclear disarmament look very distant as 2022 draws to a close.

NukeNerds at CAPS sign off with the hope that the new year will bring more reassuring tidings on the nuclear front. In any case, you can be sure that we will be keenly tracking all nuclear developments for you. Here's wishing you and yours a very happy new year!

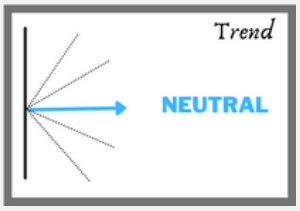
TREND OVERVIEW



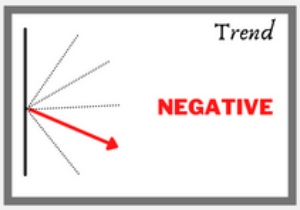
- **Nuclear Energy**
  Dr Dhruba Tara Singh
  Ms Rishika Singh



- **Nuclear Arms Control**
  Dr Manpreet Sethi



- **Nuclear Disarmament**
  Dr Manpreet Sethi
- **Nuclear Security**
  Ms Prachi Lokhande
- **Sea-Based Nuclear Developments**
  Ms Shayesta Ahmed
  Mr Anubhav S. Goswami

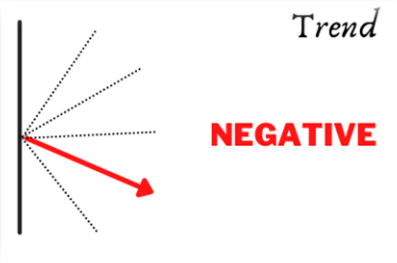


- **Vertical Nuclear Proliferation**
  Ms Shayesta Ahmed
- **Missile Developments**
  Mr Jay Desai
- **Nuclear Proliferation**
  Dr Manpreet Sethi
- **Iran**
  Dr Silky Kaur
- **North Korea**
  Dr Silky Kaur

Vertical Nuclear Proliferation

Shayesta Nishat Ahmed

Previous Trend: Negative



The **United States** Defense Department released its National Defense Strategy, the Nuclear Posture Review (NPR), and the Missile Defense Review, on 27 October 2022. Maintaining a robust and credible extended deterrence commitment and a safe, secure, and effective nuclear deterrent remain the essential priorities for the US nuclear strategy. US President Biden stated that as long as nuclear weapons exist, their primary function is to prevent a nuclear attack on the US, its allies and partners. The NPR also identifies Russia and China as two nuclear-capable peers for the US. Furthermore, the NPR emphasises US commitment to continue focusing on strategic stability, avoiding expensive arms races, and supporting risk reduction and arms control agreements whenever possible.

On 17 October 2022, **NATO** announced its two-week long annual nuclear exercise, "Steadfast Noon" targeted to train aircrews in using US non-strategic nuclear bombs. The exercise was centred at the Kleine Brogel Air Base in Belgium, one of six airbases in Europe that store U.S. nuclear bombs. This was in the backdrop of the largest conventional war in Europe since World War II. According to NATO, Steadfast Noon involved 14 countries (less than half of the 30 NATO allies) and up to 60 aircraft. This included fourth-generation F-16s and F-15Es, as well as fifth-generation F-35A and F-22 fighter jets, tankers and surveillance aircraft. Additionally, a couple of U.S. strategic B-52 bombers were also participants. The exercise witnessed the practise of nuclear sharing, under which the United States installs nuclear equipment on fighter jets of select non-nuclear NATO countries and trains their pilots to carry out nuclear strikes with U.S. nuclear bombs.

Steadfast Noon coincided with the **Russian** annual exercise, Grom, which began on 26 October 2022. The last edition of this exercise was held in February 2022, a few days prior to the outbreak of the Russia-Ukraine conflict on 24 February 2022. The Russian exercises regularly feature the deployment of strategic nuclear systems,

launches of intercontinental ballistic missiles, as well as systems such as new hypersonic weapons, along with large-scale military troop manoeuvres. In late October, Russia said that the accelerated deployment of modernised U.S. B61 tactical nuclear weapons at NATO bases in Europe would lower the "nuclear threshold" and that Russia would take the move into account in its military planning. Russian President Putin in December stated that Russia might look in to modifying its military doctrine of 'no first use', in the event of the increased threat of nuclear weapons, while reacting to the 'preventive blow' statement imbibed in the newest US NPR 2022.

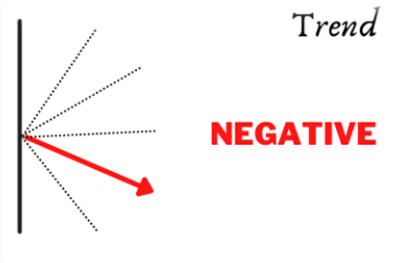
Meanwhile, in accordance with the fiscal 2022 National Defense Authorization Act provision, the US STRATCOM had issued a confidential report to Congress to notify that **China** will "likely field a stockpile of roughly 1,500 warheads by its 2035 timeline". Additionally, the report stated that China had increased its ICBM inventory, which presently sat at 300 ICBMs and launchers.

On 12 October 2022, **French** President Emmanuel Macron stated on French public television network France 2, that France would not use nuclear weapons on Russia in retaliation for the Kremlin's nuclear attack on Ukraine. He claimed that is necessary to preserve ambiguity and the power of deterrence. He reiterated that France has a well-defined nuclear doctrine founded on the core interests of the country.

Additionally, **India** successfully tested its Agni Prime (Agni-P) missile on 21 October. This was the third Agni-P test, following the first in June 2021, and the second in December 2021. The Agni-P is a "new-generation enhanced model of the Agni class of missiles with nuclear capability", equipped with a two-stage canister and a 2,000 km maximum range. According to the ministerial report, the Agni-P missile weighs 50% less than Agni-3 missile, and has modern guidance and propulsion systems. Because it is canistered, it is simple to launch or transfer from a moving vehicle and can be kept in storage for longer periods. Furthermore, on 15 December 2022, India carried out night trials of Agni V nuclear-capable ballistic missile which can hit targets beyond 5,400 km.

Missile Developments

Jay Desai



On October 4, 2022 the **DPRK** conducted a total of six missile tests. These includedthat of the Hwasong-12, an intermediate-range ballistic missile, which flew over Japan and had last been tested in 2017. On November 2, 2022 the DPRK tested in a single day the largest number of missiles ever. South Korean officials counted twenty-three short range missiles fired by the DPRK. One of these missiles was a short range ballistic missile which came dangerously close and then crossed the Northern Limit Line which is a defacto maritime buffer zone between DPRK and South Korea. The DPRK in the past has never officially crossed this Northern Limit Line until November 2, 2022, nor has it fired a missile over it earlier. As a result of all this South Koreans heard the first air raid siren in six years inside their country forcing them to take shelter in underground bunkers. The South Korean President Yoon Suk-Yeol called it an "Effective territorial encroachment". South Korea conducted "Vigilant Storm" operation, its largest combined military air drills with the US. In the five-day exercise, 240 warplanes, thousands of service members from the militaries of both countries participated. For the first time US and South Korea responded by firing a surface to air missile near the DPRK's territorial waters.

On October 14, 2022 India tested its K-15 Submarine Launched Ballistic Missile (SLBM) from INS Arihant. K-15 has a range of 700km, giving it the limited capability to hit the lower parts of Pakistan. On October 21, 2022 for the third time India tested the AGNI-P missile. On November 2, 2022 India tested its ballistic missile defence interceptor called AD-1. Furthermore, in December 2022, India had carried out night trials of the Agni V nuclear-capable ballistic missile which can hit targets beyond 5,400 km.

In October 2022, Russia conducted its annual nuclear exercises. These involved testing of its nuclear tipped missiles. Though it is unclear as to which nuclear tipped

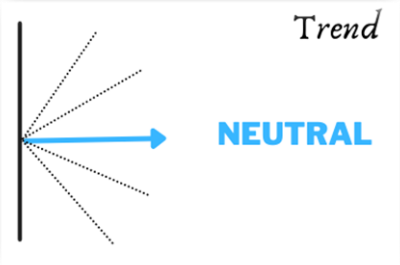
missile was tested. Around November 24, 2022 media reported that the gigantic SARMAT ICBM entered serial production in Russia. The SARMAT is expected to be inducted in Russia's Strategic Rocket Forces by end of this year. SARMAT is a three stage, liquid fueled ICBM with a range of 18000kms. The SARMAT was first tested in April 2022, following that in May 2022, Dmitry Rogozin who is former chairman of Roscosmos has said SARMAT would enter mass production with 48 of them being built.

Sea-Based Nuclear Developments

Shayesta Nishat Ahmed

Anubhav Shankar Goswami

Previous Trend: Neutral



In an effort to circumvent the U.S.-ROK missile defence systems, North Korea conducted its most recent submarine-launched ballistic missile (SLBM) test on September 25 from an inland reservoir, according to a report released by North Korean state media KCNA. However, the South Korean military said shortly thereafter that such weapons are only "effective" when launched from a submarine. According to Ankit Panda, Stanton Senior Fellow at the Carnegie Endowment for International Peace, "the lake-based SLBMs can still substantially complicate wartime targeting and planning," and added, "they won't be quite as mobile as submarines, but it'll still be another possible vector for nuclear weapons delivery that South Korea will need to plan around".

On 14 October 2022, the Indian Defence Ministry reported that **India** successfully tested a SLBM from *INS Arihant*, the country's first nuclear ballistic missile submarine (SSBN), with "excellent precision." The Bay of Bengal test proved "crew proficiency" and confirmed the nuclear submarine programme, which the government described as "a crucial aspect of India's nuclear deterrence capabilities." Although the precise type of missile used in the test is unknown, some experts think it was either the K-15 or the K-4 missile system.

The *USS West Virginia*, a UN Navy SSBN, visited its Indian Ocean military station at Diego Garcia in October, according to a rare revelation this week. The SSBN visited the facility between October 25 and October 31. The submarine "stopped at Diego Garcia for a brief port visit…during an extended deterrent patrol providing security and stability to our Allies," according to a statement issued by the US Strategic Command. The submarine had surfaced in the Arabian Sea and "participated in a joint,

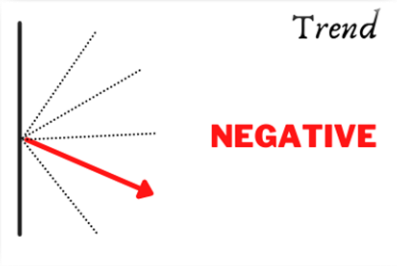
US Strategic Command-directed communications exercise to validate emerging and innovative tactics in the Indian Ocean", according to the statement.

China's six *Jin*-class SSBNs are currently "equipped with JL-3 intercontinental ballistic missiles," according to Admiral Sam Paparo, commander of the U.S. Pacific Fleet, who was speaking to military reporters at a conference in Washington on Nov. 18. According to Navy Admiral Charles A. Richard, the head of the United States Strategic Command, the third-generation JL-3 SLBM "allows the People's Liberation Army Navy's (PLA Navy) now six JIN-class ballistic missile submarines to target the continental United States from a protected bastion within the South China Sea." According to the Global Security website, the JL-3's range is predicted to be more than 10,000 kilometres (6,214 miles).

Nuclear Proliferation

Manpreet Sethi

Previous Trend: Negative

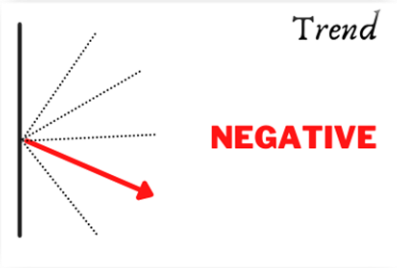


Early October India drew attention of the UNSC on proliferation of nuclear technologies from North Korea to Pakistan. India mentioned that it had received inputs that certain nuclear materials provided to Pakistan Atomic Energy Commission by Suntech Technology Company Ltd of China were being diverted to North Korea in violation of UNSC sanctions.

Iran

Silky Kaur

Previous Trend: Negative



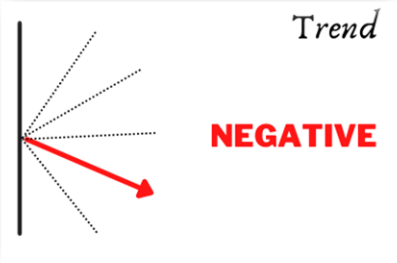
A revised nuclear deal was about to come into being in March and August, but now there seems to be no hope. The talks have been stalled since August 2022 and appear impossible in the wake of ongoing protests and demonstrations against the regime. Meanwhile, in November 2022, Iran announced an expansion of its nuclear enrichment program. It has started enriching uranium at the Fordow facility to 60 percent. This uranium enrichment is being done in response to three new situations developed in the last three months. Firstly, it is a response to a rebuke by the IAEA over the alleged existence of three undeclared nuclear sites; secondly, it is a response to the international condemnation of Iran's crackdown on protesters; and thirdly, it is a response to the condemnation by Western countries of its collaboration with Russia by selling missiles and drones. Western countries like Britain and France view the Iranian supply of missiles and drones to Russia as a breach of Iran's obligations under the 2015 nuclear deal. Many media outlets also reported that Iran seeks Russia's help to bolster its nuclear program.

Iran also began building a new nuclear power plant in the country's southwest in the first week of December 2022. The plant will be made in the oil-rich province of Khuzestan in Iran, which is close to the western border with Iraq. The construction of the new 300 megawatt Karoon plant will take eight years and cost about $2 billion. On December 11, 2022, the foreign minister of Saudi Arabia stated that if Iran were to acquire nuclear weapons, its Gulf Arab neighbors would take action to strengthen their security.

North Korea

Silky Kaur

Previous Trend: Negative



This year North Korea launched eight intercontinental ballistic missiles (ICBM) and carried out nearly 60 ballistic missile tests. In October, North Korea fired multiple ballistic missiles, including one without warning over Japan. In an unusual development on November 2, 2022, North Korea fired 23 missiles of different types to the east and west of the Korean peninsula, including an ICBM on Japan that forced Japan to issue an evacuation alert and halt trains. On November 18, 2022, North Korea test-fired a new kind of ICBM. These series of missile launches were a response to military drills between the US and South Korea, including the redeployment of the US carrier USS Ronald Reagan near the Korean peninsula. All of this was much criticized by North Korea. Japan's Prime Minister Fumio Kishida called the launches "intolerable." South Korea's President Yoon Suk Yeol ordered the "active execution" of strengthened extended deterrence measures against North Korea. In response to all these tests, US and its allies imposed sanctions on three North Korean senior officials associated with the barrage of missile tests.

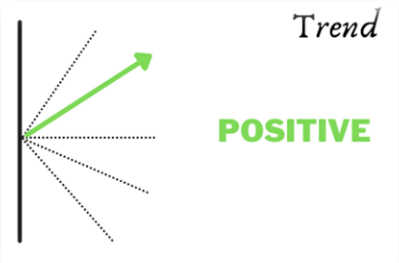
In November and December 2022, South Korea urged China to actively support South Korea's efforts for dialogue with North Korea and asked China to help dissuade North Korea from further pursuing the development of nuclear weapons and missiles. In response, China agreed to play a constructive role on the Korean Peninsula. In November 2022, Rafael Grossi, the director general of the International Atomic Energy Agency (IAEA), traveled for four days to South Korea amid growing worries that North Korea is on the cusp of another nuclear weapon test. According to reports, Tunnel 3 at the Punggye-ri nuclear test site has been ready for the test since May 2022.

Nuclear Energy

Rishika Singh

Dhruba Tara Singh

Previous Trend: Positive



The trend for nuclear energy remained positive for all of 2022, including the October-December quarter. It received attention from the climate perspective at the COP27 climate conference in Sharm El-Sheikh in November as an important power source to contribute to a sustainable net zero emission future. Across various regions of the world, there has been an uptick in new build and nuclear cooperation agreements.

Nuclear energy cooperation is advancing significantly across Eurasia and North America. In Eurasia, **Belarus** and **Russia** on December 08, 2022, revealed that both countries are preparing a roadmap for bilateral cooperation in training nuclear energy industry personnel. On December 07, 2022, **Kazakhstan's** Kazatomprom announced that 30 tons of low-enriched uranium have been sent in the form of nuclear fuel assemblies to nuclear power stations in **China.** On December 07, 2022, the **United States** and the **United Kingdom** decided to advance nuclear energy as a safe and reliable part of the clean energy transition. This comprises deepening global cooperation on nuclear fuels and advanced nuclear technologies. The **United States,** on November 26, 2022, declared its assistance to **Thailand** in the development of nuclear power in the country. The former will assist in the deployment of small modular reactors. On November 03, 2022, the **United States** and **Poland** announced a strategic partnership to launch Poland's civil nuclear program. The US welcomed Poland's decision on selecting US-based Westinghouse as a technology provider for their civil nuclear project.

National nuclear energy programmes are also looking upbeat. On December 07, 2022, the **Indian** government approved five new sites for nuclear power plants and gave the financial permission to build 10,700 MW pressurized heavy water reactors. Again on December 14, Minister of State, Mr Jitendra Singh, announced in

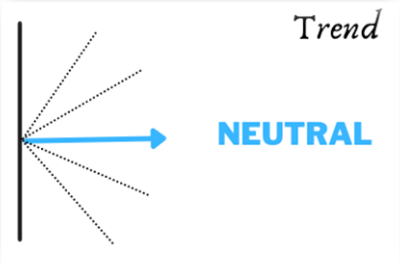
the Lok Sabha that **India** plans to commission 20 nuclear power plants by 2031. This will add 15,000 MW in power generating capacity. **Japan** has concluded that nuclear power generation is essential to attain a stable electricity supply and to decarbonize society in its draft nuclear policy. The new policy would allow nuclear power plants to operate beyond the present limit of 60 years, and would also lead to the development of next-generation nuclear power plants. Amidst ongoing energy crisis, on October 17, 2022, **Germany** decided to create a legal basis to permit the operation of the nuclear power plants Isar 2, Neckarwestheim 2, and Emsland until April 15, 2023. The **United Kingdom** government announced on November 29, 2022 that it is taking over 50% stakes in Sizewell C nuclear project from China General Nuclear. Finally, on December 12,2022, the **United States** announced a breakthrough in nuclear fission technology.

Developments in **Small Modular Reactor (SMR)** technology are taking place worldwide. SMR designs and manufacturing provides benefits of lower costs and shorter gestation period, at the same time it provides the flexibility to fit in large or small grid or remote off-grid areas as well. **India** called for the country's private sector companies and start-ups to take part in the development of SMR technology as it finds a place in country's clean energy transition. **China's** SMR demonstration project at the Changjiang nuclear power plant has entered installation phase. On December 9, 2022, the **United States** and **Ukraine** have announced a project to demonstrate the production of hydrogen and ammonia using SMR and innovative electrolysis technologies in Ukraine. NuScale Power, Shell Global Solutions and other research participants will develop a clean hydrogen production system from the SMR power plants to enable decarbonisation and support energy transition. The site preparation is underway for Canada's first grid-scale SMR at Ontario Power Generation's Darlington site in **Canada.** The initial geological survey has been completed at a proposed SMR at the Temelin nuclear power site in **Czech Republic**.

Nuclear Security

Prachi Lokhande

Previous Trend: Neutral



The safety and security of nuclear power reactors in the war zone in Ukraine remained a source of concern over the last quarter. G7 Non-proliferation Directors Group (NPDG) issued a statement in October in support of the IAEA's efforts to promote nuclear safety and security at the Zaporizhzhya Nuclear Power Plant in **Ukraine**. Since the past four months, the IAEA has maintained a staff of four specialists at Zaporizhzhya. They are working around the clock to maintain the power plant's safety and security and to avert a nuclear catastrophe. IAEA DG Grossi has ensured the viability of the plants and that the reactors are "ready to be fired up" once they can be operated safety and Ukraine's electricity grid is ready to transmit power. Meanwhile, international nuclear monitors claim they are getting closer to a deal between Ukraine and Russia that would create a security perimeter around Zaporizhzhya. Grossi has repeatedly issued a warning that the creation of a safety zone surrounding the facility is "an absolute and urgent need."

In December 2022, Rafael Grossi, mentioned that IAEA had conducted a nuclear safety and security mission to the South Ukraine Nuclear Power Plant (SUNPP) in December as part of its increased efforts to help prevent a nuclear accident. The mission, which was requested by Ukraine, was one of a series of IAEA missions to help the nation's Nuclear Power Plants (NPPs), including the SUNPP as well as the Rivne and Khmelnitsky NPPs and the Chornobyl site, to which the IAEA has dispatched a mission, with on-site assistance and support in nuclear safety and security.

US Congress too approved a package of US$ 35 million to prepare Ukraine for any accident to its nuclear facilities. The funds were meant to support procurement and maintenance of additional radiation sensors, data assessment and analysis, equipment and supplies for the National Guard of Ukraine for protective capabilities

at nuclear facilities, counter nuclear smuggling equipment for the Ukraine State Border Guard and potentially consolidation of radiological material.

Meanwhile on other news, an IAEA team of International Nuclear Security Advisory Service (INSServ) to **Sudan** reported that the country has strengthened its national nuclear security regime by implementing extensive nuclear security systems and measures in relation to materials out of regulatory control. The team concluded a nuclear security mission to the country in Dec 2022 and has encouraged Sudan to further enhance its relevant nuclear security detection and response systems.

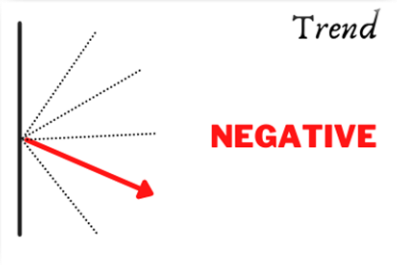
In Asia, in October 2022, US President Biden expressed concern around the safety and security of **Pakistan**'s nuclear assets owing to the presence of Islamist groups. But elsewhere in Asia, IAEA mission teams visited many countries to help with their nuclear programmes. One such mission to **Malaysia** reported that the country was committed to improving its national nuclear security regime, including by strengthening coordination between relevant national authorities and by enhancing radiation detection capabilities at its borders. IAEA mission of the Integrated Regulatory Review Service (IRRS) reviewed **Bangladesh**'s regulatory framework for nuclear and radiation safety as the country embarks on nuclear power programme. Using IAEA safety standards and international good practices, IRRS missions are designed to strengthen the effectiveness of the national regulatory infrastructure for nuclear and radiation safety, while recognizing the responsibility of each country. The IRRS team concluded another mission to **Bosnia and Herzegovina**, and hosted by the State Regulatory Agency for Radiation and Nuclear Safety (SRARNS) to review the national regulatory framework for nuclear, radiation, radioactive waste and transport safety.

An IAEA team of experts said that **Finland** is committed to the safe, secure, and sustainable management of radioactive waste as it nears completion of the world's first geological disposal facility for spent fuel. The team also emphasized the need to reduce complexities in Finland's legal and regulatory framework when revising its Nuclear Energy Act.

Nuclear Arms Control

Manpreet Sethi

Previous Trend: Extremely Negative



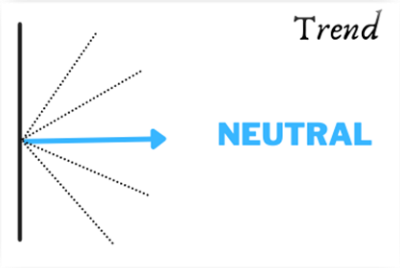
On 28 November 2022, **Russia** called off the New START (Strategic Arms Reduction Treaty) Bilateral Consultative Commission meeting with the United States, which intends to discuss treaty implementation and verification regarding the 2010 New START. As there has been a three-year break in the treaty's on-site inspections of nuclear weapon-related sites, a feature of the New START verification regime, the U.S. State Department reaffirmed its commitment to resuming the meeting as soon as possible.

No other arms control negotiations are currently going on between any other nuclear dyads. However, the only bright spot has been that the latest US NPR announced in October 2022 at least says that the United States "will seek opportunities to pursue practical steps to advance the goals of greater transparency and predictability, enhanced stability, reduced reliance on nuclear weapons and, ultimately, a world without nuclear weapons." It further states that "Mutual, verifiable nuclear arms control offers the most effective, durable and responsible path to reduce the role of nuclear weapons in our strategy and prevent their use. It remains to be seen how the US will realise the objective.

Nuclear Disarmament

Manpreet Sethi

Previous Trend: Neutral



On October 31, draft resolution titled "Steps to building a common roadmap towards a world without nuclear weapons was submitted by Govt of Japan to First Committee of UN General Assembly. Based on the Hiroshima Action Plan proposed by PM Kishida at the NPT RevCon, the resolution emphasises the importance of continued norm of non-use of nuclear weapons, enhancing transparency as well as disarmament and non-proliferation education. As a follow up on this, on Dec 2, Japan's Ministry of Foreign Affairs announced a 15-member International Group of Eminent Persons on a world without nuclear weapons.

On 15-16 Nov 2022, the G-20 Summit was held at Bali. Though primarily a grouping with a focus on economic issues, the Bali Leaders' Declaration acknowledged that security conditions could adversely impact economic recovery and growth. A statement in para 4 reads, "the use or threat of use of nuclear weapons is inadmissible."

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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.