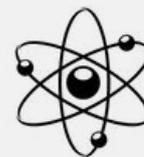




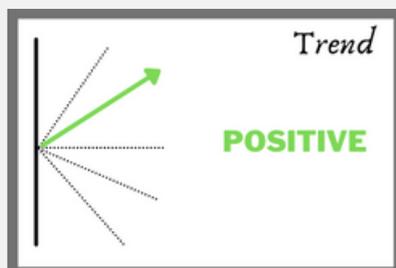
CAPS Nuclear Tracker



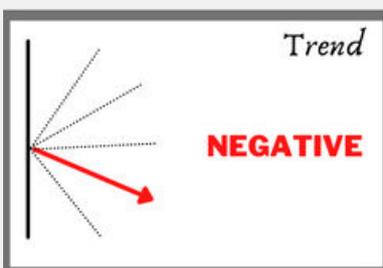
Issue 13: July - September 2024

Russia announced a new nuclear doctrine this September. The timing coincided with the address of President Zelenskyy to the UN General Assembly and his presentation of a victory plan to the US President. Russia's new nuclear doctrine now includes the threat of nuclear attacks against non-nuclear states that act with the participation or support of a nuclear weapon state. This change is likely meant to influence any decision being made in the US on allowing Ukraine to use long-strike weapons against targets deep in Russia. Evidently, nuclear brinkmanship continues even though the doctrinal change is not as momentous as was expected. Meanwhile, North Korea remains super active, and the Iranian issue is as knotty as ever despite the placatory remarks of the new Iranian President. Except on nuclear energy, where India has made some important decisions, the mood remains glum at the end of this penultimate quarter of 2024.

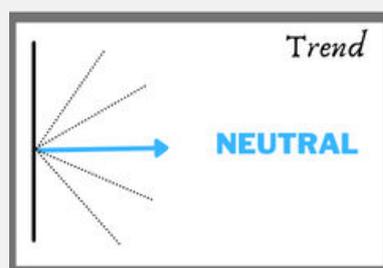
TREND OVERVIEW



- **Nuclear Energy**
Dr Dhruva Tara Singh
Ms Rishika Singh
Ms Ritika Maurya



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

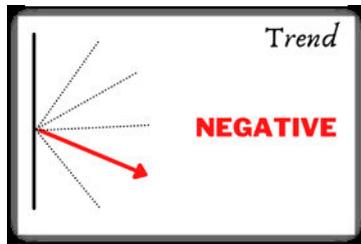


- **Sea-Based Nuclear Developments**
Mr Javed Alam
- **Nuclear Security**
Ms Prachi Lokhande

Missile Developments

Javed Alam

Previous Trend: Negative



North Korea continued testing missiles of different ranges in the third quarter of 2024. On July 2, 2024, it was [reported](#) that North Korea had test-fired a new tactical ballistic missile capable of carrying a super-large warhead. The missile North Korea tested was the Hwasong-11Da-4.5, which can carry a 4.5-ton super-large warhead. Hwasong-11 Da-4.5 is a Short-Range Ballistic Missile with a reported range of 600 km. On September 12, 2024, North Korea again [fired](#) multiple short-range ballistic missiles off its east coast.

In South Asia, **India** and **Pakistan** have tested missiles to validate their operational and technical parameters. Pakistan [conducted](#) the training launch of its surface-to-surface ballistic missile, Shaheen-II, on August 20, 2024. Shaheen-II is a Medium-Range Ballistic missile with a reported range of 1,500 to 2,000 km. The missile has been operational since November 2014. India, on the other hand, [launched](#) an intermediate-range ballistic missile, Agni-IV, on September 6, 2024. Agni-IV has a reported range of 3,000 to 4,000 km. In another important open-source intelligence analysis, the Federation of American Scientists reported that Pakistan's JF-17 now have a nuclear mission with the integration of Ra'ad-I air launched cruise missile.

In a significant open-source intelligence development, two US researchers [identified](#) “the probable deployment site in **Russia** of the 9M730 Burevestnik, a new nuclear-powered, nuclear-armed cruise missile.” The identification suggested that Russia is moving ahead with the cruise missile's deployment. The missile, however, has a poor test [record](#). According to the Nuclear Threat Initiative (NTI), the Burevestnik has been tested at least 13 times with only two partial successes.

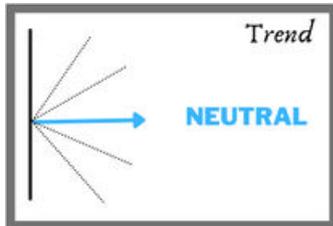
In other news, it was [reported](#) that the cost of modernising the **US** Air Force's nuclear missile arsenal would be approximately \$141 billion. Due to the review of the Sentinel Programme, the cost has been estimated to be 81% more than previous projections. The Sentinel Programme is being developed to replace Minuteman III intercontinental ballistic missile system.

In another significant development concerning ballistic missile tests, **China**, in a rare show of strength, [tested](#) an ICBM. The test is important because it is China's first ICBM test in over 40 years. The test further determined that China is moving ahead with its planned nuclear modernisation. The test is also significant as the designated area of test was the Pacific Ocean, which shows that China is flexing its ICBM capabilities in the Pacific Ocean.

Sea-Based Nuclear Development

Javed Alam

Previous Trend: Neutral



In a significant development to boost its credible minimum deterrence posture, **India** on August 29, 2024 [commissioned](#) its second Arihant-class nuclear-powered ballistic missile submarine (SSBN). Defence Minister Rajnath Singh, while commissioning the SSBN, stated that “the capabilities of *Arighat* exceed those of first-in-class INS *Arihant*.” The Indian Ministry of Defence also [stated](#) that “the presence of both INS *Arihant* and INS *Arighat* will enhance India’s capability to deter potential adversaries and safeguard its national interest.” In another news with the help of open-source intelligence, the US based Federation of American Scientists (FAS) on August 13, 2024, have [reported](#) that “one of India’s oldest naval missiles capable of launching nuclear weapons has likely been retired.” The FAS has reported that the ‘Dhanush’ which is a variant of India’s Prithvi short-range ballistic missile has now been retired.

While the on-going war between Russia and Ukraine is yet to see any resolution, a new [report](#) has suggested that **Russia** has been training its navy to “target sites deep inside Europe using nuclear-capable missiles in a potential conflict with NATO.” The secret files, which predates Russia-Ukraine war, [seen](#) by *Financial Times* have demonstrated how Russia has included “a target list for missiles that can carry either conventional warheads or tactical nuclear weapons.”

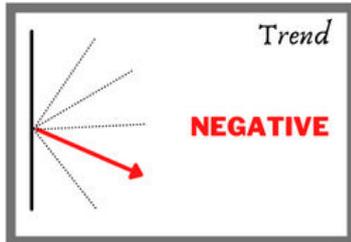
The Nuclear Notebook on July 14, 2024, [published](#) its **North Korean** nuclear weapons, 2024 report. The report mentioned that North Korea has managed to develop five versions of Pukguksong missiles, which are its primary SLBM. The report also mentioned that North Korea now has a new type of smaller SLBM which bears resemblance to the KN23 SRBM. The Nuclear Notebook has also [referred](#) to the development that North Korea is building new submarines to match its sea-based missile programme. Another important

sea-based nuclear development which the report has mentioned is the development of submarine-launched cruise missile. This new cruise missile known as Pulhwasal 3-31 and is nuclear-capable. Lastly, the [report](#) also mentioned the continuous development of North Korea's underwater weapon system known as Haeil. North Korea describes Haeil as "stealthily infiltrating into operational waters and making a super-scale radioactive tsunami through an underwater explosion to destroy naval strikes groups and major operational ports of the enemy."

Vertical Nuclear Proliferation

Prahlad Kumar Singh

Previous Trends: Negative



On August 29, 2024, the **Indian** Navy [commissioned](#) its second Arihant-class nuclear-powered ballistic missile submarine (SSBN) INS *Arighat* in Visakhapatnam. India’s Defence Minister Rajnath Singh said the *Agrihat* would further strengthen India’s three-tier retaliatory nuclear deterrent capability, enhancing maritime strike alongside its existing land and areal-based capacity to deliver strategic weapons.

As per a [report](#) by the *Federation of American Scientists* titled “Indian Nuclear Weapons, 2024,” India is modernising its nuclear arsenal and has added at least four new weapon types and a number of new delivery systems, such as aircraft, land-based, and sea-based platforms. A few of these new systems are nearly complete and will be put into service shortly. India likely possesses enough plutonium for 130-210 nuclear bombs, but it has only produced roughly 172 of them so far.

The restoration of nuclear capabilities on approximately thirty B-52 bombers—which were converted to conventional use ten years ago under the terms of the New START arms control treaty—[is estimated](#) by the **U.S.** Air Force to cost \$4.5 billion. Congress is debating this amendment to bolster the U.S. nuclear arsenal as the pact expires in 2026. After treaty constraints are lifted in 2026, the conversion process will begin and is anticipated to be completed by 2029. The Air Force claims it can handle the job during routine maintenance, despite concerns from critics that it may interfere with existing B-52 modernisation operations.

China [declined to sign](#) the ‘Blueprint for Action’ pact, which aims to stop A.I. from being in charge of nuclear weapons. More than 100 nations, including the U.S., backed this accord, which was covered during the Responsible A.I. in the Military Domain (REAIM)

forum in Seoul on September 10, 2024. It tries to maintain human control in all nuclear weapon decisions, although it is not legally enforceable.

South Korean intelligence [claims](#) that **North Korea** has [successfully modified](#) the Hwasan-31 tactical nuclear warhead for use on a variety of weapons, including multiple rocket launch systems and short-range ballistic missiles. The warhead was unveiled in March last year and has since been sufficiently standardised and reduced in size to be installed on cruise missiles such as the Hwasal-1 and Hwasal-2, which have a range of more than 2,000 km, as well as KN-23, KN-24, and KN-25 missiles. It is also capable of being installed on underwater attack drones and ballistic missiles launched from submarines, which is a major development in North Korea's nuclear weapons arsenal, which mainly targets South Korea.

North Korea is modernising and expanding its nuclear arsenal. A recent report from the *Federation of American Scientists* [estimated](#) North Korea has enough material to potentially build up to 90 warheads, though likely having assembled around 50. The country is also improving its missile delivery systems, adding new solid-fuel long-range, short-range tactical, and sea-based missiles.

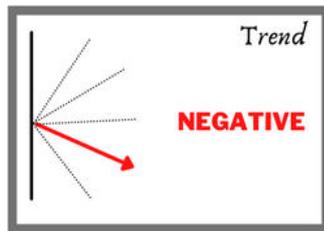
Two American researchers [claimed](#) that they have located the likely **Russian** deployment location for the 9M730 Burevestnik, a newly developed nuclear-armed cruise missile that President Putin has referred to as “invincible.” According to him, the weapon NATO has called the SSC-X-9 Skyfall can avoid American missile defences and has an almost infinite range. However, several Western analysts contest his assertions and the Burevestnik’s strategic significance, arguing that it will not confer any new capabilities upon Moscow and runs the risk of causing a radioactive accident.

On September 17, 2024, the head of **Russia’s** nuclear test site [said](#) that the facility is ready to restart nuclear testing “at any moment” if the government gives the order. This rare statement raises concerns about the increasing risk of such tests. Russia hasn’t tested nuclear weapons since 1990. However, some experts believe President Putin might consider a test to warn the West, especially if Ukraine uses long-range missiles to attack Russia.

Iran

Dr. Silky Kaur

Previous Trend: Negative



According to a recent IAEA report released on August 29, 2024, **Iran** has further [increased](#) its stockpile of uranium enriched close to weapons-grade levels, defying international demands. As of August 17, Iran possesses 164.7 kilograms of uranium enriched up to 60%, marking a 22.6-kilogram rise since the previous IAEA report in May. Uranium enriched to 60% is just a small technical step from reaching 90%, which is considered weapons-grade.

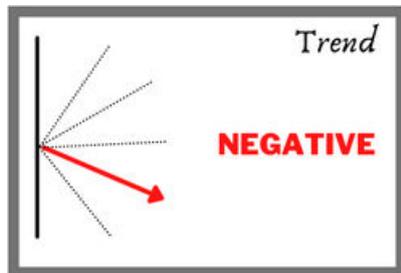
After Masoud Pezeshkian's election as Iran's president in July 2024, his administration [hinted](#) at potential adjustments in the nation's nuclear stance. During his campaign, Pezeshkian had called for improving relations with the West and expressed support for resuming nuclear negotiations, but emphasized that Iran would not be pressured into reducing its nuclear activities. On August 27, 2024, Supreme Leader Ayatollah Ali Khamenei [approved](#) limited engagement with the U.S. but advised caution, signaling that Iran could make tactical retreats when necessary. Khamenei's remarks [aligned](#) with Pezeshkian's cautious approach to negotiations, as Tehran continues to enrich uranium to near weapons-grade levels. Despite the transition in leadership, there has been no fundamental [shift](#) in Iran's nuclear policy, with uranium enrichment continuing at levels close to weapons-grade, maintaining Iran's defiance of international pressure.

On Wednesday, September 18, 2024, Behrouz Kamalvandi, a senior Iranian official, [met](#) with an Italian foreign ministry representative in Vienna during the 68th IAEA General Conference. The discussion focused on Iran's concerns regarding the lack of commitment from certain signatories of the Joint Comprehensive Plan of Action (JCPOA). Iran's Foreign Minister, Seyed Abbas Araghchi, [announced](#) on September 23, 2024, that Tehran is ready to resume nuclear negotiations immediately if other parties are willing. He made the statement while attending the UN General Assembly in New York, signaling Iran's interest in re-engaging with world powers to revive the 2015 nuclear deal (JCPOA).

North Korea

Dr. Silky Kaur

Previous Trend: Negative



In July 2024, the U.S. and South Korea [signed](#) their joint nuclear deterrence guidelines, a significant step aimed at enhancing their ability to respond to **North Korea's** growing nuclear threats. This agreement, authorized by President Joe Biden and South Korean President Yoon Suk Yeol during a NATO summit, builds on the establishment of the Nuclear Consultative Group a year earlier, which focuses on integrating U.S. nuclear assets with South Korean conventional weapons in case of contingencies. In response, North Korea [issued](#) threats to further boost its nuclear capabilities, warned the U.S. and South Korea will pay “an unimaginably harsh price”. The move comes amid heightened regional tensions and ongoing North Korean missile tests, as well as concerns over a growing North Korea-Russia alliance.

On September 10, 2024, North Korean leader Kim Jong Un again [announced](#) plans to “exponentially” increase the country’s nuclear weapons arsenal. Speaking during North Korea’s 76th founding anniversary, Kim emphasized the need to strengthen the nation’s nuclear capability to address threats from the U.S. and its allies. He underscored the importance of ensuring North Korea’s nuclear readiness at all times to safeguard state security. This statement follows increased tensions in the region, with the U.S., South Korea, and Japan condemning Pyongyang’s growing nuclear and missile activities. Additionally, the United Nations Command (UNC), led by U.S. forces in South Korea, has gained increased international involvement, with Germany recently joining the UNC in August 2024. The UNC helps police the border with North Korea, a move Pyongyang has criticized as raising tensions, calling the organization an “illegal war organization.”

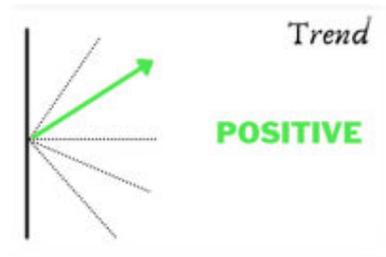
North Korea, on September 13, 2024, [released](#) images for the first time showing its uranium enrichment facility, marking a significant development in its nuclear program. During a visit to the Nuclear Weapons Institute, leader Kim Jong Un called for boosting the number of centrifuges and increasing the production of weapons-grade nuclear material. The photos displayed Kim touring a facility with rows of centrifuges, revealing North Korea's advancements in nuclear fuel production, which are banned under U.N. Security Council resolutions. This event underscores Pyongyang's ongoing efforts to expand its nuclear capabilities.

Moreover, on September 19, 2024, North Korean leader Kim Jong Un [supervised](#) successful tests of two types of missiles, including the Hwasongpho-11-Da-4.5 ballistic missile, which is designed to carry a "super-large conventional warhead" and was tested to verify its ability to accurately hit targets within a range of 320 kilometers. The second missile tested was an improved "strategic" cruise missile, likely intended for a nuclear warhead. These missile launches, are part of Kim's directive to enhance North Korea's military capabilities amid escalating tensions with the U.S. and South Korea. Following the tests, Kim emphasized the need to bolster both nuclear and conventional forces, asserting that a strong military is essential for deterring potential invasions.

Nuclear Energy

Rishika Singh, Ritika Maurya, Ngangom Dhruva Tara Singh

Previous Trend: Positive



According to the International Atomic Energy Agency (IAEA), the global nuclear power generation is anticipated to undergo substantial growth, with its capacity likely to reach 950 GW by 2050. Several Asian countries, such as South Korea, India, and China, are intensifying their nuclear energy initiatives, implementing significant projects to expand capacity and decrease dependence on fossil fuels. Furthermore, European and Central Asian countries such as the Czech Republic and Uzbekistan are progressing with their initiatives to develop small modular reactors, therefore signalling a global transition towards nuclear power as a prominent energy source in the years to come.

According to the **IAEA**, the global nuclear power generation capacity is [projected](#) to go beyond initially anticipated levels, reaching up to 950 GW by 2050. The IAEA, in a study released on September 16, updated its yearly forecast for the fourth consecutive year, indicating that worldwide nuclear capacity has the potential to increase by 2.5 times its present level by the middle of the century. The IAEA stated that small modular reactors (SMRs) will offer a substantial contribution to increased nuclear power production.

In Asia, Republic of **Korea** for the first time ever, nuclear power has [produced](#) more energy in South Korea than coal or natural gas this year, marking a significant achievement in one of the leading importers of fossil fuels globally. During the first half of 2024, nuclear power constituted 32% of South Korea's energy generation mix, surpassing coal and natural gas, which each held a 28% share.

The installed nuclear power capacity in **India** is [projected](#) to triple by 2031-32. The current installed nuclear power capacity is projected to rise from 8180 MW to 22480 MW between 2031 and 2032. The Union Minister of State for the Department of Atomic Energy

highlighted that India's nuclear power capacity has experienced a growth of 70 percent during the past decade, rising from 4,780 MW in 2013-14 to 8,180 MW presently. The yearly electricity production from nuclear power stations has risen from 34,228 million units in the fiscal year 2013-14 to 47,971 million units in the fiscal year 2023-24. It has been observed that the present built nuclear power capacity in the nation amounts to 8,180 MW, distributed among 24 nuclear power reactors.

On September 11, 2024, the Government of **India** [granted](#) approval to Anushakti Vidhyut Nigam Ltd. (ASHVINI), a Joint Venture (JV) between Nuclear Power Corporation of India Limited (NPCIL) holding 51% and NTPC Ltd. holding 49%, to construct, own, and operate nuclear power plants in India in compliance with the Atomic Energy Act. The government has granted NPCIL an exemption to invest above Rs. 500 crore and NTPC an exemption to invest over Rs. 5,000 crore in a single joint venture or subsidiary company. This will facilitate sufficient funding for the expedited expansion of Nuclear Power capacity in India.

The **Indian** government intends to [install](#) 40 to 50 nuclear reactors in collaboration with the private sector during the next decade. This constitutes a segment of the 220-megawatt Bharat Small Reactor (BSR) that Finance Minister Nirmala Sitharaman announced in her budget address in July. The declaration formally altered India's nuclear strategy, as the Atomic Energy Act of 1962 prohibited private enterprises from engaging in nuclear power generation.

Russian President Putin and **Indian** Prime Minister Modi have [expressed](#) their commitment to enhancing collaboration in the nuclear energy sector and have reached an agreement to engage in talks for the selection of a location for a new VVER-1200 nuclear power project in India.

China's State Council has granted [approval](#) to five nuclear power projects, namely Xuwei Phase I, Lufeng Phase I, Zhaoyuan Phase I, San'ao Phase II, and Bailong Phase I. These projects together propose the construction of 11 reactors. The China National Nuclear Corporation (CNNC) has announced that Phase I of its Xuwei plant in Jiangsu project will be the pioneering project globally to integrate a high-temperature gas-cooled reactor with a pressurized water reactor. The plant will primarily provide industrial heating service alongside electricity generation. The project aims to construct two Hualong 1 reactors running on pressurised water and one reactor cooled by high-temperature gas. The project

will be furnished with a steam heat exchange station that will utilize the heat-to-electricity operation mode, marking the first instance of its implementation.

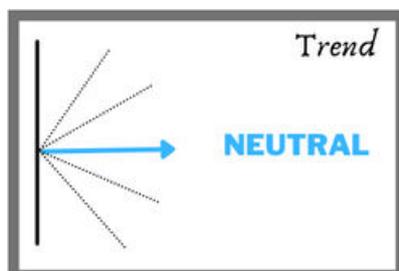
Uzatom, the Atomic Energy Agency of **Uzbekistan**, has [entered](#) a protocol with Atomstroyexport, the Engineering Division of Rosatom, to initiate the development of a SMR nuclear power station in the Jizzakh region of Uzbekistan. The commencement of the active phase of preparatory work at the construction site marks the initiation of the creation of design and licensing documentation.

In Europe, the **Czech Republic's** nuclear power plant operator, ČEZ has [finalised](#) a security agreement with the government, enabling the ongoing process of choosing a prospective supplier for its intended small modular reactors. Steady Energy, a **Finnish** developer of SMRs, has [entered](#) into a one-year pre-planning agreement with Kuopion Energia. The specific objective of this agreement is to build a small nuclear power station that will begin generating district heat in the city of Kuopio in the early 2030s. The agreement stipulates that Kuopion Energia will initiate an environmental impact assessment for prospective plant sites.

Nuclear Security

Prachi Lokhande

Previous trend: Neutral



In the latest [update](#) for this quarter on the situation in Ukraine, DG IAEA Grossi informed the annual Member States gathering at the IAEA about its expanding efforts to help prevent a nuclear accident during the military conflict in Ukraine. The IAEA has deployed more than 140 support and assistance missions to the country over the past two years. Despite continuous presence and monitoring, IAEA continues to document disturbing conditions at the Zaporizhzhia Nuclear Power Plant (ZNPP). The IAEA has issued a new [report](#) on its efforts to ensure nuclear safety and security during the conflict in Ukraine, marking two years since IAEA's presence was established at the ZNPP site. The situation at the ZNPP remains precarious and very fragile, DG Grossi said in the report's foreword. The 28-page report highlights the challenges and achievements of the IAEA's activities to protect the nuclear power plant. During this time, the IAEA teams at the site have reported on incidents including shelling and drone strikes at the facility, which has also suffered repeated loss of off-site power events. The report provides information about the IAEA's continued presence at Ukraine's other nuclear sites, as well as details on its comprehensive programme of assistance to the country.

The [UN](#) General Assembly approved a [resolution](#) on 11th July demanding that Russia urgently withdraw its military and personnel from ZNPP and immediately return the facility to Ukraine. The resolution was approved by a vote of 99-9.

On 6th August, Russia [accused](#) Ukraine of trying to attack the Kursk nuclear power station located in the Russian territory in what it called an act of nuclear terrorism. Russia, in response, has strengthened security at the plant heightening tensions in the region. Following Russian claims of an attack IAEA DG Grossi visited the Kursk nuclear power station. Grossi informed [reporters](#) that the facility is the same model as the Chernobyl plant in Ukraine and lacks the containment dome and protective structure that is typical of modern nuclear power

stations. The core of the reactor containing nuclear material is protected just by a normal roof which makes it extremely exposed and fragile.

The IAEA [General Conference](#) was held from 16th to 20th September in Vienna. The conference sets the course of the Agency's work for the coming year, as it seeks to use nuclear science and technology to improve lives worldwide. DG Grossi in his opening statement highlighted how regular explosions, drone attacks, gunfire, and repeated interruptions of external power supply, among other challenges, increase the risk of a nuclear accident. As one of the [side events](#) the *Building Communities of Practice in Nuclear Security: Network Approaches for Detection Operations, Education, Training, Technical Support, and Scientific Support* event [highlighted](#) the importance of nuclear security networks in building capacity and collaboration. It also showcased best practices shared by the speakers on how they had improved nuclear security practices through increasing collaboration and resource sharing; and by providing opportunities to enhance capacity building.

UK think tank Chatham House released a new [report](#) titled *Cybersecurity of the Civil Nuclear Sector* in July 2024 emphasising the role of nuclear energy as an important source of energy for nations across the world and the increasing cybersecurity risks associated with it. In August, the governing body of the Sellafield nuclear power plant pleaded [guilty](#) to criminal charges relating to a string of cybersecurity failings at Britain's most hazardous nuclear site, which it admitted could have threatened national security. The site on the English coast has been hacked multiple times since 2015 and information that could threaten UK's national security was left exposed for four years. While Sellafield is used primarily as a nuclear waste and decommissioning site, rather than for active nuclear production, the site has the world's largest stores of plutonium.

Disclaimer: The views and opinions expressed in this document are those of the authors and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS].



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.

