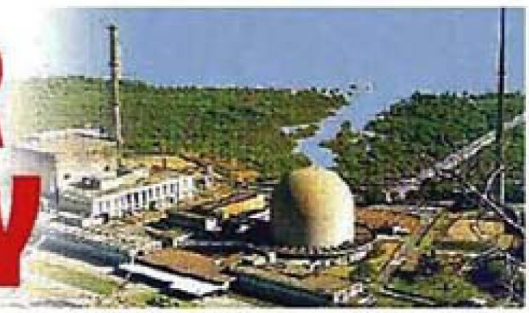
NUCLEAR SECURITY



A FORTNIGHTLY NEWSLETTER ON NUCLEAR DEFENCE, ENERGY AND PROLIFERATION FROM CENTRE FOR AIR POWER STUDIES

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OPINION – Paul Ingram, Ward Wilson

The Extreme Nature of Nuclear Deterrence

The wars in Ukraine, the Middle East, and Africa are raging in the context of rising great power competition on the one hand and, on the other, urgent issues that demand global cooperation, such as climate change and the crises in liberal democracies. Attitudes in Europe appear to have hardened significantly since the disastrous Russian invasion of Ukraine. Fearful of an aggressive Russia and believing that there is a need for a stronger European nuclear deterrent, Poland has been testing the waters to see whether it could host US nuclear weapons, and even recently, non-aligned Finland has also been considering nuclear deployments.

Responding to the possibility of a new Trump Presidency and doubt over US commitments to Europe, debate has opened up in Germany over building a nuclear force of its own — a move that would irrevocably blow a hole in the global non-proliferation regime. Looming over all is the shadow of nuclear conflict and talk of a possible Third World War. Confidence in the stability of nuclear deterrence is hitting a new low, yet states appear to be doubling down on their bets. Many states' leadership profess a shared faith in nuclear deterrence as a contribution to stability (at least when they or their allies control it), but this is probably because they have no idea of any alternative. There is no question that nuclear threats are so frightening that they can work in dissuading states from aggression (or joining a war).

Attitudes in Europe appear to have hardened significantly since the disastrous Russian invasion of Ukraine. Fearful of an aggressive Russia and believing that there is a need for a stronger European nuclear deterrent, Poland has been testing the waters to see whether it could host US nuclear weapons, and even recently, non-aligned Finland has also been considering nuclear deployments.

It is said that Russia has been deterred from attacking NATO members or supply lines into Ukraine, and NATO has been deterred from joining the war with boots on the ground or no-fly zones. But the risk is fearsome, and the deterrent effects can wane over time. It is an obvious but

inconvenient truth that nuclear deterrence demands the signalling and credible readiness to fight a nuclear war. The risk of nuclear war is, therefore, baked into nuclear deterrence.

As a result, suggestions to reduce nuclear risk, for example, by issuing no-first-use declarations, consistently run up against objections that they're not practical or undermine the credible threat at the heart of deterrence. Questions about whether or how often nuclear deterrence may fail catastrophically only serve to strengthen deterrence in the minds of advocates. One additional core problem is often overlooked. Even when nuclear deterrence works, it leaves a residue of poison behind in international relationships, just as a detonated nuclear weapon leaves a trail of invisible radioactive fallout downwind.

It is said that Russia has been deterred from attacking NATO members or supply lines into Ukraine, and NATO has been deterred from joining the war with boots on the ground or no-fly zones. But the risk is fearsome, and the deterrent effects can wane over time. It is an obvious but inconvenient truth that nuclear deterrence demands the signalling and credible readiness to fight a nuclear war. The risk of nuclear war is, therefore, baked into nuclear deterrence.

The problem is that threats with nuclear weapons are extreme, by their nature, promising massive and devastating harm. It is very difficult to use nuclear weapons without killing civilians and turning large areas into rubble. This triggers something in human nature. Such catastrophic threats cross a line; they create wariness, mistrust, and avoidance in the person being threatened. If your neighbour threatens to kill you and shoot your children and then burn down your house and strangle your dog, you will find it difficult to coexist with, trust, or work cooperatively with that person forever after. Extreme actions and extreme threats make normal relations problematic going forward. The consequences arising from the use of nuclear weapons are so extreme that the very threat dehumanises those on the receiving end and brutalises those making the threats.

President Putin's reminders of Russia's nuclear capabilities in early 2022 were a shock, and appear to be the root cause of resentment many in Europe feel towards him, even in the face of his actual destruction in Ukraine. This is despite the fact that analysts find it challenging to articulate what it was about his exact words that departed from past implied nuclear threats supporting aggressive military action (such as UK Defence Secretary Geoff Hoon against non-nuclear Iraq in March 2002).

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Nuclear deterrence harms cohesion within the international community. Yet the need for cooperation among the nations of the international community has never been more urgent. Rising hostility and confrontation are all but destroying the international community's capacity to tackle the tremendous common challenges of our time: the weakening fabric of our societies and the rise of populism; responding to climate change; reversing the destruction of our planet's ecosystems; and managing weapons of mass destruction and the terrifying destructive possibilities arising from disruptive technologies such as AI.

Greater collaboration between governments across many activities is essential for our collective survival. Efforts by many states in the international community to isolate Russia have disrupted negotiations in international fora. One example was the 2022 NPT Review Conference, when there was an attempt to get a consensus agreement that all nuclear power facilities in Ukraine should be

under the control of Ukrainians (a demand that Russia would clearly veto).

Although the practice of nuclear deterrence is generally thought of within nuclear-armed states as relatively benign – like an invisible shield that protects nations from harm – it carries with it often unnoticed adverse effects, diluting the soft power of those states that practice it. Nuclear-armed states threaten global security and drive arms-racing behaviour and are perennially criticised by other states at every nuclear non-proliferation conference.

Evidence that the use of nuclear deterrence may be wearing thin within the majority world is the emergence of the Treaty on the Prohibition of Nuclear Weapons — which now has more than 80 signatories and has entered into force. States parties to the Treaty are engaged in a host of serious activities aimed at re-evaluating and replacing nuclear deterrence as a defining feature of global politics.

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The very nature of nuclear deterrence – the credible threat to annihilate the other – exacerbates the current high levels of tension and angry antagonism between the three largest nuclear powers: Russia, the US, and China. When nuclear weapons first arrived on the scene, they were hailed by those responsible for US nuclear doctrine as tools that could do virtually anything, but over time, a certain amount of reality has sunk in. Some believe a "nuclear taboo" has developed, but perhaps the more plausible explanation for their non-use since 1945 is that they are simply too big and too destructive for fighting wars.

Our militaries keep hold of them in the belief that within their integrated deterrence strategies (in which nuclear-armed states propose a broad toolbox of capabilities to uphold deterrence), nuclear weapons have an irreplaceable role. But in a world where there are many ways to deliver strategic deterrence across a wide range of effects, ways that are likely to be more credible than the threat of a nuclear attack, it is time to reverse the slide into a new nuclear arms race and instead let go of the dangerous and doubtful belief that nuclear weapons are essential.

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Of course, if other tools for effective strategic deterrence are more effective and credible, states could adopt them unilaterally. But this transformation is more likely if they come around to recognising these realities in tandem together.

The N5 (formally misnamed P5) Process meeting of nuclear weapon states has continued to meet at the working level and has been discussing nuclear postures. In August, the Chair will be taken on by the Chinese, who rejuvenated the process when they last chaired five years ago. They are set to invite their fellow Nuclear Weapon States to consider the no-first-use doctrine. Still, perhaps they could also kick off a shared process that questions their received wisdom and explores the fundamental utility of nuclear deterrence itself. The opinions articulated above represent the views

of the author(s) and do not necessarily reflect the position of the European Leadership Network or any of its members. The ELN's aim is to encourage debates that will help develop Europe's capacity to address the pressing foreign, defence, and security policy challenges of our time.

Source: https://www. european leadership network.org/commentary/the-extreme-nature-of-nuclear-deterrence/, 16 May 2024.

OPINION – Syeda Saba Batool

Challenges and Opportunities for the Nuclear Suppliers Group

Amid the evolving geopolitics and great power competition, the NSG – a group of nuclear supplier countries voluntarily enforcing export guidelines to prevent nuclear proliferation – finds itself at a crossroads, grappling with challenges to its credibility and effectiveness. These challenges are multi-fold and involve both NSG member states and non-NSG countries that have not placed all their nuclear activities under the IAEA safeguards. The increasing number of non-NSG states able to access the nuclear market coupled with the failure of NSG member states to advance non-proliferation norms has raised serious concerns about the group's effectiveness.

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These issues have been compounded by the activities of great powers included within the NSG, with the US, China, and Russia all having undermined the significance of non-proliferation norms of comprehensive safeguards – that non-nuclear weapon states should benefit from peaceful nuclear technology access only if they place their nuclear activities under the IAEA safeguards. In order to overcome these difficulties, the NSG should consider reforms which deepen inclusivity, clarify the terms for transfer of sensitive nuclear technology, and develop an effective means for bringing non-NSG states into the group; especially India and Pakistan.

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Diversity and Inclusivity – A Challenge and an Opportunity for Decision-Making: Decision making in NSG is likely to become more challenging in the future. The NSG was created in response to the 1974 Indian nuclear test. It originally closed some loopholes – including monitoring states' access to nuclear energy market to prevent the possibility of utilisation of peaceful nuclear technology for building nuclear weapons – but issues still remain over nuclear safety, security and the global non-proliferation regime. A key challenge has been disparity between members – for example, Canada and the US required comprehensive safeguards as conditions for supply but many members did not, which provided opportunities for non-NPT parties such as Brazil and Argentina to play one supplier against the other and by giving contracts to the suppliers without any comprehensive safeguards. After the controversy of Iraq, the NSG updated its control list and allowed membership from a few advanced nuclear states to diversify the group geographically and politically. The group now includes 46 countries but is still not diverse enough to include and regulate nuclear programs of many important non-NPT states.

Exploitation of the IAEA-Indian Nuclear Safeguards Agreement- A Case Study: The NSG currently faces the challenge of the adoption of new restraints on transfer of enrichment and making recipient states adopt the Additional Protocol (AP) of the IAEA. The comprehensive safeguards in 1992 also created a few loopholes in the group guidelines. One of them is, that the

grandfather clause adopted at the time has requirements that apply only to subsequent nuclear cooperation and did not cover supply commitments agreed before the adoption of the safeguards. This loophole was exploited by Russia to justify nuclear sales to India. Moscow claims that they were grandfathered by the Russian-Indian agreement of 1988. This justification was given by Moscow in the late 1990s. In 2001, Russia again exported low-enriched uranium to India for fuelling Tarapur reactors. The US regards this export as a violation of Russia's commitment to comprehensive safeguards guidelines. Russia signed another reactor deal with India in 2007 and delivered nuclear fuel to India even before the 2008 exemption of India from its comprehensive safeguards' requirement of the NSG regulations.

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Self-Interest Jeopardising the Purpose of the Cartel: A few NSG members have been exploiting their membership in the group for their own state interests while jeopardising the purpose of the cartel. For instance, the exemption that was provided to India by the NSG was a violation of the NSG regulations. Despite India's commitment with the 2009 agreement between the US and India, including signing the Additional Protocol (AP), India has not yet classified its reactors as military or civilian, despite having signed the IAEA Additional Protocol. India still hasn't fully separated its nuclear reactors used for civilian and military purposes. At the facility level, India follows the policy of functional separation, which designates some nuclear sites for civilian use and reserving others for military or strategic uses. However, the lack of specificity at the reactor level between civilian and military reactors, and the refusal to bring Indian civilian reactors under IAEA safeguards caused serious concern in Pakistan, as they could be used for military purposes. Since then, India has still not fully separated its strategic and civilian nuclear reactors, as required by the Additional Protocol.

This creates a sense of mistrust between the two rival nations – India and Pakistan – creating a pro-nuclear proliferation environment and causing serious security concerns for Pakistan. This, in turn, has negative implications for regional security, and even risks instigating an Indian-Pakistani arms race, which would further challenge stability across South Asia.

Non-member suppliers, the states outside the NSG that possess nuclear capabilities but lack effective export control measures, can challenge proliferation norms. But they also provide an opportunity for the NSG to evolve and include more diverse states. These states can be brought under NSG guidelines. The NSG should collaborate with more organisations like the Zangger Committee and support UN export control resolutions.

NSG Membership: Opportunity for Inclusivity: Non-member suppliers, the states outside the NSG that possess nuclear capabilities but lack effective export control measures, can challenge proliferation norms. But they also provide an opportunity for the NSG to evolve and include more diverse states. These states can be brought under NSG guidelines. The NSG should collaborate with more organisations like the Zangger Committee and support UN export control resolutions. The NSG also needs to include states – whether they are NPT signatories or not – to diversify the group and expand it to bring all states' nuclear trade and access under its regulations. NSG members need to strengthen their export control systems, enact strict penalties

for violations, and enhance intelligence sharing.

As the NSG membership diversifies, reaching consensus on crucial matters becomes more challenging. Major nuclear powers may need to consult smaller powers to facilitate decisions, prioritising issues to reach inclusive decisions. Some view the NSG as a group favouring nuclear supplier states, hindering peaceful nuclear energy access for other states. Efforts to improve transparency and outreach are essential to address this perception.

The Geopolitics of NSG – A Challenge to its Effectiveness: In the changing geopolitical landscape, the US refers to China as a "major competitor" and India as a "major defender" against China in its National Defence and Security Strategy documents (NDS and NSS). These strategies of great powers have been challenging the effectiveness of the NSG. A particularly clear example is how this geopolitical competition has been hampering the NSG membership bids of India and Pakistan.

In the changing geopolitical landscape, the US refers to China as a "major competitor" and India as a "major defender" against China in its National Defence and Security Strategy documents (NDS and NSS). These strategies of great powers have been challenging the effectiveness of the NSG. A particularly clear example is how this geopolitical competition has been hampering the NSG membership bids of India and Pakistan.

According to the NSG criteria, joining the suppliers group requires NPT membership. But with the evolving dynamics of the global nuclear order, it is an acknowledged necessity to bring the non-NPT states under the umbrella of the NSG. For this, the NSG member states have a task to consensually decide a formula to admit non-NPT states to the group without undermining the stability of any region. In the case of Pakistan and India's membership bids, both states need to be provided membership together to maintain regional stability in South Asia and prevent any mistrust among the two rival nations.

However, since 2008, the US has pursued a state-specific strategy to secure exemptions from NSG restrictions on nuclear trade, particularly for India. This effort aims to assist India, a non-NPT signatory, in gaining exemption from NSG regulations requiring international inspections of nuclear facilities. The US advocated for this waiver to strengthen strategic ties and enhance nuclear commerce, despite objections from some NSG members. Pakistan, despite its strong nuclear safety record, was not given similar treatment.

In 2016, Pakistan opposed the US's preferential treatment of India, advocating for NSG membership criteria to be based on objective standards rather than being country-specific. To address this challenge China proposed a consensus approach to NSG membership for non-NPT states. China blocked a proposal for an exemption for India at the 2016 meeting and supports a norm-based admittance with a "criteria-based approach" for all NSG entries, particularly those of non-NPT states. However, there is no consensus among the NSG member states to decide on what such a set of criteria might look like, especially for non-NPT states. As a result, the Chinese proposal does little to address the long-term issues facing the NSG.

The fact is that Pakistan's national security, as well as industrial development and economic progress, could be jeopardised if India joins the NSG before Pakistan. If any of the two states get the membership before the other, the admitted state will try to prevent the other state from entering the group. And this will disturb the stability of that region with one state having more access to nuclear material than the other.

Even with all the NSG regulations, the non-member state will mistrust the member state for getting more access to the nuclear market. It could ultimately lead into an arms race between the two states, with major consequences for the stability of the South Asian region. Failing to find a fair solution to the challenge of Indian and Pakistani

accession to the NSG therefore endangers the cartel's objectives; the current impasse is emblematic of the broader problems facing the NSG.

A Way Forward: A way to increase the effectiveness and credibility of the group is to successfully resolve the Indian and Pakistani NSG membership bids case. This can act as a best practice by NSG member states to be followed later for dealing with such cases. It can be done if the NSG members create and agree on an unbiased formula to provide both nations with NSG membership, bringing their nuclear trade under NSG regulations. One such formula can be an advanced criteria-based approach which addresses all the challenges that are faced by the NSG today. Unlike the criteria-based approach that is under discussion at the NSG, an advanced criteria with reforms addressing all existing challenges that have so far prevented the formation of a consensus must be discussed, in order to allow the inclusion of diverse members and bring all nuclear trade under the NSG regulations.

A way to increase the effectiveness and credibility of the group is to successfully resolve the Indian and Pakistani NSG membership bids case. This can act as a best practice by NSG member states to be followed later for dealing with such cases. It can be done if the NSG members create and agree on an unbiased formula to provide both nations with NSG membership, bringing their nuclear trade under NSG regulations. One such formula can be an advanced criteria-based approach which addresses all the challenges that are faced by the NSG today.

The criteria can be inspired by IAEA regulations and safeguard standards. The IAEA is inclusive as well as effective. Even though both bodies are different and have different objectives, inspiration can be drawn from the agency's working and inclusive yet safe agreements. Youth of the member states should be engaged to educate and train them as future leaders about the NSG mission. Another issue that must be addressed in this advanced formula is to increase openness and engage people, states and civil society of the member states into policy discussions which can help bring new ideas to the table for discussion.

The potential benefits of this include establishing a process for integrating non-NPT parties into the nuclear trade regime in the long term, thereby enhancing effectiveness by bringing more nations within the group and ensuring global peace. This expansion could ensure regional stability and strengthen the non-proliferation regime.

How the NSG approaches India and Pakistan's case amid the growing great power competition is a key litmus test for whether the export control group can effectively collaborate to bring about a solution-oriented approach to both interstate competition and its existing structural challenges. It remains a question if the NSG member states will be able to impartially assess the case of non-NPT states especially Pakistan and India's membership bid through a criteria-based approach or not. If NSG did not advance its strategy to include the non-NPT states and diversify the group under a framework then it might become ineffective in the emerging geopolitical structure, destabilising regions, instigating arms race around the world and losing the credibility of the cartel in the global perception.

Source: https://wavellroom.com/2024/05/13/challenges-and-opportunities-for-the-nuclear-suppliers-group/, 13 May 2024.

OPINION – Michael R. DeMarco

Nuclear Castling in the Indo-Pacific

It is time to restation nuclear weapons in South Korea. The US must modernize extended deterrence and strengthen the assurance of allies across the Indo-Pacific region. While the US and South Korea previously agreed to station weapons from 1958 until the end of 1991, that agreement was part of an earlier nuclear posture centred on the Soviet Union. Now though, both North Korea and China

have surged their numbers of nuclear weapons and delivery systems, adding a worsening complexity to the region for the US and its allies.

North Korea continues to increase its weapons production while advancing its ICBM and nascent SLBM legs of an emerging nuclear dyad. At the same time, China increased its numbers and types of nuclear weapons and dual-capable delivery systems. It has built multiple fast breeder reactors and reprocessing facilities to produce and separate plutonium. Moreover, China's fielding of a dual-capable fractional orbital bombardment system (FOBS) and hypersonic glide vehicle raises questions about its commitment to its long-standing policy of no-first-use of nuclear weapons. As Matthew Kroenig notes, the more nuclear weapons a state has, the more assertive and coercive it tends to become to achieve its goals. This fits China's pattern of behaviour and is consistent with North Korea's modus operandi. These developments threaten vital American security interests by undermining extended deterrence—placing the US and mutual defence treaty allies at increased risk.

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To counter this situation, while preserving strategic options for use during periods of acute crisis, "nuclear castling" would involve the restationing of nuclear weapons in South Korea. In chess, castling involves the simultaneous moving of the king and rook in a protective manoeuvre that preserves capabilities and opens new possibilities across the board. Repositioning American nuclear weapons to South Korea would help close an emergent theatre deterrence gap and modernize extended deterrence for all Indo-Pacific allies. The following proposal addresses how these weapons would serve an even greater imperative than in the past, even if only to provide the president of the US options for use in extremis.

The US should restation B61-3, 4, and/or 12 nuclear gravity bomb variants in South Korea for delivery of low-yield weapons by dual-capable F-35A, F-15E, or F16C/D. New START Treaty limitations only apply to heavy bombers, ICBMs, and SLBMs, as opposed to these lower yield warheads and fighter aircraft. Additionally, the South Korean Air Force should train to perform conventional support for nuclear operations (CSNO), similar to how the air forces of some NATO allies in Europe operate. The US should also use this opportunity to invite the Japanese Air Force to participate in CSNO training and operations.

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Skeptics will likely say the April 2023 Washington Declaration between the US and South Korea should have a chance to strengthen deterrence and assurance. Part of the agreement commits America

to reintroducing periodic ballistic missile submarine patrols in the vicinity of South Korea. In addition to South Korea reaffirming its pledge not to seek its own nuclear weapons and commitment to the NPT, the Washington Declaration clears the way for America and South Korea to establish a nuclear consultative group modelled on NATO's Nuclear Planning Group.

In fact, within six months of the Washington Declaration, the USS Kentucky made the first visit of an American ballistic missile submarine to South Korea since the 1980s. The visible gesture of deterrence accompanied the inaugural meeting of the American and South Korean Nuclear Consultative Group meeting on the same day in July 2023.

In parallel, an April 2024 display of combined air operations with the South Korean and Japanese Air Forces further contributes to theatre deterrence. But, while the Washington Declaration is an important step in the right direction, more is needed to deter North Korea or China and to assure our regional allies.

Others will also argue that reintroducing small numbers of nuclear weapons to South Korea will not make an appreciable difference in North Korea or China's perception of risk or the credibility of America's nuclear deterrent. However, repositioning weapons within the theatre to deter two nuclear arms–racing aggressors and assure allies creates options for the US that do not require employment of strategic weapons. For allies that rely on extended deterrence, reintroducing nuclear weapons to South Korea would renew confidence in America's nuclear umbrella.

However, repositioning weapons within the theatre to deter two nuclear arms–racing aggressors and assure allies creates options for the US that do not require employment of strategic weapons. For allies that rely on extended deterrence, reintroducing nuclear weapons to South Korea would renew confidence in America's nuclear umbrella.

While some observers may also view any reintroduction of nuclear weapons to South Korea in this manner as a contravention of the NPT, the US would rely on custodial control to align with the NPT. Though fundamentally different than long-standing NATO arrangements that pre-date the NPT, restationing nuclear weapons in South Korea is a comparable approach that involves a treaty ally of the US. Most importantly, there is a historic precedent between both countries.

At a relatively low cost and risk, restationing nuclear gravity bombs in South Korea has a high return on investment if agreed to by the South Korean government. Additionally, considering production delays for the American Columbia-class ballistic missile submarines to replace the current Ohio-class submarines and the similarly lengthy timeline for fielding a nuclear sea-launched cruise missile, this recommendation is a timely option for strengthening overall American nuclear deterrence.

The Indo-Pacific chess board has strategically shifted since the US last stationed weapons there. The longer America maintains a regional nuclear status quo in the face of egregious North Korean and Chinese nuclear arms racing, the less credible and more overstretched America's nuclear deterrent may appear. Nuclear castling offers an approach to close the emergent deterrence gap and to provide a forceful example of interoperability for treaty allies, complementing bold integrated deterrence moves and magnifying a new sense of integrated assurance.

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Source: https://globalsecurityreview.com/nuclear-castling-in-the-indo-pacific/, 14 May 2024.

OPINION – Ruan Steyn

The Transformative Power of Artificial Intelligence in the Nuclear Industry

As artificial intelligence (AI) and machine learning technologies permeate an increasing number of industries, their potential to drive improvements in the complex and highly regulated nuclear sector has begun to be realized. From optimizing reactor operations to enhancing safety monitoring and tackling the longstanding challenge of nuclear waste management, AI is poised to transform the nuclear industry in profound ways. Exploring the current and future applications of AI in the nuclear sector, highlighting the promising opportunities and unique challenges that lie ahead.

One of the most immediate areas where AI can add value in the nuclear industry is in the optimization of power plant operations. By analysing the vast amounts of real-time data generated by sensors throughout a facility, AI algorithms can identify the most efficient operating conditions for reactors. This can lead to increased power output, reduced fuel consumption, and extended plant lifetimes. Machine learning, a subset of AI, is particularly well-suited to analysing the complex trends and patterns that emerge from this data.

Opportunities:

1. ***AI for Nuclear Power Plant Optimization:*** One of the most immediate areas where AI can add value in the nuclear industry is in the optimization of power plant operations. By analysing the vast amounts of real-time data generated by sensors throughout a facility, AI algorithms can identify the most efficient operating conditions for reactors. This can lead to increased power output, reduced fuel consumption, and extended plant lifetimes. Machine learning, a subset of AI, is particularly well-suited to analysing the complex trends and patterns that emerge from this data. By learning from historical information, machine learning models can anticipate potential maintenance needs before they cause unplanned outages, reducing downtime and increasing overall plant reliability.

For example, the Finnish nuclear power company Fortum has partnered with the AI start-up Predii to implement machine learning for predictive maintenance at its Loviisa plant. By analysing sensor data on vibration, temperature, and other parameters, the Predii platform can detect early signs of equipment failure, allowing Fortum to schedule maintenance during planned outages and avoid costly surprises.

2. ***AI-Enhanced Safety Monitoring and Analysis:*** Beyond optimization, AI holds tremendous potential to enhance safety in the nuclear industry. By monitoring multiple data streams in real-time, AI-powered systems can detect early signs of potential safety issues before they escalate. This allows operators to take proactive measures to mitigate risks and prevent incidents from occurring. Machine learning also plays a critical role in analysing historical incident data to identify patterns and inform safety strategies. By learning from past events, AI models can highlight areas of vulnerability and recommend steps to bolster defences.

For instance, researchers at the Massachusetts Institute of Technology are using AI to simulate various nuclear emergency scenarios and optimize response strategies. The project, funded by the US Department of Energy, aims to leverage machine learning to identify the most effective actions to minimize the consequences of potential incidents, from reactor meltdowns to waste transportation accidents.

3. ***Artificial Intelligence and Nuclear Waste Management:*** One of the most enduring challenges facing the nuclear industry is the safe

management and disposal of radioactive waste. With AI, new opportunities are emerging to improve waste characterization, classification, and storage. By analysing data on waste composition and behaviour, machine learning algorithms can optimize remediation processes and reduce the risks associated with long-term storage.

The US Department of Energy's Idaho National Laboratory is at the forefront of this research, with several initiatives exploring the application of AI to nuclear waste management. One project is using machine learning to analyse images of waste drums to detect anomalies and predict potential issues, allowing for more targeted and efficient inspection processes.

Challenges and Future Directions: While the potential of AI in the nuclear industry is vast, several challenges must be navigated to fully realize its benefits. The heavily regulated nature of the sector creates hurdles to implementation, with stringent requirements for validation and verification of AI systems. Moreover, the limited availability of high-quality training data in the nuclear domain poses a challenge for machine learning. Given the infrequency of incidents and the proprietary nature of much operational data, obtaining the large datasets needed to train accurate models can be difficult.

While the potential of AI in the nuclear industry is vast, several challenges must be navigated to fully realize its benefits. The heavily regulated nature of the sector creates hurdles to implementation, with stringent requirements for validation and verification of AI systems. Moreover, the limited availability of high-quality training data in the nuclear domain poses a challenge for machine learning.

Despite these challenges, the future of AI in the nuclear industry looks bright. As the technology advances, we can expect to see even more innovative applications emerge. From predictive maintenance to radiation protection and public communication, AI holds the potential to transform nearly every aspect of nuclear operations.

Source: https://energycentral.com/c/gn/transformative-power-artificial-intelligence-nuclear-industry, 13 May 2024.

NUCLEAR STRATEGY

SWEDEN

Second NATO Nation Mulls Hosting US Nuclear Weapons

Swedish PM Ulf Kristersson said his country would be open to hosting U.S. nuclear weapons if war breaks out, becoming the second NATO country to make similar statements in recent weeks. Kristersson told Swedish public broadcaster P1 Morgon that the deployment of nuclear weapons would not be allowed during peacetime, but that the situation would be different in wartime.

"In a war situation it's a completely different matter. It would depend entirely on what would happen," Kristersson said. "In the absolute worst-case scenario, the democratic countries in our part of the world must ultimately be able to defend themselves against countries that could threaten us with nuclear weapons."

The only countries in the alliance with their own nuclear weapons are the U.S., the U.K. and France. However, five other NATO members host U.S. nuclear weapons as part of a nuclear sharing arrangement. The war in Ukraine has prompted NATO members near Russia to bolster their military capabilities and enhance their defences against potential threats. Kristersson said that it was important for NATO countries to have the option to access nuclear weapons as long as countries such as Russia have them.

Kristersson's comments come after Polish President Andrzej Duda said in April that it was "ready" to host NATO nuclear weapons if the alliance wanted to strengthen security on its eastern flank bordering Russia. The only countries in the alliance with their own nuclear weapons

are the U.S., the U.K. and France. However, five other NATO members host U.S. nuclear weapons as part of a nuclear sharing arrangement. The war in Ukraine has prompted NATO members near Russia to bolster their military capabilities and enhance their defences against potential threats. Kristersson said that it was important for NATO countries to have the option to access nuclear weapons as long as countries such as Russia have them.

Sweden, which joined NATO in March, is planning to vote on a Defence Cooperation Agreement (DCA) with the U.S. that would forge a closer security partnership and allow the U.S. to access Swedish military bases and store weapons. The Swedish government said in January that the defence cooperation agreement would reflect its vital relationship with the U.S.

"The US is Sweden's most important security and defence partner, both bilaterally and within NATO," the Swedish Defence Ministry said. Kristersson added that Sweden, not the U.S., would ultimately be in charge of making the final decision about whether or not to allow nuclear weapons on its soil. Groups that oppose the use of nuclear weapons have called on the government to put in the agreement that Sweden would not allow nuclear weapons on its soil.

The Arrow system, according to Israel's air force, "carried out the main part" in their interception. That success immediately drummed up global interest, said Boaz Levy, CEO at state-owned Israel Aerospace Industries (ISRAI.UL) (IAI), the project's main contractor. The U.S. is a partner in the Arrow project and Boeing (BA.N), opens new tab is involved in its production.

Russia has long viewed NATO as antagonistic. In 2022, former Russian President Dmitry Medvedev warned that his country could deploy nuclear weapons in the Baltic if Finland and Sweden joined NATO—which both subsequently did.

Source: https://www.newsweek.com/sweden-nato-us-nuclear-weapons-1899847, 13 May 2024.

BALLISTIC MISSILE DEFENCE

ISRAEL

Israel Aerospace Sees Interest in Arrow System that Repelled Iran's Missiles

Israel's Arrow defence systems helped thwart Iran's massive missile and drone attack last month, and a number of countries are now interested in purchasing the technology, said the developer's chief executive. Iran's overnight attack between April 13 and 14, repelled by Israel's multi-tiered defence shield with the help from allies, included more than 100 ballistic missiles.

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Arrow-2 has been around for years and intercepts ballistic missiles at long range. The newer Arrow-3 specializes in knocking out missiles while they are still outside Earth's atmosphere. Israel, with U.S. approval, agreed last year to sell the Arrow-3 system to Germany in a $3.5 billion deal, its biggest ever defence sale. The agreement comes as Germany and its neighbours in Europe are boosting defence spending in the wake of Russia's war in Ukraine.

The Germany deal took almost two years to sign, Levy said, and that would likely be the time frame of new deals in the works. The process is handled between governments and again would need U.S. approval, he said. Each Iron Dome interceptor, used frequently to shoot down rockets from Gaza and Lebanon, is estimated to cost about $50,000. The Arrow missiles are on a different level.

"The cost of the Arrow interceptor is on par with similar interceptors around the world, even cheaper. The amount passes a million dollars," Levy said, without elaborating. Iran's attack spurred IAI to boost both production of current Arrow systems and also the development of its next generation, the Arrow-4, which will replace Arrow-2. "It's in a very accelerated process towards the start of production. And we are doing this in full coordination with the security

establishment here in Israel and the Missile Defence Agency in the US," Levy said. He declined to say when Arrow-4's development would be complete.

Source: https://www.reuters.com/world/middle-east/israel-aerospace-sees-interest-arrow-system-that-repelled-irans-missiles-2024-05-16/ , 16 May 2024.

NORTH KOREA

North Korea Increases Production of Ballistic Missile Following Possible Request of Russia

According to North Korea's KCNA news agency, North Korean leader Kim Jong-un has inspected the latest advancements in missile technology for the Korean People's Army (KPA). During his visit to the military-industrial complex on May 14, 2024, Kim expressed satisfaction with the production results of the first half of the year and emphasized the importance of meeting the 2024 military production plan to improve the army's war readiness substantially.

This cooperation between the two nations is part of a broader context of strengthening bilateral ties and mutual support in the face of international sanctions and diplomatic isolation. The supply of these weapons by North Korea aims to help Russia overcome its logistical and resupply challenges on the Ukrainian front while consolidating the strategic alliance between Moscow and Pyongyang.

State media reported that the visit highlighted the introduction of a new series of tactical missile weapon systems expected to be operational by the end of the year. These systems are particularly intended for KPA artillery units, which perform critical firing duties. The inspection focused on the production scale of transporter erector launchers (TEL) for the Hwasong-11D short-range ballistic missiles. The Hwasong-11D is a modified, smaller variant of the KN-23 missile, known locally as Hwasong-11Ga. It has an estimated range of 100 to 180 kilometers and can deploy four missiles per launcher....

North Korea has recently intensified its deliveries of arms and ammunition to Russia, thereby supporting Russian military efforts in the war in Ukraine. According to diplomatic sources and intelligence services, Pyongyang has shipped various types of military equipment, including artillery shells, rockets, and light ammunition. Moreover, it is believed that North Korea has also supplied short-range missiles and anti-tank missiles, significantly bolstering Russia's offensive capabilities.

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In addition, the geopolitical situation of North Korea in its immediate environment is marked by persistent tensions with its neighbors, particularly South Korea and Japan. Relations with South Korea are characterized by an alternation of dialogue and confrontation, exacerbated by Pyongyang's frequent nuclear and ballistic missile tests. These tests are perceived as direct provocations, threatening the stability of the Korean Peninsula and prompting reinforced military responses from Seoul.

Additionally, Japan, also within the reach of North Korea's military capabilities, maintains a heightened state of vigilance, intensifying its defence cooperation with the US to counter the North Korean threat. North Korea's missile tests, often launched towards the Sea of Japan, worsen already tense relations and strengthen regional alliances aimed at containing Pyongyang's military influence. These geopolitical dynamics create a climate of insecurity and uncertainty in the region, with potential implications for global security.

Source: https://armyrecognition.com/news/army-news/army-news-2024/north-korea-increases-production-of-ballistic-missile-following-possible-request-of-russia, 16 May 2024.

North Korea Fires Multiple Short-Range Ballistic Missiles, Seoul Says

North Korea fired a number of short-range ballistic missiles towards the sea off its east coast on Friday, South Korea's military said, a day after the U.S. and South Korea conducted joint drills with stealth fighter jets simulating air combat. South Korea's Joint Chiefs of Staff condemned the launch as a provocation. It said the projectiles were fired from the east coast town of Wonsan and flew about 300 km (186 miles) before landing in the sea.

Citing a government official, Japan's public broadcaster NHK also reported that a short-range missile appeared to have been launched and had already fallen. North Korea has launched ballistic and cruise missiles as well as tactical rockets in recent months, describing them as part of a program to upgrade its defensive capabilities.

South Korea's military did not specify the latest type of weapon, but the North's state media has reported that its military has been testing multiple launch rocket systems that are being upgraded. North Korean leader Kim Jong Un viewed the testing of 600 mm "super-large" multiple rocket launchers and 240 mm multiple launch rockets in recent weeks and also visited production facilities, state media reported.

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Tensions on the Korean peninsula have increased since the North last year scrapped a 2018 pact aimed at de-escalating tensions near the military border drawn up under a truce ending the 1950-53 Korean War and then labelled the South "enemy No. 1". Earlier, the powerful sister of North Korea's leader, Kim Yo Jong, said its tactical weapons were intended solely as a deterrent against South Korean military aggression, while again denying that Pyongyang was exporting the weapons. U.S. and South Korean officials have accused the North of shipping weapons to Russia to help Moscow replenish stocks for use in its war against Ukraine. Moscow and Pyongyang have denied the accusation.

Friday's missile launches come at the same time as a visit by Russian President Vladimir Putin to the Chinese northeastern city of Harbin. Putin and Chinese President Xi Jinping criticised Washington and its allies for what the leaders called "intimidation in the military sphere" against North Korea at a meeting in Beijing. South Korea's air force has said U.S. and South Korean stealth fighters conducted "intense" joint exercises on Thursday in the central region to test and enhance offensive and defensive maneuverability.

Source: https://reuters.com/world/asia-pacific/north-korea-fires-ballistic-missile-reports-yonhap-2024-05-17/ , 17 May 2024.

RUSSIA

Russia Puts Submarine-Launched Bulava Intercontinental Missile into Service

Russia has put its submarine-launched Bulava intercontinental ballistic missile into service, state media said on Tuesday, a a key element in the modernisation of its nuclear arsenal. TASS news agency quoted the missile's chief designer Yuri Solomonov as saying its adoption was announced in a decree dated May 7, the same day that President Vladimir Putin began a new six-year term in the Kremlin.

Putin has warned the West since the start of the war in Ukraine that direct intervention by NATO troops there could trigger a nuclear conflict. In March he said he did not believe the US was "rushing" towards this, but that Russia's nuclear forces were technically ready. The Bulava was developed under a programme that started in the 1990s, and is designed to be deployed on Russia's Borei-class submarines.

Last November, the defence ministry said one of

those submarines had successfully test-launched the Bulava, firing it from an underwater position in the White Sea off northern Russia and hitting a target thousands of kilometres away on the Kamchatka peninsula in the far east. TASS said Russia's Northern and Pacific fleets now include seven Borei submarines and each carries 16 Bulavas. Solomonov is chief designer at the Moscow Institute of Thermal Engineering that also developed Russia's Topol-M and Yars intercontinental ballistic missiles.

According to the Missile Defence Project at the Washington-based Centre for Strategic and International Studies, the Bulava has a range of 8,300 km (5,160 miles) and a payload of up to 10 multiple independently targetable re-entry vehicles or MIRVs, capable of delivering nuclear warheads to different targets.

Ukraine has struggled to intercept Russia's missile and drone attacks as it runs dangerously low on-air defence systems and ammunition. According to the data cited by the Journal, Ukraine has shot down just 10% of Russian ballistic missiles and has failed to intercept any S-300 and S-400 missiles fired by Russia into Ukraine this year.

Source: https://www.reuters.com/world/europe/russia-puts-submarine-launched-bulava-intercontinental-missile-into-service-2024-05-14/, 14 May 2024.

UKRAINE

Ukraine's Air Defences are Struggling and Shot Down Just 30% of Russian Missiles Last Month

Ukraine's air defences shot down just 30% of Russian missiles last month, compared to 46% over the last six months, according to The Wall Street Journal, highlighting a worrying trend for Ukraine. Its success rate was as high as 73% in the six months before that, the Journal reported. The outlet drew its analysis from daily data shared by the Ukrainian Air Force Command, it said.

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At the same time, Russia has ramped up its drone and missile attacks by around 45% over the last six months, the Journal reported, citing the data. It has almost doubled the number of Shahed drones it has deployed, tripled the number of ballistic missiles, and doubled the number of hypersonic Kinzhal and Zircon missiles it has fired, compared to the preceding six months, per the outlet.

Despite some gaps in the data, and Ukraine using it for propaganda purposes, an unnamed spokesperson for the Armed Forces of Ukraine and an unnamed independent defence analyst told the Journal that the statistics gave an overall accurate picture. It is a picture that will be of concern to Ukraine and its allies. Ukraine is waiting on significant resources from the US after Republicans in Congress finally agreed to a $61 billion military aid package. Before the vote in Congress, the Pentagon said it could rush vital air defence weapons and artillery shells to Ukraine within days of the military aid bill clearing the Senate and receiving President Joe Biden's signature.

But according to a recent assessment by The Institute for the Study of War, Russia is exploiting Ukraine's weakened air defence systems before further supplies make it to the front lines. And Russia's large-scale bombardments have the potential to overwhelm Ukrainian defences while also depleting ammunition supplies, making it sometimes impossible for air defence systems to reload fast enough, an unnamed UAF spokesperson told the Journal. An unnamed European military intelligence official told the Journal that the next two months or so will be key in determining whether Russian forces can be stopped before Western air defence systems reach the front lines.

Source: https://www.businessinsider.in/international/news/ukraines-air-defences-are-struggling-and-shot-down-just-30-of-russian-

missiles-last-month-report-says/articleshow/110087962.cms, 01 May 2024.

USA

US Air Force A-10 Escort Nuclear-Armed Navy Ballistic Missile Submarine

The Fairchild Republic A-10, a time-tested ground attack fighter, has been assigned yet another mission to its expanding repertoire. On May 7, the US Navy (USN) released photographs of a quartet of A-10s from the US Air Force (USAF) providing escort to one of the navy's ballistic missile submarines during a coastal strait journey.

The Puget Sound is the location of the USN's Naval Base Kitsap, which is home to the USS Abraham Lincoln aircraft carrier strike group and 12 submarines, six of which are capable of being armed with nuclear-tipped intercontinental ballistic missiles. While the nature of the cruise was not confirmed by the service, the Pentagon routinely maintains multiple ballistic missile subs at sea as part of Washington's strategic nuclear deterrent.

The submarine, the nuclear-propelled USS Nebraska, was navigating through the Strait of Juan de Fuca, a channel in Washington state that links the Puget Sound of the Seattle area with the Pacific Ocean. The navy has not elaborated on the purpose of the A-10 flight, stating only that the fighters, along with a US Coast Guard vessel, were assisting in the Nebraska's transit to "guarantee that the U.S. military is prepared to fulfil its security obligations domestically and internationally."

According to the navy, a formation of four A-10 fighters accompanied the USS Nebraska, a nuclear ballistic missile submarine, through the Strait of Juan de Fuca on May 6 to "guarantee that the U.S. military is prepared to fulfil its security obligations domestically and internationally." The Puget Sound is the location of the USN's Naval Base Kitsap, which is home to the USS Abraham Lincoln aircraft carrier strike group and 12 submarines, six of which are capable of being armed with nuclear-tipped intercontinental ballistic missiles. While the nature of the cruise was not confirmed by the service, the Pentagon routinely maintains multiple ballistic missile subs at sea as part of Washington's strategic nuclear deterrent.

The A-10, known for its low-altitude, slow flight, is being increasingly tasked with ship escort duties as the USAF seeks new roles for the iconic "Warthog," which is considered by air force officials as too susceptible to modern air defences.

Source: https://warriormaven.com/air/us-air-force-a-10-escort-nuclear-armed-navy-ballistic-missile-submarine, 13 May 2024.

US and Japan Sign Agreement to Enhance Missile Defence Capabilities

On May 15, 2024, the defence departments of the US and Japan signed a formal agreement for the cooperative development of the Glide Phase Interceptor (GPI). This agreement is part of the U.S.-Japan bilateral MOU for Research, Development, Test, and Evaluation (RDT&E) projects.

The GPI initiative aims to reinforce regional deterrence and deepen missile defence cooperation between the two nations. The U.S. Missile Defence Agency (MDA) will lead the development of the GPI, which will provide defence capability against hypersonic missiles during their glide phase, the longest phase of their trajectory. Japan will be responsible for developing the rocket motors and propulsion components of the GPI.

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The GPI is designed to intercept and destroy hypersonic missiles during their glide phase, between launch and reentry into the atmosphere, when they are most vulnerable. This project addresses the urgent need for both countries to counter emerging hypersonic capabilities that pose significant regional security challenges, particularly due to North Korea's repeated ballistic missile tests and China's increasing military activities in the Indo-Pacific.

The GPI program is the second joint development of a missile interceptor by Japan and the US, following the Standard Missile (SM)-3 Block IIA program. This collaboration builds on the success of the previous project and strengthens the alliance's deterrence posture. American defence companies Raytheon and Northrop Grumman are competing to design the interceptor, with contracts awarded to continue development.

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According to the U.S. Department of Defence, "the development of a counter-hypersonic capability is a pressing need for both countries to address challenges in the Indo-Pacific region, including the emergence of sophisticated missile capabilities for potential acts of coercion. The GPI co-development will build upon long-standing U.S.-Japan missile defence cooperation and strengthen the alliance's deterrence posture." This agreement marks a significant step in enhancing regional security and improving the missile defence capabilities of both allied nations.

Source: https://armyrecognition.com/news/army-news/army-news-2024/united-states-and-japan-sign-agreement-to-enhance-missile-defence-capabilities, 16 May 2024.

YEMEN

Houthis Claim Attack on US Warship and Bulker as UN Discusses Actions

Houthi spokesperson Yahya Saree issued his first statement in days reporting two incidents that appeared to be days old. U.S. officials have speculated that the ongoing efforts of the U.S. and EU as well as other nations may be taking a toll on the Houthis' capabilities and stockpile of weapons.

The latest report claimed an attack on a U.S. warship, the Arleigh Burke-class guided-missile destroyer USS Mason, which has been one of the vessels regularly taking down Houthi attacks. The Houthi inferred the targeting of the vessel, which they called "successful," was in response to the ship's efforts.

US Central Command two days ago reported the Mason had been involved in the most recent volley of assaults. On May 13, they reported the Mason engaged and destroyed one inbound anti-ship ballistic missile. It was one of the interceptions reported by CENTCOM which said its forces also took down two drones launched by the Houthi that day. EUNAVFOR Aspides, which tracks the daily reports, shows that U.S. and EU forces have taken down 13 drones and missiles in the past week. One additional drone they show as having crashed. All of these launches have come since the Houthi stepped up attacks saying they were launching a fourth wave in their efforts...

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In the discussion at the Security Council, many members called on the Houthis to cease attacks on vessels transiting the Red Sea and the Gulf of Aden, underlining that security is a prerequisite for peace. The Russian Federation representative, however, expressed regret that events in the

Middle East are impeding Yemen's normalization while saying the situation is further complicated by "totally unjustified" Western strikes on Yemen's sovereign territory and the increasing militarization of the waters surrounding it.

UN officials highlighted that through dialogue, diplomacy, and negotiation a roadmap had been agreed last year that could lead to a political settlement of the long-running civil war in Yemen. Hans Grundberg, Special Envoy of the Secretary-General for Yemen noted that such commitments would provide for a nationwide ceasefire, ensure much-needed relief for Yemenis, and initiate an inclusive political process to sustainably end the conflict. Unconfirmed reports said that they expect Saudi Arabia to lead a new effort to restart the roadmap and move toward the negotiated settlement.

Source: https://maritime-executive.com/article/houthis-claims-attack-on-us-warship-and-bulker-as-un-discusses-actions, 15 May 2024.

NUCLEAR ENERGY

GENERAL

SMRs Cost-effective in Hydrogen Production, Study Finds

Hydrogen can be produced for less than EUR3.50 (USD3.80) per kilogram using a combination of solid oxide electrolysis cells (SOEC) and SMRs, significantly cheaper than alternative methods, a new study led by Dutch nuclear energy development company ULC-Energy BV has concluded.

In November last year, ULC-Energy announced it had signed an agreement with Denmark's Topsoe, the UK's Rolls-Royce SMR and Dutch energy market consultancy KYOS to jointly investigate the production of hydrogen using Topsoe's Solid Oxide Electrolysis Cell (SOEC) technology with both electricity and heat produced by a Rolls-Royce SMR nuclear power plant. The joint investigation was to include a valuation of the operational flexibility of the Rolls-Royce SMR in combination with Topsoe's proprietary SOEC technology in the future energy market.

ULC-Energy has now announced the results of the study, saying the study had revealed significant advantages of the SMR-SOEC combination: a Rolls-Royce SMR power plant can operate 24/7, with 95% availability; SOEC electrolysis can produce more hydrogen per total power input when compared with conventional electrolyser technologies; steam can be supplied directly from the nuclear power plant heat exchangers; and hydrogen production can take place off-grid.

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The results revealed that hydrogen can be produced this way for less than EUR3.50 per kilogram and that this cost can be driven down to less than EUR2.00 per kilogram by 2050 "by taking into account the value of the flexibility to curtail hydrogen production and deliver electricity to an increasingly intermittent grid".

The study also demonstrated that the SMR–SOEC combination produces the highest annual quantity of hydrogen as a result of higher process efficiency and a high availability. "The large-scale production of clean hydrogen is an extremely important driver of decarbonisation," said ULC-Energy CEO Dirk Rabelink. "At ULC-Energy we believe strongly that nuclear can and will play a major role to produce clean hydrogen and derivative clean fuels. "The study that is now completed clearly demonstrates the capability of nuclear to deliver low-cost, clean hydrogen at an industrial scale. Importantly, it also shows the additional value associated with the flexibility to switch between energy markets such as

electricity, heat and, in this case, hydrogen. Topsoe SOEC and Rolls-Royce SMR are both highly modularised solutions that are factory manufactured and can be scaled rapidly."

Rolls-Royce SMR's Director of Strategy and Business Development Alan Woods added: "Rolls-Royce SMR believes one of its powerful advantages is that it can produce clean energy cheaply and extremely reliably, but can also direct its output to meet demand. This operational flexibility will be increasingly valuable as intermittent energy sources, such as wind and solar, expand. We are excited by the results of ULC-Energy's study and look forward to taking next steps."

In August 2022, Rolls-Royce SMR signed an exclusive agreement with ULC-Energy to collaborate on the deployment of Rolls-Royce SMR power plants in the Netherlands. ULC-Energy - established in 2021 and based in Amsterdam - aims to accelerate decarbonisation in the Netherlands by developing nuclear energy projects that efficiently integrate with residential and industrial energy networks in the country.

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The sodium-cooled BN-series fast reactor plans are part of Rosatom's project to develop fast reactors with a closed fuel cycle whose MOX fuel will be reprocessed and recycled. In addition to the BN-600 reactor, which began operation in 1980, the 789 MWe BN-800 fast neutron reactor - constructed as Beloyarsk unit 4 - entered commercial operation in October 2016.

Source: https://www.world-nuclear-news.org/Articles/SMRs-cost-effective-in-hydrogen-production,-study, 17 May 2024.

RUSSIA

BN-1200 Plans Clear Environmental Hurdle

The Russian environmental regulator Rosprirodnadzor has approved the plans for a BN-1200M fast sodium reactor at the Beloyarsk nuclear power plant. According to Rosatom, Rosprirodnadzor said that its investigations showed that "there is no significant impact on the environment" and the project meets the requirements of environmental legislation. The response will be included in documents submitted to Russia's nuclear regulator Rostechnadzor, who will decide on issuing a licence for the proposed new nuclear power unit.

Ivan Sidorov, director of the Beloyarsk nuclear power plant, said that as part of the development of next generation - Generation IV - reactors, Rosatom "is creating a new technological platform for the deployment of nuclear energy of the future, based on fast reactors operating in a closed nuclear fuel cycle". It will be the prototype of a serial power unit, he said, as they seek to move from "single unique projects, such as BN-600 and BN-800", to serial production of the BN-1200. "New technological solutions make it possible to fully utilise the energy potential of uranium raw materials, and also have a new level of safety," he added.

The sodium-cooled BN-series fast reactor plans are part of Rosatom's project to develop fast reactors with a closed fuel cycle whose MOX fuel will be reprocessed and recycled. In addition to the BN-600 reactor, which began operation in 1980, the 789 MWe BN-800 fast neutron reactor - constructed as Beloyarsk unit 4 - entered commercial operation in October 2016. This is essentially a demonstration unit for fuel and design features for the larger BN-1200, which will be unit 5 at Beloyarsk. Rosatom says the projects at Beloyarsk nuclear power plant, in the

Sverdlovsk region, are aimed at "solving the strategic task of the nuclear industry to develop a closed nuclear fuel cycle, which will provide fuel for the nuclear power industry for hundreds of years, allow for the reuse of used nuclear fuel and minimise radioactive waste".

Source: https://www.world-nuclear-news.org/Articles/BN-1200-plans-for-Beloyarsk-clear-environmental-hu, 17 May 2024.

Russia Progresses with BN-1200M Sodium-Cooled Fast Reactor Development

Russia's Beloyarsk NPP in the Sverdlovsk Region has received a positive opinion from the Federal Service for Supervision of Natural Resources, Rosprirodnadzor, for siting of the new BN-1200M power unit. The BN-1200 sodium-cooled fast reactor is planned to be built as unit 5 of the Beloyarsk NPP. Two similar but smaller units are currently operating at the plant – unit 3 with a BN-600 fast neutron reactor, which started up in 1980 and unit 4 with a BN-800 fast reactor, which started up in 2015. These are the world's largest units with fast neutron reactors and the only ones operating on a commercial basis. The BN-1200 will break these records.

The environmental aspects contained in them, and the results of the studies prove that the safety requirements for the placement of the BN-1200M reactor have been met at a high level, there is no significant impact on the environment, and the facility meets the requirements of sanitary-hygienic and environmental legislation. Earlier, participants in public hearings held in November 2023 came to similar conclusions.

Rosatom plans to obtain a licence for the construction for the BN-1200 in 2027. Construction of Beloyarsk 5 is scheduled for 2035. Earlier Valery Shamansky, Deputy Chief Engineer for Safety & Reliability at Beloyarsk NPP said Rosatom's roadmap for the construction the unit had been approved. "During 2023, we plan to transfer the materials of the investment project for the capital expenditures of the Rosenergoatom concern. In 2024, we plan to develop design of the structure. Public discussions and a positive environmental review are planned for 2025," he added. All design work should be completed in 2025, and construction will begin at the end of 2026-2027.

Rosprirodnadzor has now studied the materials of the licence justification submitted for the state environmental review, including materials on an environmental impact assessment. The environmental aspects contained in them, and the results of the studies prove that the safety requirements for the placement of the BN-1200M reactor have been met at a high level, there is no significant impact on the environment, and the facility meets the requirements of sanitary-hygienic and environmental legislation. Earlier, participants in public hearings held in November 2023 came to similar conclusions (holding hearings is a mandatory stage preceding state environmental review).

Rosatom is developing technologies for the transition to a competitive two-component energy system based on a closed nuclear fuel cycle by pairing the operation of traditional VVER thermal neutron power reactors with fast neutron reactors. VVER used fuel can be recycled for use in the fast reactors, which can also burn dangerous radionuclides produced during reprocessing (minor actinides), thereby significantly reducing waste volumes.

Now the entire package of documents has been passed on to the Federal Service for Environmental, Technological & Nuclear Supervision, Rostekhnadzor for examination. Based on its results, the Beloyarsk NPP expects to receive a construction licence for the new unit.

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Source: https://www.neimagazine.com/analysis/

advanced-reactorsfusion/russia-progresses-with-bn-1200m-sodium-cooled-fast-reactor-development/?cf-view, 21 May 2024.

SLOVAKIA

Slovakia Considers Building Another 1.2 GW Nuclear Power Unit, PM Fico Says

The Slovak government is considering building another nuclear power unit with capacity of up to 1.2 GW, and could reach a decision at a meeting on Wednesday, PM Robert Fico said on 13 May. The decision would be a basis for concrete steps to prepare the project, he said. Slovakia has long been a supporter of nuclear and hydro energy. Utility Slovenske Elektrarne, which is 33% state-owned, last year completed the 472-megawatt Unit 3 at the Mochovce plant and is now completing another at the same site, a project that has its roots in the communist era.

Slovakia has long been a supporter of nuclear and hydro energy. Utility Slovenske Elektrarne, which is 33% state-owned, last year completed the 472-megawatt Unit 3 at the Mochovce plant and is now completing another at the same site, a project that has its roots in the communist era.

"We have an agreement that Slovakia - the state - has interest in building, under state ownership, one massive nuclear unit with output of up to 1,200 megawatts," Fico told a broadcast news conference. Slovakia, through Slovenske Elektrarne, currently operates two nuclear units with 505 MW capacity each at Jaslovske Bohunice in addition to the Mochovce plant.

The country has taken a more pro-Russian stance under Fico than under a previous government, but Economy Minister Denisa Sakova said the supplier of the new unit would be picked in a tender, with Russia's Rosatom not allowed to compete. "From the political point of view we cannot imagine that the technology would come from the Russian Federation," she said. "We expect that top companies active in nuclear energy will be interested," she added, saying French, U.S. or Korean companies could be among interested parties. She said the government aimed to complete the tender in the current election cycle ending in 2027.

Source: https://www. reuters.com/business/energy/slovakia-considers-building-another-12-gw-nuclear-power-unit-pm-fico-says-2024-05-13/, 13 May 2024.

SWEDEN

Swedish Project to Develop Gen IV Nuclear Power System

The Swedish Energy Agency has granted SEK50 million (USD4.7 million) for a project led by researchers at Chalmers University of Technology in Gothenburg for the development of an entire Generation IV nuclear power system. The project also aims to rebuild national expertise in nuclear technology science.

The MUST (Multidisciplinary Commitments for Sweden's Gen IV Technology and Expertise) project includes researchers from Chalmers University of Technology, the Royal Institute of Technology (KTH), Uppsala University and Lund University. It will strengthen the already existing research centres in nuclear science in Sweden - ANItA (Academic-industrial Nuclear technology Initiative to Achieve a sustainable energy future) at Uppsala University and SUNRISE (Sustainable Nuclear Energy Research In Sweden) at KTH - with a clear focus on sustainable electricity production and resource use in the Gen IV system.

Gen IV nuclear technology holds the promise of revolutionising the energy sector by significantly reducing long-lived radioactive waste and minimising the need for new uranium mining. By reusing used nuclear fuel, Gen IV systems could provide sustainable and abundant energy with a reduced environmental footprint.

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Technologies for fuel recovery and new manufacturing, radiation protection strategies and monitoring of reactors are being developed. Unlike previous initiatives, this project will include an entire Gen IV nuclear power system. The funding in the MUST projects by the Swedish Energy Agency marks one of its largest investments to date in the future of nuclear energy. The results of the will provide valuable input for a case study for Gen IV implementation by Swedish small modular reactor (SMR) project development company Kärnfull Next AB.

In addition to developing Gen IV technology, the project also addresses the need for education and know-how development in nuclear and radiation sciences. By engaging younger researchers and allocating significant resources for the education and mentorship of doctoral students, the initiative aims to help rejuvenate Sweden's expertise in nuclear technology. A system for mentorship, both scientific and in leadership, has been launched as part of the project. ...Kärnfull Next aims to have the first commercial SMR operational at a new nuclear site in Sweden by the early 2030s.

Source: https://www.world-nuclear-news.org/Articles/Swedish-project-to-develop-Gen-IV-nuclear-power-sy, 16 May 2024.

NUCLEAR COOPERATION

CHINA–FRANCE

China and France Increase Nuclear Energy Cooperation

During his recent visit to France, Chinese President Xi Jinping advocated increased cooperation in a number of areas, including "nuclear energy, innovation and finance". French President Emmanuel Macron said France was "ready to step up cooperation with China" in areas including "nuclear energy for civilian use". The visit coincided with the 60th anniversary of the establishment of diplomatic ties between China and France.

Among the business cooperation agreements concluded during the visit was a Letter of Intent (LOI) on Deepening Related Cooperation in the Nuclear Energy Field signed by China General Nuclear (CGN) Chairman Yang Changli and EDF Chairman & CEO Luc Raymond. Under the LOI, "the two parties will further expand and strengthen cooperation in aspects such as nuclear power engineering construction, talent training, EPR operations and leadership training in the field of nuclear power operations to achieve common development", CGN noted.

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This visit took place during the 60th anniversary of diplomatic ties between China and France presenting an important opportunity to build on past achievements and guide the future of bilateral ties, Xinhua noted. Co-operation between CGN and EDF began in the 1980s with the construction of the Daya Bay NPP in Shenzhen, Guangdong province. Herve Machenaud, former technical director of EDF from 1984 to 1989 told Xinhua News Agency: "EDF put its trust in China, and China put its trust in EDF, a contract of trust that has kept the parties together for 40 years," he said. CGN said that deepening and expanding cooperation areas "is of great significance to the development of civil nuclear energy in both countries and the business development of the two groups". Two-way trade between China and France reached $78.9bn in 2023. China is now France's largest trading partner in Asia, while France ranks as China's third-largest trading partner within the EU.

Also, during the visit, China National Nuclear Corporation (CNNC) and EDF jointly released a

"Bluebook" – a prospective study on nuclear energy to support low carbon transformation. CNNC Chairman Yu Jianfeng said: "China and France, as major nuclear energy-producing countries in the world, play an irreplaceable role in promoting nuclear energy to address climate change and low-carbon."...The two companies participated in the IAEA's nuclear safety standards development work, especially the Nuclear Harmonisation and Standardisation Initiative (NHSI) small modular reactor regulatory forum activities. The EDF and the CNNC have also made important contributions to the standardisation work of international standardisation organisations and the International Electrotechnical Commission.

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Global Times reported that the "Bluebook" is the first strategic planning soft science cooperation between Chinese state-owned nuclear energy enterprises and partners in developed Western countries in recent. It was included in plans agreed during French President Macron's visit to China in 2023, according to Luo Qingping, President of CNNC's China Institute of Nuclear Industry Strategy.

France is open to the UAE investing in its nuclear power and artificial intelligence industries, its finance minister said, ahead of signing a strategic partnership with the Gulf state on AI. The Gulf state has emerged as a major investor in artificial intelligence while sources have told Reuters that oil rich Abu Dhabi wants to invest in Europe's nuclear power industry.

The release of the Bluebook at the historical moment of the 60th anniversary of the establishment of diplomatic relations between China and France can also be seen as the opening of a new chapter in the nuclear energy cooperation of the two countries. In the future, China and France can combine the contents of the "bluebook" to deepen cooperation in promoting nuclear energy development, including cooperation in exploring third-party markets....

Source: https://www.neimagazine.com/news/newschina-and-france-increase-nuclear-energy-cooperation-11770812, 15 May 2024.

FRANCE–UAE

France Open to Emirati Investments in Nuclear, AI, Minister Says

France is open to the UAE investing in its nuclear power and artificial intelligence industries, its finance minister said, ahead of signing a strategic partnership with the Gulf state on AI. The Gulf state has emerged as a major investor in artificial intelligence while sources have told Reuters that oil rich Abu Dhabi wants to invest in Europe's nuclear power industry.

French Finance Minister Bruno le Maire told reporters that France would welcome Emirati investments into its nuclear industry such as in nuclear fuel specialist Orano, which the government majority owns. "We are open to that kind of cooperation," he said in Abu Dhabi's financial district ahead of signing the partnership, adding that he would discuss it in meetings with UAE officials.

Le Maire was due to meet Khaldoon Al Mubarak, the chairman of state Emirates Nuclear Energy Corp and managing director of Abu Dhabi government-controlled fund Mubadala. He was also to meet with Sultan Al Jaber, minister of industry and advanced technology and chief executive of state oil firm Adnoc.

France is providing tens of billions of euros for state-controlled energy provider EDF to build six new reactors. Emirates Nuclear Energy is interested in building up a portfolio of minority investments in European nuclear power infrastructure, sources previously said.

The Gulf state has since 2021 operated its own nuclear power plant, which was built by South Korea, and sources have said Abu Dhabi is planning to soon tender for four new reactors. Le Maire said France would be willing to provide assistance if UAE expanded its nuclear infrastructure. France also would welcome Emirati investments in artificial intelligence, he said, adding that Paris wanted to work closely with Abu Dhabi on semiconductors and computer chip capabilities. Abu Dhabi state-controlled fund Mubadala is the majority shareholder in chipmaker Global Foundaries, which is building a semiconductor facility in France with STMicroelectronics (STMPA.PA), opens new tab.

UAE investments in AI drew scrutiny from the US over the Gulf state's ties with China and concerns sophisticated American technology and capabilities could be acquired by Chinese companies partnering with the UAE.

Le Maire said France and the UAE could jointly invest in cloud computing and data processing and that the strategic partnership would see more scientists and researchers at the Abu Dhabi campus of the Paris Sorbonne. UAE investments in AI drew scrutiny from the US over the Gulf state's ties with China and concerns sophisticated American technology and capabilities could be acquired by Chinese companies partnering with the UAE. However, the UAE this year agreed with the US to limit its technology cooperation with China in exchange for better access to American technology and capabilities. Le Maire said France's partnership with the UAE would be based on the idea of sovereignty, meaning that key technologies and the skills must remain with those nations that develop it.

Source: https://www.reuters.com/world/france-open-uae-investments-nuclear-industry-minister-says-2024-05-21/, 21 May 2024.

HUNGARY–CHINA

Hungary and China Sign Nuclear Energy Cooperation Agreement

During Chinese President Xi Jinping's recent visit to Hungary – the third stop in his five-day visit to Europe after France and Serbia – a memorandum of understanding on the peaceful uses of nuclear energy was signed by the China Atomic Energy Authority and Hungary's Ministry of Foreign Affairs. It was one of 18 agreements covering a range of subjects.

The joint statement on the establishing of an All-Weather Comprehensive Strategic Partnership for the New Era, noted: "The Chinese side will continue to encourage capable Chinese enterprises to invest in Hungary. The two sides will promote orderly cooperation in emerging fields including clean energy, artificial intelligence, mobile communication technology and nuclear energy and technology."

The joint statement on the establishing of an All-Weather Comprehensive Strategic Partnership for the New Era, noted: "The Chinese side will continue to encourage capable Chinese enterprises to invest in Hungary. The two sides will promote orderly cooperation in emerging fields including clean energy, artificial intelligence, mobile communication technology and nuclear energy and technology.

Following talks with President Xi, Hungary's President Viktor Orban said Hungary had serious ambitions. "The previous 100 years, the 20th Century, was a shameful one for Hungary. It was a century in which we lost, a century in which we suffered extremely heavy losses of historic proportions. And the concept driving the Hungarians is that we want to win the 21st Century, and not lose it. And to win we need partners, investors, trading partners and the world's most advanced technology."... This holds great potential, because in this respect – in terms of the nuclear industry – Hungary has considerable international experience and prestige, as we have been involved in this industry for more than 50 years, and currently the largest nuclear

development in Europe is taking place in Hungary. Our plan is that by the beginning of the next decade the share of Hungary's energy provided by nuclear power will be between 60 and 70%."

Hungary's Foreign Affair &Trade Minister Peter Szijjártó said the talks between Xi and Orbán had been "extremely successful". He said the two sides expanded an earlier a list of joint projects under the Belt and Road initiative aimed at developing East-West connections.

"We have now agreed with the Chinese government on drafting a cooperation agreement covering the length and breadth of the nuclear industry to ensure both countries' access to the cheapest, safest, most efficient way of producing electricity," he noted. Demand for electricity will increase sharply the world over, he said, adding that nuclear energy best met such demand....

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Source: https://www.neimagazine.com/news/newshungary-and-china-sign-nuclear-energy-cooperation-agreement-11767506, 14 May 2024.

INDIA–RUSSIA

'India will Get Next-Generation Nuclear Fuel this Summer', Says Russia's Alexey Likhachev

Russian state nuclear corporation-Rosatom head Alexey Likhachev said that India will get next-generation nuclear fuel this summer, further calling India a key partner in the nuclear area, reported Russia Today (RT). Moreover, the head of Rosatom Likhachev also praised the cooperation between the two nations, calling India a key partner in the nuclear area. Earlier, Mohanty and the head of Rosatom held meetings in Seversk, Tomsk region.

The leaders of Russian and India nuclear industries visited the site of the Pilot Demonstration Energy Complex (PDEC) being built in Seversk, Tomsk region, as a part of the "Proryv" ("the Breakthrough") strategic industry project, according to a statement by Rosatom. During the joint visit, a full-scale discussion took place on the perspective areas of the Russian-Indian cooperation in the nuclear field.

"We are ready to serious expansion of the cooperation with India in the field of using nuclear energy for peaceful purposes. This includes first of all, serial construction of the Russian-designed high-capacity nuclear power units at a new site in India, implementation of land-based and floating low-power generation projects, cooperation in the nuclear fuel cycle area, as well as in the field of non-power applications of nuclear technologies", Alexey Likhachev said. Atomic Energy Commission chairman Mohanty is visiting Tomsk, Russia, with the Indian ambassador to Russia, Vinay Kumar. ...

Source:https://www.livemint.com/news/india/india-will-get-next-generation-nuclear-fuel-this-summer-says-russias-alexey-likhachev-11716528744493.html, 24 May 2024.

Russia Offers Floating Nuclear Plant Tech to India

Russia has offered India technology for building and operating floating "low power" nuclear power generation projects. This has been revealed in a press release of the Russian state-owned nuclear power company, Rosatom, issued in the context of the meeting of Ajit Kumar Mohanty, Chairman, Atomic Energy Commission and Alexey Likhachev, Director General, Rosatom, in Russia on Thursday.

Russia has also offered "serial construction of the Russian-designed, land-based nuclear power units at a new site in India," as well as cooperation in nuclear fuel cycle. Also mentioned is "non-power applications of nuclear technologies." "Alexey Likhachev and Ajit Kumar Mohanty also discussed the progress of the joint Kudankulam

Nuclear Power Project being constructed as per the Russian design in India, comprising six power units equipped with light-water reactors, each of 1,000 MW capacity," the release said.

Proryv Project: Indian nuclear industries visited the site of the Pilot Demonstration Energy Complex (PDEC) being built in Seversk, Tomsk region, as a part of "Proryv" ("the Breakthrough") strategic industry project.

While talks on land-based, large nuclear power plants is a matter of routine, the reference to floating nuclear power plants is significant. There is growing interest in SMR, including in India, and some SMRs could be ship-mounted. Russia operates the world's only floating nuclear power plant, onboard the ship Akademic Lomonosov, which is stationed at the Arctic port of Pevek. ...

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Source: M Ramesh, https://www.thehindubusinessline. com/news/world/russia-offers-floating-nuclear-plant-tech-to-india/article68208062.ece, 23 May 2024.

SLOVAKIA–SOUTH KOREA

Slovakia and South Korea Discuss Cooperation on New Nuclear

The Slovak Republic government is aiming to develop details of proposals for a new nuclear power unit at Bohunice by October - with South Korea, as well as the USA and France, among potential partners. The Slovak Republic's government officially approved the plans for a new 1.2 GWe unit, near the existing Bohunice nuclear power plant, last week. The government asked the economy ministry to draw up details of the plan by the end of October. The government meeting and the decision took place last Wednesday, before PM Robert Fico was targeted in an assassination attempt. He is described as in a serious but stable condition and recovering in hospital.

The Slovak Republic's government officially approved the plans for a new 1.2 GWe unit, near the existing Bohunice nuclear power plant, last week. The government asked the economy ministry to draw up details of the plan by the end of October. The government meeting and the decision took place last Wednesday, before PM Robert Fico was targeted in an assassination attempt. He is described as in a serious but stable condition and recovering in hospital.

Slovak Republic Foreign Minister Juraj Blanár was on a visit to South Korea last week, and held talks with his South Korean counterpart Cho Tae-yul about expanding their bilateral cooperation to the status of strategic partnership.

The Slovak Republic's official TASR news agency reported Blanár as saying: "We also talked with our South Korean partner about the use of nuclear energy, in which Slovakia and South Korea see great potential. The Republic of Korea has extensive experience in the planning, construction and operation of nuclear power plants, so we welcome further discussion and consultations with the South Korean side."

It added that the minister said that South Korea could be a potential partner in the construction of the new nuclear block, and that there was also discussion about small modular reactors, which Slovakia is considering. Slovakia currently has five nuclear reactors - three at Mochovce and two at Bohunice - generating half of its electricity, and it has one more at Mochovce under construction. Both plants are operated by Slovenske Elektrarne....

Source: https://www.world-nuclear-news.org/Articles/Slovakia-and-South-Korea-discuss-cooperation-on-ne, 20 May 2024.

USA–SAUDI ARABIA

US-Saudi Nuclear Deal: How Might it Work?

White House National Security Adviser Jake Sullivan will visit Saudi Arabia this weekend for talks expected to touch on a civil nuclear cooperation agreement, one piece of a wider arrangement Washington hopes will lead to normalization of Israeli-Saudi relations. Below is a description of the key issues involved in a U.S.-Saudi civil nuclear deal, what risks and benefits it may offer the US and Saudi Arabia, and how it fits within U.S. efforts to broker Israeli-Saudi reconciliation.

What is a Civil Nuclear Cooperation Agreement: Under Section 123 of the U.S. Atomic Energy Act of 1954, the US may negotiate agreements to engage in significant civil nuclear cooperation with other nations. It specifies nine nonproliferation criteria those states must meet to keep them from using the technology to develop nuclear arms or transfer sensitive materials to others. The law stipulates congressional review of such pacts.

As the world's largest oil exporter, Saudi Arabia at first glance is not an obvious candidate for a nuclear pact typically aimed at building power plants to generate electricity. There are two reasons Riyadh may wish to do so. The first is that under Crown Prince Mohammed bin Salman's ambitious Vision 2030 reform plan, the kingdom aims to generate substantial renewable energy and reduce emissions. At least some of this is expected to come from nuclear energy.

Why Does Saudi Arabia Want a US Nuclear Cooperation Agreement: As the world's largest oil exporter, Saudi Arabia at first glance is not an obvious candidate for a nuclear pact typically aimed at building power plants to generate electricity. There are two reasons Riyadh may wish to do so. The first is that under Crown Prince Mohammed bin Salman's ambitious Vision 2030 reform plan, the kingdom aims to generate substantial renewable energy and reduce emissions. At least some of this is expected to come from nuclear energy.

Critics cite a second potential reason: that Riyadh might wish to develop nuclear expertise in case it someday wished to acquire nuclear weapons despite the safeguards enshrined in any deal with Washington to prevent this. The Saudi crown prince has long said that if Iran developed a nuclear weapon, Saudi Arabia would follow suit, a stance that has fueled deep concern among arms control advocates and some U.S. lawmakers over a possible U.S.-Saudi civil nuclear deal. The Sunni Muslim kingdom and Shi'ite revolutionary Iran have been at odds for decades.

How Would the US Benefit from a Civil Nuclear Deal with Saudi Arabia: There could be strategic and commercial gains. The Biden administration has made no secret of its hope to broker a long-shot, multi-part arrangement leading Saudi Arabia and Israel to normalize relations. It believes Saudi support for normalization may hinge partly on striking a civil nuclear deal.

The strategic benefits would be to shore up Israel's security, build a wider coalition against Iran and reinforce U.S. ties to one of the wealthiest Arab nations at a time when China is seeking to extend its influence in the Gulf. The commercial benefit would be to put U.S. industry in a prime spot to win contracts to build Saudi nuclear power plants, as U.S. atomic companies compete with Russia, China and other countries for global business.

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What are the Hurdles to a US-Saudi Civil Nuclear

Deal: A civil nuclear deal is envisaged as part of a wider arrangement on Israeli-Saudi normalization, something that is all but inconceivable while the Gaza war rages. Israel invaded the Gaza Strip after Hamas-led gunmen on Oct. 7 attacked southern Israeli communities, killing about 1,200 people and taking 253 hostages, according to Israeli figures. The Gaza death toll, health officials in the Hamas-run coastal enclave say, has risen to more than 35,000 and malnutrition is widespread. It is hard to imagine the Saudis being willing to normalize relations while Palestinians are dying in such numbers.

What is the Wider Pact in which a Nuclear Deal Might Figure: The US hopes to find a way to give Saudi Arabia several things it wants - a civil nuclear pact, security guarantees and a pathway toward a Palestinian state - in return for Riyadh agreeing to normalize relations with Israel. Earlier this month, seven people familiar with the matter told Reuters the Biden administration and Saudi Arabia were finalizing an agreement for U.S. security guarantees and civilian nuclear assistance to Riyadh. However, the wider Israel-Saudi normalization envisaged as part of a Middle East "grand bargain" remains elusive.

A key issue is whether Washington might agree to build a uranium enrichment facility on Saudi territory, when it might do so, and whether Saudi personnel might have access to it or it would be run solely by U.S. staff in a "black box" arrangement. Without rigorous safeguards built into an agreement, Saudi Arabia, which has uranium ore, could theoretically use an enrichment facility to produce highly enriched uranium, which, if purified enough, can yield fissile material for bombs.

What are Some of the Key Issues to be Worked Out in a Saudi-US Nuclear Deal: A key issue is whether Washington might agree to build a uranium enrichment facility on Saudi territory, when it might do so, and whether Saudi personnel might have access to it or it would be run solely by U.S. staff in a "black box" arrangement. Without rigorous safeguards built into an agreement, Saudi Arabia, which has uranium ore, could theoretically use an enrichment facility to produce highly enriched uranium, which, if purified enough, can yield fissile material for bombs. Another issue is whether Riyadh would agree to make a Saudi investment in a U.S.-based and U.S.-owned uranium enrichment plant and to hire U.S. companies to build Saudi nuclear reactors.

Source: https://www.reuters.com/world/how-might-us-saudi-civil-nuclear-deal-work-2024-05-18/, 19 May 2024.

URANIUM PRODUCTION

UGANDA

Uganda Looks to Potential Uranium Production

The Government of Uganda is hosting an IAEA Integrated Uranium Production Cycle Review mission as it reviews its potential to produce uranium to support its plans for 24,000 MWe of nuclear capacity.

IAEA Integrated Uranium Production Cycle Review (IUPCR) missions are designed to assist IAEA member countries in the development of infrastructure for national uranium production programmes, through all phases of the uranium production cycle. Carried out at the request of the country in question, the missions provide independent reviews based on IAEA safety standards, technical guidance, and international good practices, and also give representatives of the requesting country the opportunity for in-depth discussions with international experts about experiences and best practices in legal, regulatory and operational aspects specific to the uranium production cycle. The reviews enable countries to identify areas that require more focus or additional resources or to confirm their readiness to move forward with their uranium production cycle….

"Uganda's plans to develop nuclear power plants with a total output of 24,000 MW will require

nuclear fuel. To this effect, Uranium exploration is ongoing in the country with the aim of discovering uranium deposits for sustainable nuclear fuel supply," she continued that the government "also plans to establish a centre for Nuclear Science and Technology for nuclear education, training, research and this ... will require Uranium for Production of radioisotopes for industrial and medical applications"....

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Uganda's Vision 2040 roadmap, issued in 2013, incorporates the development of nuclear capacity as part of the country's future energy mix. In May 2022 it was reported that the government had acquired land on which to site a nuclear power plant, and in August last year, Ugandan President Yoweri Museveni announced that Russia and South Korea had been selected to build two nuclear power plants with a combined capacity of 15 GWe. Uganda launched its uranium exploration initiative in the district of Buhweju in November. The IUPCR mission is taking place from 14-22 May in Munyonyo.

USA

US Q1 Uranium Production Highest Since 2018

US production of 82,533 pounds U3O8 (32.1 tU) in the first quarter of 2024 was the highest Q1 production since 2018 and almost 80% more than production for the whole of 2023. According to the US Energy Information Administration's (EIA) latest Domestic Uranium Production Report, US uranium production in the first three months of the year was from five facilities, all using in-situ leach methods rather than conventional mining and milling. Four of these - Nichols Ranch, Ross, Lost Creek and Smith Ranch-Highland - are in Wyoming.

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The fifth facility, Rosita, in Texas, resumed operations in November, having last produced uranium in 2008. EnCore Energy Corp announced the first shipment of uranium from the plant, which has an annual capacity of 800,000 pounds U3O8, in March.

The EIA listed three US uranium mills as "on standby" in Q1: Shootaring Canyon and White Mesa, both of which are in Utah, and Sweetwater in Wyoming. Anfield Energy Inc has recently said that it is targeting a restart of the Shootaring Canyon mill in 2026 - it has been on standby since 1982. The Vancouver-based company has submitted its plans for reactivating the mill, which it acquired in 2015, to Utah state regulators for approval.

Source: https://www.world-nuclear-news.org/Articles/US-Q1-uranium-production-highest-since-2018, 14 May 2024.

USA–RUSSIA

Big Win for Barrasso as his Ban on Uranium Imports Signed into Law

An effort spearheaded by Wyoming's senior Sen. John Barrasso to ban Russian uranium imports was signed by President Joe Biden. He said the move "officially ended Russia's chokehold on America's uranium supply." There won't be any more uranium coming into the US from Russia anytime in the foreseeable future.... "Today, we officially ended Russia's chokehold on America's uranium supply," Barrasso said in a Monday statement...

What It Means: The ban is designed to revitalize the nation's nuclear fuel industry and remove ties from Russia. Brent Berg, senior vice president of Uranium Energy Corp., a Texas-based uranium business that has plans to restart uranium production in the Powder River Basin, said it's a big win for Wyoming's uranium industry. Uranium Energy expects to start production in August. "I think it's great news for uranium in Wyoming," Berg said. "It's something the uranium industry has been asking for a long time."

Producing Uranium: Often called yellowcake for its powdered, yellow appearance — is one of the first steps in making fuel for nuclear reactors. Uranium production in the US peaked in 1980, and uranium purchases by U.S. nuclear power plant operators from domestic suppliers peaked in 1981, according to the U.S. Energy Information Administration (EIA). At that time, uranium production was a major industry in Wyoming. Wyoming is still the largest uranium producer in the U.S. But since 1992, most of the uranium purchased by U.S. nuclear power plant operators has been imported. Although the US banned imports of oil, natural gas, and coal from Russia following the country's full-scale invasion of Ukraine in February 2022, uranium was not included....

China will continue to utilize platforms such as the IAEA and the Nuclear NPT, review process to thoroughly discuss the political, legal, and technical issues related to the AUKUS nuclear submarine deal, a spokesperson from China's Ministry of Foreign Affairs said. Until the international community reaches a clear conclusion, the US, UK, and Australia should halt the advancement of the initiative, the spokesperson noted.

EIA reports that imported uranium makes up more than 95% of America's total ownership. According to Reuters, Russia is the world's top supplier of enriched uranium, and about 24% of the enriched uranium used by U.S. nuclear power plants come from the country.

About a year ago, Barrasso held a roundtable to discuss the issue of Wyoming energy producers being undercut by Russian uranium. "As our nation's leading uranium producer, Wyoming is ready to do our part to power American reactors with American nuclear fuel," Barrasso said. "Russia's dominance of the world's nuclear fuel supply chain is coming to an end." Barrasso introduced his bill to ban Russian uranium imports in March 2023, which was added as an amendment to the Nuclear Fuel Security Act the next month.... The law also unlocks about $2.7 billion in funding from previous legislation to build out the U.S. uranium fuel industry.

Source: https://cowboystatedaily.com/2024/05/13/biden-signs-barrassos-ban-on-uranium-imports-to-end-russias-chokehold/, 14 May 2024.

NUCLEAR PROLIFERATION

AUSTRALIA

China Urges US, UK and Australia to Stop AUKUS Nuclear Submarine Deal

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The remarks were made by Wang Wenbin, spokesperson for China's foreign ministry, when asked to comment on a workshop titled "AUKUS: A Case Study about the Development of IAEA Comprehensive Safeguards" organized by the Permanent Mission of China in Vienna recently. On May 10th, the Permanent Mission of China in Vienna hosted a seminar on AUKUS. Representatives from nearly 50 countries' permanent missions in Vienna, the IAEA Secretariat, and experts think tanks from both China and other countries attended the meeting, with over 100 participants in total, said Wang, noting that the participants engaged in lively

discussions on the supervision and security of AUKUS, highlighting the widespread attention and concern of the international community on this issue.

The AUKUS nuclear submarine deal undermines efforts to maintain regional peace and security. US, UK and Australia are forming a trilateral security partnership, advancing cooperation on nuclear submarines and other cutting-edge military technologies, stimulating an arms race, undermining the international nuclear non-proliferation regime, stirring up blocs, and opposing and disrupting regional peace and stability, Wang said. The spokesperson said China and other relevant countries in the region have repeatedly expressed serious concerns and strong opposition.

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Wang stated that AUKUS also triggered widespread concern about nuclear proliferation internationally. It involves the transfer of nuclear propulsion technology and a large volume of weapons-grade highly enriched uranium, which the existing safeguards and supervision system of the IAEA cannot effectively implement. There is a significant controversy in the international community over the interpretation and application of relevant safeguards and monitoring clauses. If the three countries insist on advancing cooperation on nuclear submarines, it will create a huge risk of nuclear proliferation and have far-reaching negative impacts on the resolution of nuclear hotspots in other regions, said Wang. Wang said China has called on the international community to take seriously the impact of AUKUS on the authority and effectiveness of NPT, as well as the deal's negative effects on the institutional safeguards and oversight mechanisms.

Source: https://www.globaltimes.cn/page/202405/1312342.shtml, 15 May 2024.

IRAN

Iran Warns it will be Forced to Change its Nuclear Doctrine if Existence is Threatened

Israel has repeatedly targeted Iran's nuclear facilities accusing it of making bomb despite the supreme leader of the Islamic republic ruling such option out by calling it un-Islamic. The head of Iran's Strategic Council on Foreign Relations (SCFR) and an advisor to Iran's supreme leader Ayatollah Khamenei, Kamal Kharrazi, told Al Jazeera that his country would be forced to change its nuclear doctrine if its existence is threatened.

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Kharrazi, who is also a former foreign minister of the country, warned that if Israel tries to attack Iran's nuclear facilities or damages them in any way Tehran will have to develop the next level of deterrence, hinting at a change in the policy of not developing nuclear arsenal. Iran has been subjected to various unilateral sanctions by the US and other countries which have accused it of having a clandestine nuclear program despite Iran being a signatory of the NPT. Iran has also been subjected to one of the most stringent surveillance regimes by the IAEA.

Iran was also subjected to the UN sanctions for almost a decade over its nuclear program. The international sanctions were lifted in 2016 following the signing of the JCPOA between Iran and the US and five other countries, the UK, France, Germany, China and Russia. The JCPOA allowed Iran to have its peaceful nuclear program with certain restrictions and under IAEA surveillance. However, following the unilateral withdrawal of the US under president Donald Trump in 2018, the US has re-imposed various unilateral sanctions on Iran.

Iran has since then gone back on some of its obligations under the JCPOA. It has already been enriching uranium at 60% percent purity since the failure of the US to lift sanctions and breakdown in talks to revive the JCPOA in 2022. Despite the setbacks in the JCPOA and unilateral sanctions, Iran has maintained that it has no plan to develop a nuclear bomb. Khamenei had even issued a "fatwa" in early 2000s claiming nuclear bombs are "haram" or forbidden in Islam.

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Kharrazi too reiterated Iran's claims that his country has not decided to develop nuclear bombs yet. However, he acknowledged that Iran has the capacity to develop it anytime. Iran has often accused Israel of carrying out terrorist operations in the country to sabotage its peaceful nuclear program. ...

Source: https://peoplesdispatch.org/2024/05/13/iran-warns-it-will-be-forced-to-change-its-nuclear-doctrine-if-existence-is-threatened/, 13 May 2024.

SOUTH KOREA

South Korea Expresses its Desire to Join the Anti-China AUKUS Alliance

During recent talks between the foreign and defence ministers from South Korea and Australia, Seoul acknowledged publicly for the first time that it was actively seeking to join the AUKUS military alliance, currently comprised of Australia, the UK and the US. The move is part of US-led plans throughout the Indo-Pacific region for war against China.

South Korean Foreign Minister Jo Tae-yeol and Defence Minister Sin Won-sik met with their respective counterparts Penny Wong and Richard Marles in Melbourne, Australia on May 1 for the sixth iteration of the "two plus two" talks between the two US allies. A joint statement released afterwards stated, "The ROK welcomed that the AUKUS countries are considering cooperation with additional partners on Pillar II advanced capability projects."

Indicating that cooperation with other countries will expand, Marles stated, "As AUKUS Pillar II develops, there will be opportunities in the future, and we're seeing that play out in relation to Japan as well." The announcement comes after the three AUKUS countries announced last month in connection with Japanese PM Fumio Kishida's visit to Washington that they were planning to bring Japan into Pillar II as well.

Sin made clear after the talks that this meant the possibility of Seoul joining the anti-China alliance, saying, "During today's meeting, we also discussed the possibility of partnering with AUKUS Pillar II." Not stopping there, the joint statement also noted that the South Korean ministers "expressed the ROK's interest in the Quad." The Quad, or Quadrilateral Security Dialogue comprised of the US, Australia, Japan and India, is a quasi-military alliance also meant to surround and threaten China.

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AUKUS was launched in September 2021 and includes two "pillars." The first involves the transfer of nuclear-powered submarines to Australia while the second deals with military technology sharing, cooperation and development. While Pillar I is currently not open to additional members, Pillar II is provocatively being expanded to incorporate other allies, such as South Korea and Japan, but potentially New Zealand and Canada as well.

Source: https://www.wsws.org/en/articles/2024/05/13/ncfo-m13.html, 12 May 2024.

NUCLEAR NON-PROLIFERATION

GENERAL

Vote on a Draft Resolution on the Prevention of an Arms Race in Outer Space

On Monday afternoon (20 May), the Security Council is scheduled to vote on a draft resolution on the prevention of an arms race in outer space (PAROS) and outer space security, which was prepared by Russia. The draft text is open for co-sponsorship by the wider UN membership.

Background: On 24 April, the Security Council voted on a draft resolution on WMDs in outer space, which was prepared by Japan and the US and co-sponsored by 65 member states. The draft resolution affirmed the obligations of states parties under the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of WMDs, install such weapons on celestial bodies, or station such weapons in outer space in any other manner. It also called on states not to develop nuclear weapons or any other kind of WMDs specifically designed to be placed in orbit around the Earth.

The draft amendment failed to be adopted because it did not garner the requisite support. ... It received seven votes in favour (Algeria, China, Ecuador, Guyana, Mozambique, Russia, and Sierra Leone), seven votes against (France, Japan, Malta, the Republic of Korea, Slovenia, the UK, and the US), and one abstention (Switzerland).

The Japan-US draft text called on states to refrain from actions contrary to PAROS and emphasised the need for further measures—including political commitments and legally binding instruments, with appropriate and effective provisions for verification—to prevent an arms race in outer space in all its aspects. It urged the exploration and uses of outer space for peaceful purposes in accordance with international law, including the UN Charter.

Council members also voted on an amendment to the draft resolution, which was proposed by China and Russia. This amendment consisted of an operative paragraph calling on all states to take urgent measures to prevent the placement of weapons of any kind in outer space, as well as the threat or use of force in outer space, from space against Earth, and from Earth against objects in outer space. Additionally, it urged member states to seek through negotiations the early elaboration of appropriate, reliably verifiable, legally binding multilateral agreements....

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After the vote, several Council members expressed regret over Russia's use of the veto, arguing that

the proposed resolution was an opportunity to enhance global security by preventing the potential weaponisation of outer space. Some members accused Russia of undermining the global non-proliferation regime. The US specifically criticised Russia for "irresponsibly invoking dangerous nuclear rhetoric and walking away from several of its arms control obligations", adding that Moscow has "defended and even enabled dangerous proliferators".

China explained its abstention by stating that the issue of WMDs represents "only one aspect of the governance of outer space security". It further argued that the draft resolution should include additional substantive elements and pointed out that the proposed amendment contained language from a General Assembly resolution on "Further practical measures for the prevention of an arms race in outer space" (A/RES/78/238), which was supported by more than two-thirds of member states.

Russia defended its veto by arguing that its goal is to ban the placement of any type of weapons in space, not just WMDs. It accused Western countries of actively engaging in military activities in outer space and declared its intention to propose an alternative draft resolution to the Council. Similarly, China explained its abstention by stating that the issue of WMDs represents "only one aspect of the governance of outer space security". It further argued that the draft resolution should include additional substantive elements and pointed out that the proposed amendment contained language from a General Assembly resolution on "Further practical measures for the prevention of an arms race in outer space" (A/RES/78/238), which was supported by more than two-thirds of member states....

On 6 May, the General Assembly held a plenary meeting pursuant to resolution A/RES/76/262 of 26 April 2022, which stipulates that the President of the General Assembly shall convene a formal meeting of the General Assembly within ten working days of a veto being cast by a permanent member of the Security Council....

Negotiations on the Draft Resolution in Blue: Russia circulated an initial draft resolution on 30 April and then convened one round of negotiations on the text on 2 May. The penholder circulated a revised draft on 9 May and placed it under silence until the following day (10 May). The silence procedure was subsequently extended until Monday (13 May) at the request of some Council members. ... Silence was broken by Japan, after which several other delegations submitted additional comments. That same day, Russia placed a second revised draft in blue without a further silence procedure.

The draft resolution in blue is largely comprised of the draft Security Council resolution co-authored by Japan and the US which was vetoed by Russia on 24 April. It includes, however, the amendment proposed by China and Russia which failed to garner sufficient votes. The draft text also features a new operative paragraph calling on member states to promptly conclude negotiations on an international legally binding agreement or agreements on PAROS in all its aspects, including the prevention of the placement of weapons in outer space. Other additions include a reference to the report of the Ad Hoc Committee on PAROS and to commitments made since 2004 by member states to not be the first to place weapons in outer space.

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It appears that the penholder incorporated language proposed by some Council members during the negotiations, but overlooked concerns raised by several others regarding elements that lack the consensus of Council members,

particularly the operative paragraph corresponding to the amendment proposed by China and Russia on 24 April. At the time of writing, it appeared unlikely that the Russian draft Security Council resolution would have the necessary support for adoption, as Council members are expected to take stances similar to those during the 24 April vote on the amendment proposed by China and Russia.

Source: https://www.securitycouncilreport.org/whatsinblue/2024/05/vote-on-a-draft-resolution-on-the-prevention-of-an-arms-race-in-outer-space.php, 17 May 2024.

RUSSIA–EUROPE

Why is Russia Holding Nuclear Drills and should the West be Worried?

Russian President Vladimir Putin has ordered his military to practice the deployment of tactical nuclear weapons after what Moscow said were threats from France, Britain and the US. Russia's defence ministry said, opens new tab missile forces in the Southern Military District will take part, together with aviation and the navy. The southern district, headquartered in Rostov-on-Don, lies alongside Ukraine and includes, opens new tab parts of Ukraine which Russia controls. Belarus will also be involved.

The Russian Foreign Ministry linked the drills to what it called "militant statements", opens new tab by Western officials which it said created security threats for Russia. It specifically mentioned French President Emmanuel Macron, British Foreign Secretary David Cameron and the delivery to Ukraine of U.S. Army Tactical Missile Systems (ATACMS)....

All nuclear powers carry out routine nuclear exercises but it is extremely rare to explicitly link such drills in public to a current war as Russia did. It is unclear how much Russia will allow the outside world to see. Mock warheads will probably be taken out of storage and driven to a designated point where soldiers will train how to "mate" them with the aircraft or missiles that would be used to deliver them. Russia has numerous weapons systems capable of delivering a tactical nuclear warhead - meaning one designed for use on the battlefield, as opposed to strategic warheads that could wipe out whole cities. The U.S. and its allies will be watching closely which ones are involved. They could include Iskander, Kinzhal, Kalibr or Novator 9M729 missiles, and possibly air-dropped bombs, said William Alberque of the International Institute for Strategic Studies.

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"The Kalibr Kh-102 is of great interest because the Kh-101 has been so comparatively easy for Ukraine to shoot down," said Alberque, who believes the war in Ukraine has increased the importance to Moscow of tactical nuclear weapons as a means of deterring and defeating NATO.... Pavel Podvig, director of the Russian Nuclear Forces Project, said: "This is supposed to be a signal to the West, probably to make people stop thinking about deeper involvement in the war. But I believe we can be quite confident that it is not a threat to use nuclear weapons in Ukraine or against Ukraine."...

A senior Russian source who spoke on condition of anonymity said the signal was meant to make the West afraid and to deter the US and its European allies from a potentially catastrophic escalation over Ukraine. "He is not saying that he is about to do so, but warning that there are some conditions under which he would do so," said Christopher Chivvis, a former U.S. intelligence official. "It seems unlikely Russia would use such weapons offensively to make gains on the battlefield. More likely, they would use them defensively in a situation where Russian forces

were rapidly retreating and significant losses seemed probable."

Source: https://www.reuters.com/world/europe/why-is-russia-holding-nuclear-exercises-what-watch-2024-05-15/, 15 May 2024.

USA–CHINA

US Questions China's No-First-Use Nuclear Call Given Buildup

China has not responded to U.S. nuclear-weapons risk-reduction proposals and Washington has questions about Beijing's call for no-first-use talks while China continues to build up its arsenal, the top U.S. arms control official said. Under Secretary of State Bonnie Jenkins told the Senate Foreign Relations Committee the U.S. estimates China currently has 500 operational nuclear warheads and will probably have more than 1,000 by 2030. She said U.S. officials met with Chinese counterparts last November, opens new tab to discuss arms control and proliferation, their first such talks in nearly five years, opens new tab.

Unfortunately...the PRC has declined a follow-on meeting and has not provided (a) substantive response to risk-reduction suggestions we put forward," she said, using the acronym for the People's Republic of China. Referring also to Russia, Jenkins said China's nuclear buildup "raises the specter that US may soon face two expansionary and significantly nuclear-armed peers." "Beijing's development of a larger, more diverse nuclear arsenal is deeply concerning, and raises questions about the trajectory of the PRC nuclear weapons program.

"The meeting enabled a preliminary discussion on potential measures for managing and reducing risks," she said. "Unfortunately...the PRC has declined a follow-on meeting and has not provided (a) substantive response to risk-reduction suggestions we put forward," she said, using the acronym for the People's Republic of China. Referring also to Russia, Jenkins said China's nuclear buildup "raises the specter that US may soon face two expansionary and significantly nuclear-armed peers." "Beijing's development of a larger, more diverse nuclear arsenal is deeply concerning, and raises questions about the trajectory of the PRC nuclear weapons program" she said.

Jenkins was asked about China's call in February for states with the largest nuclear arsenals to negotiate a treaty on no-first-use of nuclear weapons against each other or to make a political statement in this regard. She said it was the first time the U.S. had heard such a proposal from China, underscoring the need for nuclear talks....

Source: https://www.reuters.com/world/us-questions-chinas-no-first-use-nuclear-call-given-buildup-2024-05-15/, 16 May 2024.

NUCLEAR TERRORISM

INDONESIA

Indonesia Guarantees 10th World Water Forum Secure from Nuclear Threats

The Government of the Republic of Indonesia is highly committed in ensuring security at the 10th World Water Forum, slated to be held on 18—25 May 2024 in Bali. The Nuclear Energy Regulatory Agency of the Republic of Indonesia (BAPETEN RI) guarantees the smooth and safe organization of the event from radioactive and nuclear threats.

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Director of Technical Support and Nuclear Emergency Preparedness (DK2N) of BAPETEN Zulkarnain, on Saturday (18 May) in Jakarta, said that his agency has been actively involved in

dealing with potential crimes involving radioactivity and nuclear. This is in line with BAPETEN's duties and functions in ensuring the use of nuclear energy for peaceful purposes.

In implementing the security arrangement, BAPETEN is coordinating with the Presidential Security Detail (Paspampres) as security coordinator at the 10th World Water Forum. "BAPETEN is taking part in securing the 2024 World Water Forum as a Major Public Event (MPE) to ensure there are no instances of misuse of radioactive substances for terror purposes to disrupt the event," said Zulkarnain.

A total of 4243 incidents of illegal or unauthorized activities involving nuclear and other radioactive material have been reported in the IAEA ITDB since 1993, according to a new factsheet released by the IAEA today. In 2023, 168 incidents were reported by 31 States, in line with historical averages.

He revealed that during the organization of the 10th World Water Forum, BAPETEN is tasked with carrying out initial mapping (baseline) of environmental radioactivity and detection (monitoring and sterilization) around the venues of the activities with assistance from the Presidential Security Detail…. The security arrangements began implementation from 16 May, by mapping background radiation levels at several 10th World Water Forum venues and several other locations that are considered vital, including Bali International Convention Center (BICC) as the venue for the forum's agenda and Garuda Wisnu Kencana Bali as the venue for the Gala dinner agenda. Similar mapping was also carried out in the airport area and Nusa Dua area. …Meanwhile, BAPETEN's Engineering Function Group Coordinator, Wita Kustiana, said that BAPETEN had assigned ten personnel equipped with various detection equipment to secure the organization of the 10th World Water Forum in Bali….

The IAEA Rafael Mariano Grossi says that regular drills and exercises at Zaporizhzhia nuclear power plant "are especially important in view of the extraordinary risks it is currently facing". In his latest update on the situation at the six-unit plant, which has been under Russian military control since early March 2022.

Source: https://worldwaterforum.org/blog-m/news-3/indonesia-guarantees-10th-world-water-forum-secure-from-nuclear-threats-203#blog_content, 18 May 2024.

NUCLEAR SAFETY

GENERAL

IAEA Database on Trafficking of Nuclear and Other Radioactive Material Records 4243 Incidents Since 1993

A total of 4243 incidents of illegal or unauthorized activities involving nuclear and other radioactive material have been reported in the IAEA ITDB since 1993, according to a new factsheet released by the IAEA today. In 2023, 168 incidents were reported by 31 States, in line with historical averages.

The ITDB receives information on incidents ranging from illegal possession, attempted sale and smuggling of nuclear and other radioactive material to unauthorized disposal of material and discovery of lost radioactive sources. Six of the incidents reported in 2023 were likely related to trafficking or malicious use. There was insufficient information to determine the intent of ten incidents. The 152 incidents that were not connected to trafficking or malicious use primarily resulted from unauthorized disposal, unauthorized shipment or the discovery of radioactive material.

…The release of the ITDB factsheet coincides with this week's International Conference on Nuclear Security (ICONS). ICONS 2024 provides a forum for ministers, policymakers, senior officials and nuclear security experts to discuss the future of nuclear security worldwide, while providing an

opportunity to exchange information, share best practices and foster international cooperation. ...

Source: https://www.iaea.org/newscenter/pressreleases/iaea-database-on-trafficking-of-nuclear-and-other-radioactive-material-records-4243-incidents-since-1993, 20 May 2024.

UKRAINE

IAEA Staff Observe Emergency Drill at Zaporizhzhia

The IAEA Rafael Mariano Grossi says that regular drills and exercises at Zaporizhzhia nuclear power plant "are especially important in view of the extraordinary risks it is currently facing". In his latest update on the situation at the six-unit plant, which has been under Russian military control since early March 2022, IAEA Director General Grossi said: "The IAEA will remain present at the Zaporizhzhia Nuclear Power Plant (ZNPP) for as long as it is needed. The nuclear safety and security situation at the plant remains extremely precarious and challenging. Thanks to our experts at the site, we can inform the world about developments there. We will continue to do everything in our power to keep this major nuclear facility safe and secure." ...

Grossi said that over recent days the members of the team performed walks within the perimeter of the plant and other buildings to monitor adherence to the UN-backed principles that nuclear power plants should not be fired at, or from, or be used as a base for heavy military weaponry and equipment. The update said: "They did not observe any heavy weapons or indications that drones could have been launched from the ZNPP. However, the IAEA experts are still not permitted to access all areas of the ZNPP."

On Wednesday, the IAEA experts at the plant observed an emergency drill take place, based on the scenario of damage to a pipe connected to one of the sprinkler ponds providing cooling water to cool unit 1 and its safety systems. The exercise involved plant staff pumping water into the sprinkler pond and repairing the damaged pipe while also ensuring safety systems and back up generators remained operational. "The IAEA team's opinion was that the exercise was well organised and that the personnel responded effectively," the update said.... IAEA teams at the other nuclear power plants in Ukraine reported nuclear safety and security being maintained, although the team at Rivne NPP reported that attacks on the energy infrastructure elsewhere in Ukraine "had resulted in instability in the back-up power lines connected to the plant".

The objectives of the POLCA Project are to Enhance knowledge of SFPs in an accident scenario; Improve the physical understanding of large-scale pools to provide thermal hydraulics data; Support the thermo-hydraulics model development and validation for SFP during a loss of cooling accidents; Evaluate some mitigation strategies for fuel assembly management.

Source: https://www.world-nuclear-news.org/Articles/IAEA-officials-observe-emergency-drill-at-Zaporizh, 17 May 2024.

NUCLEAR WASTE MANAGEMENT

GENERAL

Assessing the Safety of Spent Fuel Pools During a Loss of Cooling Accident

A new NEA nuclear safety joint project, the entitled Pool during Loss of Cooling Accident (POLCA), was launched during a meeting of 40 international experts on 9-10 April 2024. The two-day meeting was organised to finalise the project's experimental and analytical programme. The POLCA project will examine the behaviour of spent fuel pools (SFPs) during situations of loss of cooling through experimental analysis. This four-year project brings together experts from eight NEA countries: Belgium, Canada, Czechia, France, Germany, Spain, Sweden, the US and non-member the United Arab Emirates.

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scenario; Improve the physical understanding of large-scale pools to provide thermal hydraulics data; Support the thermo-hydraulics model development and validation for SFP during a loss of cooling accidents; Evaluate some mitigation strategies for fuel assembly management.

The POLCA project will contribute to the enrichment of an experimental database, used to improve thermohydraulic numerical tools in pool conditions. The project will utilise the facilities of the French Institute of Radiological Protection and Nuclear Safety (IRSN) which provide dedicated instrumentation for measuring thermohydraulic behaviour.

Following the Fukushima Daiichi nuclear power plant accident, the international nuclear community initiated a deep assessment of the safety of spent fuel pools, which store spent fuel from nuclear reactors. In April 2023, around 30 experts from 10 countries met at the IRSN in Cadarache, France, to discuss how to advance the understanding of SFP phenomena during a loss of cooling accident. As a result of this meeting, the POLCA (Pool during Loss of Cooling Accident) joint project was established. The next POLCA meeting is scheduled to take place in France in November 2024.

Source: https://www.oecd-nea.org/jcms/pl_92835/assessing-the-safety-of-spent-fuel-pools-during-a-loss-of-cooling-accident, 13 May 2024.

NETHERLANDS

Dutch Regulator Issues Permit for Urenco Waste Store

The Authority for Nuclear Safety and Radiation Protection (ANVS) has granted the final permit to Urenco for the construction and operation of a new radioactive waste storage facility at its Almelo site. The uranium enrichment company was last year granted permission to build the facility prior to the permit being issued. In the autumn of 2022, Urenco received a warning from the ANVS after an inspection, because radioactive material (activated carbon and waste oils) was being stored in a room that was not sufficiently fire-resistant.

Although there was no immediate danger to people and the environment, ANVS in April 2023 issued a 'tolerance decision', allowing the construction of a new storage facility, without the required permit having been granted in advance, so that Urenco could meet the safety requirements as quickly as possible....

Waste from Urenco's uranium enrichment activities at Almelo cannot immediately be sent for storage at the Central Organisation for Radioactive Waste (Covra). It must first be processed by the company. It can then be transported to Covra - the only storage for radioactive waste in the Netherlands. The material must therefore remain stored at Urenco until that processing has taken place.

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In addition to granting the final permit for the waste storage facility, ANVS has also made three amendments to Urenco's licence for the Almelo plant. The company may also adapt the floor plan of its buildings to the new situation.... Urenco announced plans in December last year to increase capacity at its Almelo plant by 15% in response to new commitments from customers. The project will see multiple new centrifuge cascades added to an existing plant at the site, adding about 750 tonnes of SWU per year. The first new cascades are scheduled to come online around 2027.

Source: https://www.world-nuclear-news.org/Articles/Dutch-regulator-issues-permit-for-

Urenco-waste-sto, 15 May 2024.

UK

UK Plans Near Surface Disposal of Intermediate Level Waste

In its updated strategy for handling nuclear waste and radioactive substances, the UK proposes to use a shallower disposal facility for suitable intermediate-level waste which was previously earmarked for the planned deep geological disposal facility. The Department for Energy Security and Net Zero said that the search for a site for a geological disposal facility (GDF) was currently under way in England and Wales, and it was unlikely to be ready to start accepting waste until 2050. The plan has been for it to provide permanent safe disposal of high and intermediate-level waste. The existing near surface disposal facilities are used solely for the disposal of suitable low-level waste.

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But following a consultation held last year, the department has now published its response and updated strategy which includes the proposed near surface disposal facility for intermediate-level waste (ILW). It would have the advantages of being ready within 10 years and would allow for quicker decommissioning and savings of around GBP500 million (USD636 million) in storage costs, the department says.

In Managing Radioactive Substances and Nuclear Decommissioning: UK policy framework it says: "A near surface disposal facility for ILW is a facility that can be located at or below the surface (up to 200 metres, the minimum depth of a GDF), and may make use of existing structures. It differs from a GDF in the degree of isolation provided by the facility, including host geology, depth and design.

"A near surface disposal facility for ILW below the surface could be constructed as silos, vaults or caverns and could be accessed by a tunnel or shaft. They would likely consist of multiple barriers including waste packages, grout, walls, backfill material and reinforced caps over the closed silos, vaults or caverns."

It also says a surface level disposal facility for intermediate-level waste could be similar to the Low Level Waste Disposal Facility at Dounreay, with waste packages stacked in engineered concrete vaults "up to the approximate level of the surface ... when the vaults are closed, they would be covered with an engineered cap to prevent rainwater entering and reduce the risk from inadvertent human intrusion. The barriers provided by the packaging of the waste, the concrete vaults and the engineered cap prevent any harmful amounts of radioactivity escaping".

The working assumption in the strategy is that the disposal facility for intermediate-level waste would most likely be located on existing Nuclear Decommissioning Authority land. It also says that "lightly contaminated rubble and substructures can be disposed of on-site if safe to do so. This will avoid tonnes of waste being bagged up and transported for heavy-duty disposal elsewhere, reducing impact on the environment".

The working assumption in the strategy is that the disposal facility for intermediate-level waste would most likely be located on existing Nuclear Decommissioning Authority land. It also says that "lightly contaminated rubble and substructures can be disposed of on-site if safe to do so. This

will avoid tonnes of waste being bagged up and transported for heavy-duty disposal elsewhere, reducing impact on the environment"….

UK Minister for Nuclear Andrew Bowie said of the overall framework: "The UK has been a pioneer in nuclear technology, and now we're taking sensible steps to manage our radioactive waste, while reducing the burden on the environment and taxpayer. This will help continue our world-leading nuclear safety record, protect our environment and mean quicker decommissioning of former sites."…

Source: https://www.world-nuclear-news.org/Articles/UK-plans-near-surface-disposal-of-intermediate-lev, 21 May 2024.

Centre for Air Power Studies

The Centre for Air Power Studies (CAPS) is an independent, non-profit think tank that undertakes and promotes policy-related research, study and discussion on defence and military issues, trends and developments in air power and space for civil and military purposes, as also related issues of national security. The Centre is headed by Air Vice Marshal Anil Golani (Retd).

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