



OPINION – K Ramanathan

Vol 19, No. 07, 01 FEB. 2025

Can Nuclear Replace Coal-Based Electricity In India?

India's energy strategy should be a judicious mix of coal, nuclear power, and clean energy resources. The share of coal, however, needs to come down. India needs an optimal mix of energy resources with a minimum of fossil fuel to meet its rapidly increasing demand for 24x7 clean energy. This demand is driven by economic growth, people's aspirations, and digital India initiatives among others.

The government has set a target of a non-fossil energy capacity of 500 GW by 2030 with the main focus on solar and wind energy. Both these resources are intermittent and variable. They alone cannot provide base load support — the minimum level of electricity demand that needs to be constantly supplied to the grid at any given time — and ensure requisite levels of reliability and security. Therefore, there is a need for fuel that can meet these requirements and is also environmentally friendly. Can nuclear power generation fill the gap and slowly replace coal-based electricity generation?

Historically, coal has served

The government has set a target of a non-fossil energy capacity of 500 GW by 2030 with the main focus on solar and wind energy. Both these resources are intermittent and variable. They alone cannot provide base load support — the minimum level of electricity demand that needs to be constantly supplied to the grid at any given time — and ensure requisite levels of reliability and security. Therefore, there is a need for fuel that can meet these requirements and is also environmentally friendly. Can nuclear power generation fill the gap and slowly replace coal-based electricity generation?

CONTENTS

- ☛ OPINION
- ☛ NUCLEAR STRATEGY
- ☛ BALLISTIC MISSILE DEFENCE
- ☛ NUCLEAR ENERGY
- ☛ SMALL MODULAR REACTORS
- ☛ NUCLEAR COOPERATION
- ☛ NUCLEAR SAFETY
- ☛ NUCLEAR DISARMAMENT
- ☛ URANIUM PRODUCTION
- ☛ NUCLEAR PROLIFERATION
- ☛ NUCLEAR WASTE MANAGEMENT

as a major source of stable energy for humankind. India is the second-largest producer and consumer of coal in the world. Coal-based electricity currently meets over 70 per cent of its energy needs. Coal has also helped in substantial job creation. Statistics show that the industry supports millions of jobs, both directly and indirectly. From mining operations to transportation and power plant operations, coal remains a significant employment generator, particularly in resource-rich

states like Jharkhand, Odisha, and Chhattisgarh.

For these states abandoning coal is an existential question. Plant efficiencies have also improved over the years through technological developments, such as supercritical and ultra-supercritical boilers. Similarly, environmental concerns are being addressed to some extent with the emergence of technologies like gasification and carbon capture, utilisation, and storage (CCUS).

Notwithstanding the above advantages, coal is fast losing its sheen. Burning of coal is a leading contributor to air pollution and greenhouse gas emissions, responsible for over 40 per cent of India's CO2 emissions. India ranks third in global emissions from coal mining. Additionally, coal mining often results in environmental degradation, loss of biodiversity, and displacement of communities. Rising global pressure to transition to cleaner energy sources also casts doubt on the long-term sustainability of coal.

Nuclear Power's Advantages: Compared to coal, nuclear power is one of the cleanest energy sources. The life cycle CO2 emissions per unit of electricity generation is 12g, compared to 820g in the case of coal-based power generation. Besides, nuclear power offers the advantages of high energy output from lower quantity of fuel, the ability to provide base load support, and serve as an enabler for large-scale variable renewable energy (VRE) integration. These VRE sources include solar, wind, ocean, and some hydropower generation technologies. Nuclear power is also becoming potentially cost-effective and safe, thanks to the

Compared to coal, nuclear power is one of the cleanest energy sources. The life cycle CO2 emissions per unit of electricity generation is 12g, compared to 820g in the case of coal-based power generation. Besides, nuclear power offers the advantages of high energy output from lower quantity of fuel, the ability to provide base load support, and serve as an enabler for large-scale variable renewable energy (VRE) integration.

Indian nuclear plants adhere to stringent safety standards and are also supervised by the IAEA. India has also strengthened its nuclear capabilities through international collaborations with the IAEA and countries like Russia, USA, and France. India is also a member of the 35-member collaborative effort project the International Thermonuclear Experimental Reactor for advancing magnetic fusion.

technological developments in nuclear power technology. India has over 60 years of experience in nuclear energy technology. During this period, the country has achieved significant progress in technology development, fuel use efficiency, and human resources development. Several organisations like DAE, BARC, Indira Gandhi

Centre for Atomic Research, NPCIL, Atomic Minerals Directorate for Exploration and Research, AERB are contributing to this.

Indian nuclear plants adhere to stringent safety standards and are also supervised by the IAEA.

India has also strengthened its nuclear capabilities through international collaborations with the IAEA and countries like Russia, USA, and France. India is also a member of the 35-member collaborative effort project the International Thermonuclear Experimental Reactor for advancing magnetic fusion. The prospects of bilateral collaboration have also increased. Yet

another advantage India has is that it has one of the largest deposits of Thorium in the world, a potential source for fueling nuclear power. Thorium-powered reactors though not yet in commercial operation in India hold forth the promise of energy independence, minimisation of waste management requirements and nuclear proliferation risks.

In recent years, interest in nuclear power has picked up fast in many countries including Japan, the US, China, South Korea and France, as a reliable source and a key enabler for achieving decarbonisation of the energy sector. Geo-political

developments following the Ukraine war are also fuelling this. In the past, the relatively long gestation periods for regulatory approvals and construction, the high capital investment required for construction, maintenance, and eventual decommissioning, the safety of waste disposal, import of Uranium, potential radiation and health risks and risk of proliferation of fuel have been major deterrents in moving forward.

A Judicious Energy Mix: While these are getting eased out, apprehensions about human safety and environmental impacts remain a major challenge. Securing suitable sites for nuclear plants often encounters resistance from local communities concerned about displacement, environmental impacts, and the possibility of radiation hazards. In sum, India's energy strategy should not be an either-or choice but a judicious mix of coal, nuclear power, and clean energy resources. Coal provides a pragmatic solution in the short term given its affordability, abundance, job creation potential, and the country's developmental needs.

However, its share in the energy mix has to come down progressively. This is important for the transition to a net zero energy scenario. Nuclear power aligns more closely with India's vision for a low-carbon future. India is well poised to move ahead on nuclear power development. Addressing the challenges of high capital costs, safety concerns, and waste management is important in this context. Fast-tracking of Thorium reactors and advancing indigenous technologies like the Bharat Small Reactors and Small Modular Reactors can enhance energy security and reduce dependency on imported uranium. These small reactors are

India's energy strategy should not be an either-or choice but a judicious mix of coal, nuclear power, and clean energy resources. Coal provides a pragmatic solution in the short term given its affordability, abundance, job creation potential, and the country's developmental needs.

Fast-tracking of Thorium reactors and advancing indigenous technologies like the Bharat Small Reactors and Small Modular Reactors can enhance energy security and reduce dependency on imported uranium. These small reactors are modified scaled-down versions of India's well-developed PHWR technology, allowing for adaptable reactors, which can be used in remote areas and for large industries like steel and cement plants.

modified scaled-down versions of India's well-developed PHWR technology, allowing for adaptable reactors, which can be used in remote areas and for large industries like steel and cement plants. The recent opening up of the sector through joint

ventures and private sector participation could be catalysts for this.

Source: <https://www.eco-business.com/opinion/can-nuclear-replace-coal-based-electricity-in-india/>, 27 January 2025.

OPINION – Jonathan Lord

Convene the E3 to Address the Iranian Nuclear Threat

In its first 100 days, the Trump administration should convene the UK, France, and Germany—the E3—to coordinate a strategy for dealing with Iran's nuclear program, including a possible negotiated settlement. Iran is closer than ever to having the capability to produce a nuclear weapon;

the Trump administration should ensure that the regime does not make the decision to pursue it. The Trump administration should have a coordinated sanctions and negotiation strategy with the E3 to formulate a collective negotiation strategy before the Joint Comprehensive Plan of Action's snapback mechanism expires in October 2025.

When Trump is sworn in as the 47th U.S. president, Iran will be closer than ever to having the capability to produce a nuclear weapon. The only thing standing between Iran and the bomb is a decision by Supreme Leader Ali Khamenei on whether to move ahead. With the second-strike threat of Hezbollah now severely diminished following

Israel's military operation in Lebanon, and the Iranian regime's air defenses rendered inoperable following Israel's direct military strike on Iran in October, many in the regime likely see a nuclear weapon as critical to deterring threats to the sovereignty and stability of the revolutionary government. Beginning on "Day 1," the Trump administration must make every effort to impress upon the regime that the opposite is true.

In his first term, President Trump took unilateral action to pressure Iran. In leaving the Iran nuclear deal, he put Washington at odds with its European partners who chose to remain party to the agreement. In his second term, Trump will find the positions of the UK, France, and Germany have shifted toward favoring a more muscular approach to dealing with Iran's nuclear program since his previous term. As such, the administration should focus its energies in the first 100 days on reaching a coordinated policy position with the UK, France, and Germany to deal with Iran's nuclear program.

While the Iranian regime has taken significant steps toward acquiring the bomb, the supreme leader also has signaled his willingness to pursue another negotiated settlement to achieve sanctions relief. Simultaneously, Iran has continued stockpiling highly enriched uranium and has blocked IAEA inspectors from accessing key nuclear sites, which drew a censure from the IAEA's Board of Governors in November 2024. Just as Tehran has sent mixed signals by advancing its nuclear program while messaging its willingness to talk, the second Trump

In his first term, President Trump took unilateral action to pressure Iran. In leaving the Iran nuclear deal, he put Washington at odds with its European partners who chose to remain party to the agreement. In his second term, Trump will find the positions of the UK, France, and Germany have shifted toward favoring a more muscular approach to dealing with Iran's nuclear program since his previous term.

Just as Tehran has sent mixed signals by advancing its nuclear program while messaging its willingness to talk, the second Trump administration has similarly sent mixed signals to Iran. Trump's policy advisors have indicated that he would move swiftly to resume "maximum pressure," an array of sanctions and focused enforcement meant to choke Iran's oil exports. However, President Trump has indicated his preference for a negotiated settlement with Iran.

administration has similarly sent mixed signals to Iran. Trump's policy advisors have indicated that he would move swiftly to resume "maximum pressure," an array of sanctions and focused enforcement meant to choke Iran's oil exports. However, President Trump has indicated his preference for a negotiated settlement

with Iran. In November 2024, Elon Musk, a Trump advisor, reportedly met with Iran's UN ambassador to discuss how Washington and Tehran might reduce tensions.

In his second term, Trump will find the positions of the UK, France, and Germany have shifted toward favoring a more muscular approach to dealing with Iran's nuclear program since his previous term. These policies of pressure and negotiation, of course, are not mutually exclusive. If these policies are properly sequenced, Trump administration officials likely assess they can pick up where they left off and pressure Tehran into negotiating a better deal.

To improve its chances of entering negotiations from a position of strength, the Trump administration should immediately engage the USA's European allies. During his first term, Trump unilaterally withdrew from the JCPOA, the multilateral nuclear deal the USA had struck

with Iran in 2015 alongside the UK, France, Germany, Russia, China, and the EU. However, these European nations and China—known as the P5+1—remained party to the agreement. When Washington reimposed sanctions, it did so alone.

When President Trump restores maximum pressure on Iran, he is likely to find the UK, France,

and Germany—known as the E3—far more receptive to coordinating a pressure campaign with Washington. For more than a year, the E3 quietly has sought to push the USA to focus its attention on Iran’s nuclear program and agree to more confrontational diplomatic responses to Iran’s nuclear advances. The Europeans wanted to censure Iran in June 2024, following an IAEA report that Iran had amassed its largest stockpile of highly enriched uranium to date.

Reportedly, the Biden administration argued against censure, fearing it would push the Iranians to behave more rashly. While the Biden administration voted with the E3 in favor of censure in November 2024, the Europeans have been pressing Washington for a more aggressive approach to Iran for many months.

The White House must act fast or risk Iran miscalculating that regional aggression and nuclear breakout are the best options to preserve the regime. Within the first 100 days, the Trump administration should convene the E3 to coordinate a strategy for dealing with Iran’s nuclear program. The USA and the E3 have several key decisions to make before the JCPOA’s snapback mechanism expires in October 2025. By declaring Iran out of compliance with the JCPOA, the USA

and E3 could trigger the immediate reimplementa-tion of UN sanctions on Iran, thus creating a critical opportunity for the USA and the E3 to leverage snapback in pursuit of a deal. Whether the USA and the E3 decide to implement snapback immediately or use the threat of snapback as negotiating leverage, the administration will be more successful if it works in cooperation with the UK, France, and Germany and approaches Iran with a collective position. While the supreme leader is eager for sanctions

The USA and the E3 have several key decisions to make before the JCPOA’s snapback mechanism expires in October 2025. By declaring Iran out of compliance with the JCPOA, the USA and E3 could trigger the immediate reimplementa-tion of UN sanctions on Iran, thus creating a critical opportunity for the USA and the E3 to leverage snapback in pursuit of a deal.

The White House must act fast or risk Iran miscalculating that regional aggression and nuclear breakout are the best options to preserve the regime. While time is of the essence, and a deal to prevent Iran from obtaining a nuclear device is more important than ever, President Trump should avoid racing to the table with Tehran.

relief, Tehran also may seek to use negotiations to run out the clock on snapback, robbing the West of a powerful sanctions tool. While Russia and China—two nations that have grown significantly closer to the Iranian regime—likely would undercut the economic impact of snapback sanctions by

continuing to trade with and support Iran, Tehran still fears the international stigma of being under UN sanctions once again.

Trump’s return to office coincides with Iran standing closer to a nuclear weapon than ever before. In the past year, Tehran has demonstrated a greater tolerance for risk than it has

in the past—twice attacking Israel directly and once attacking Pakistan, both nations that reportedly have nuclear capabilities of their own. The White House must act fast or risk Iran miscalculating that regional aggression and nuclear breakout are the best options to preserve the regime. While time is of the essence, and a deal to prevent Iran from obtaining a nuclear device is more important than ever, President Trump should avoid racing to the table with Tehran. First, he should do everything he can to maximize his leverage by making his first call to the E3 to coordinate a common negotiating position. Now is the time to come to agreement with the USA’

European partners on how to leverage snapback sanctions before they expire and formulate a collective negotiation strategy. With little time on the clock and Iran so close to a weapon, doing so will deliver the Trump administration the best opportunity to prevent Iran from becoming the world’s 10th nuclear power.

Source: <https://www.cnas.org/publications/commentary/convene-the-e3-to-address-the-iranian-nuclear-threat>, 20 January 2025.

OPINION – Col Rajeev Agarwal

Iran Nuclear Talks in Geneva: Setting the Stage for Critical Negotiations

With its regional strategy of fighting through proxies demolished, the nuclear programme is the only trump card that Iran holds and it would therefore not let it go, without concrete 'iron clad' assurances from the international community. Interlocutors from Iran convened with representatives from Germany, France, and the UK in Geneva on January 13 for another round of discussions concerning Tehran's contentious nuclear programme. These talks are taking place amidst heightened tensions in West Asia and the recent ouster of the Assad regime in Syria, which has severely disrupted Iran's regional strategy. The timing of these negotiations is particularly significant, occurring just a week before Trump is inaugurated as US President for a second term. With Iran steadfast in asserting its right to uranium enrichment and the USA absent from these discussions, the potential outcomes of these talks remain uncertain.

Background of the Negotiations:

The preceding round of talks on November 29, 2024, involving the same European parties, yielded little progress. This stalemate followed a resolution passed by the IAEA on November 21, 2024, which censured Iran for its lack of cooperation. The motion, sponsored by the U.S., the UK, France, and Germany, was a continuation of a similar resolution adopted earlier in June 2024. Iran strongly criticized these actions, threatening to escalate its nuclear enrichment

activities if the censure was not withdrawn. This tension arose despite a prior agreement during IAEA head Grossi's visit to Tehran, where Iran consented to cap its stock of uranium enriched to near-weapons-grade levels up to 60 per cent purity. However, faced with additional sanctions, Iran threatened to scale up the program further.

With its regional strategy of fighting through proxies demolished, the nuclear programme is the only trump card that Iran holds and it would therefore not let it go, without concrete 'iron clad' assurances from the international community. Interlocutors from Iran convened with representatives from Germany, France, and the UK in Geneva on January 13 for another round of discussions concerning Tehran's contentious nuclear programme.

Current State of Iran's Nuclear Programme:

The JCPOA, signed on July 14, 2015, was a pivotal agreement aimed at preventing Iran from developing nuclear weapons. It was an 'instrument of faith' between the two parties that incorporated strict checks and balances aimed at ensuring a strict vigil on Iran's nuclear program, lest Iran progress to developing a nuclear weapon. However, the deal was derailed in 2018 when President Trump unilaterally withdrew the USA, labeling the JCPOA a "horrible deal". Negotiations to revive the agreement resumed under President Joe Biden in 2021 but stalled by early 2022 after eight rounds of talks due to geopolitical crises, including the Russia-Ukraine war and escalating conflicts in Gaza.

Iran, meanwhile, free from the shackles of the deal, has increased the Uranium enrichment drastically. While the IAEA has raised concerns over the enrichment and especially Iran's decision to enrich Uranium up to 60 per cent, it was in January 2023 that an IAEA report raised the alarm when its inspectors discovered that two cascades of IR-6 centrifuges at the Fordo nuclear plant in Iran had been configured differently.

Iran, meanwhile, free from the shackles of the deal, has increased the Uranium enrichment drastically. While the IAEA has raised concerns over the enrichment and especially Iran's decision to enrich Uranium up to 60 per cent, it was in January 2023 that an IAEA report raised the

alarm when its inspectors discovered that two cascades of IR-6 centrifuges at the Fordo nuclear plant in Iran had been configured differently. The samples collected showed particles up to 83.7 percent enriched uranium, close to 90 per cent required for weapon-grade uranium. Iran dismissed the concerns, stating that small

particles get highly enriched during the process of enrichment. However, the concerns have mounted ever since.

Soon after the last meeting in November 2024, the IAEA report of December 2024 stated that Iran has significantly raised the levels of enrichment and has advanced its nuclear programme significantly. The two-page report caused immediate alarm as it indicated a dangerous spike in Iran's enrichment activities at the Fordow enrichment plant. The findings stated that Iran is instituting a capacity to make weapon-grade uranium (WGU) under the guise of making 60 percent HEU at the Fordow underground enrichment plant and that it can possibly produce WGU without even using its existing stocks of 60 per cent HEU. As per the IAEA report, Iran is setting up a three-step, interconnected enrichment process at Fordow, going from natural uranium up to 5 percent enriched uranium in up to 8 IR-6 cascades, from 5 to 20 per cent in six current IR-1 cascades, and 20 to 60 per cent in two interconnected IR-6 cascades. This three-step process allows the near continuous, sequential enrichment of natural uranium to 60 per cent HEU. This process can be easily modified to produce WGU. If true, this could mark a dangerous escalation of the nuclear program with potential weaponisation possibilities.

As per the IAEA report of 19th November 2024, Iran's total enriched uranium stockpile was 6,604 kg, of which Iran had an estimated 182.3 kg of uranium enriched up to 60 per cent purity. By the IAEA's theoretical definition, around 42 kg of

The findings stated that Iran is instituting a capacity to make weapon-grade uranium (WGU) under the guise of making 60 percent HEU at the Fordow underground enrichment plant and that it can possibly produce WGU without even using its existing stocks of 60 per cent HEU. As per the IAEA report, Iran is setting up a three-step, interconnected enrichment process at Fordow, going from natural uranium up to 5 percent enriched uranium in up to 8 IR-6 cascades, from 5 to 20 per cent in six current IR-1 cascades, and 20 to 60 per cent in two interconnected IR-6 cascades.

As per the IAEA report of 19th November 2024, Iran's total enriched uranium stockpile was 6,604 kg, of which Iran had an estimated 182.3 kg of uranium enriched up to 60 per cent purity. By the IAEA's theoretical definition, around 42 kg of uranium enriched to 60 per cent is required to make the required amount of highly enriched (beyond 90 per cent) enriched uranium for one nuclear bomb.

uranium enriched to 60 per cent is required to make the required amount of highly enriched (beyond 90 per cent) enriched uranium for one nuclear bomb. By this calculation, Iran already has the required enriched uranium to make weapon-grade uranium for four bombs.

What Can Geneva Talks Achieve?

Geneva talks are happening more in hope than conviction. The talks aim to keep Iran engaged and responsive to the queries and discussions at the meeting. Unlike November last year, when the talks took place under threats and counter threats, it is hoped that there will be understanding this time. The developments in West Asia

recent resulting from the successful Israeli operations in Gaza, West Bank and Southern Lebanon, wherein it has been able to eliminate any major threat from Hamas and Hezbollah have had a significant impact on Iran. The ouster of Assad from Syria has effectively broken any direct link that Iran had with the proxies in the region, dealing a deadly blow to its regional strategy in the region. The return of Trump as the President is bound to have an impact, too, especially with his threats of 'Maximum Pressure 2.0', adding pressure on Iranian leadership.

Plus, the fact that only three European powers are engaging in talks with Iran gives it only a cosmetic look, especially with the big three, the US, Russia and China, not being part of the talks. The absence of these major stakeholders reduces the potential for binding agreements, relegating the talks to a largely symbolic exercise aimed at maintaining dialogue and preventing further escalation. As

signatories to the JCPOA, these European powers, at best, could seek to prevent further nuclear proliferation and, once again allow the IAEA access to its nuclear sites. In return, Iran may be promised some relief from economic sanctions that have crippled its economy.

Conclusion: Iran's nuclear issue has been an issue of conflict not only between Iran and other powers in the region, but also with the US and Israel. PM Netanyahu has often suggested taking out Iran nuclear sites through air strikes. In fact, Israel claimed to have successfully targeted some parts of Iran nuclear program during its airstrike on 26th October last year.

It is very unlikely that Iran will concede to roll back its nuclear program to July 2015 deal levels. Also, as per the 'Sunset Clause' of the previous deal, the restrictions on Iran to use only first-generation centrifuges (IR-1) for enriching uranium was only for ten years, i.e. 2025. There were other clauses that were applicable till 2030 like restriction on uranium enrichment to 3.67 per cent purity and limit its enriched uranium stockpile to 300 kg. In any new deal that is to be negotiated, these clauses too will have to be re-drawn.

Also, with its regional strategy of fighting through proxies demolished, the nuclear programme is the only trump card that Iran holds and it would therefore not let it go, without concrete 'iron clad' assurances from the international community. Statement from Gharibabadi, Iran's Deputy Foreign Minister, after the meeting on 13th January, describing the talks as "serious, frank, and constructive", is a clear positive and departure from the previous talks in November

which were full of threats and mistrust. It is hoped that this meeting will help restore some trust and lay the foundation for future full-fledged talks later in the year.

Source: <https://www.firstpost.com/opinion/iran-nuclear-talks-in-geneva-setting-the-stage-for-critical-negotiations-13853177.html>, 15 January 2025.

OPINION – Peter Suci

Russia's Nuclear Forces are Slowly Falling Apart

Since the invasion of Ukraine, the Kremlin appears to have made conventional weapons its greater priority—at least for now. Last October, the Kremlin carried out an exercise that put its nuclear forces to the test, while Russian President Putin has repeatedly threatened the use of nuclear weapons—going so far as to lower the nuclear threshold under which conditions Russia would employ weapons of mass destruction. Moscow's new doctrine

would allow it to respond with nuclear weapons even to a conventional attack if that nation carrying out the attacks is supported by a nuclear power. Essentially, the Kremlin's new doctrine claims that an attack from a non-nuclear state supported by a nuclear state—clearly a reference to Ukraine striking inside Russia with American weapons—would be viewed as a joint attack on Russia. Indeed, that change was made just as the Biden Administration gave the green light to Ukraine to fire long-range U.S.-made missiles into Russia. At the time, President Trump was critical of that decision, blaming Biden for recklessly escalating the conflict for no gain. However, so far, he has not spoken

The absence of these major stakeholders reduces the potential for binding agreements, relegating the talks to a largely symbolic exercise aimed at maintaining dialogue and preventing further escalation. As signatories to the JCPOA, these European powers, at best, could seek to prevent further nuclear proliferation and, once again allow the IAEA access to its nuclear sites. In return, Iran may be promised some relief from economic sanctions that have crippled its economy.

Moscow's new doctrine would allow it to respond with nuclear weapons even to a conventional attack if that nation carrying out the attacks is supported by a nuclear power. Essentially, the Kremlin's new doctrine claims that an attack from a non-nuclear state supported by a nuclear state—clearly a reference to

publicly about the decision, or indicated whether he would reverse it or leave it in place.

A Focus on Conventional Weapons:

Despite Putin's nuclear saber rattling, the reality is that Russia has been forced to turn its focus away from increasing its nuclear arsenal and back to its conventional weapons. According to a study by

Carnegie Politika, Moscow has shifted its rearmament strategy away from the "modernization of its strategic nuclear forces," which included "retiring missiles and carriers developed in Soviet times" in favor of newer Russian-designed platforms. Instead, last year, "Russia's nuclear forces stopped being updated."

The report observed that 88 percent of Moscow's current Strategic Missile Force now consists of "modern weapons" made in the post-Soviet era, while only 12 percent dated back to 1991. However, the figures for the end of 2024 were identical to those in 2023, meaning that Russia had effectively paused progress on phasing out Cold War-era weapons altogether. "Unsurprisingly,

the Russian authorities made no mention of this in their statements last year. Instead, they paid a lot of attention to the medium-range hypersonic missile of which Putin is so fond: the Oreshnik, which was tested in combat conditions in November," Carnegie Politika added.

The Reality of the Situation: Since launching its unprovoked invasion of Ukraine nearly three years ago, Russia has faced sanctions that have impacted the development of its more advanced weapons. It has clearly put a focus on the Oreshnik medium-range missile, but likely at the expense of other platforms. The once highly touted T-14

Instead, last year, "Russia's nuclear forces stopped being updated." The report observed that 88 percent of Moscow's current Strategic Missile Force now consists of "modern weapons" made in the post-Soviet era, while only 12 percent dated back to 1991. However, the figures for the end of 2024 were identical to those in 2023, meaning that Russia had effectively paused progress on phasing out Cold War-era weapons altogether.

A standout feature of the new version of the aircraft, called the Tu-95M SM, is the ability to carry Kh-101/102 missiles." As of now, none of the modernized bombers have been delivered. The sanctions have made it difficult for Russia to source the components. Moreover, even as China, Iran and North Korea are aiding Russia's war effort, those countries can't (or won't) help when it comes to these upgrades.

Armata main battle tank (MBT) is hardly discussed, and while the Kremlin continues to praise the Sukhoi Su-57 (NATO reporting name "Felon") fifth-generation multirole fighter, it has struggled to produce the aircraft in significant numbers. Moreover, Russia has been unable to reach production levels of any of its aircraft or tanks to replace battlefield losses.

It is thus not the least bit surprising that the nuclear arsenal is on the back burner.

The Tupolev Tu-160M White Swan (NATO reporting name "Blackjack"), a nuclear-capable long-range strategic bomber, is among the platforms specifically noted in the Carnegie

Politika report. Moscow was supposed to see two of the bombers added to its arsenal last year, but this appears to have been delayed. An additional two Tu-160Ms were scheduled for delivery this year, but as the report noted, "That does not look likely either." Other programs are also just as bogged down, perhaps even worse. While the USA Air Force continues to see slow but steady upgrades of

its Boeing B-52 Stratofortress—including new engines that will keep the bombers flying for decades to come—Russia's Tupolev Tu-95 (NATO reporting name "Bear") has made little to no progress on a similar modernization effort. "The program, launched in 2018, was supposed to cover up to thirty-five aircraft, including their navigation and information display systems, onboard defense systems, radars, and engines," the report stated. "A standout feature of the new version of the aircraft, called the Tu-95M SM, is the ability to carry Kh-101/102 missiles." As of now, none of the modernized bombers have been delivered. The

sanctions have made it difficult for Russia to source the components. Moreover, even as China, Iran and North Korea are aiding Russia's war effort, those countries can't (or won't) help when it comes to these upgrades.

Still a Nuclear Threat: None of this means that Russia isn't still a capable nuclear power. Indeed, the country has around 1,710 active deployed nuclear warheads, according to a November 2024 Congressional Research Service report. But since the invasion of Ukraine, the Kremlin appears to have made conventional weapons its greater priority—at least for now. That's unlikely to change while the conflict continues, and probably will remain so for some time afterward. As has been reported, Russia's tank fleet has been destroyed. It has seen its Aerospace Force decimated. It will require years to rebuild both—and the nuclear arsenal modernization will likely continue to be put on the back burner. Rather than worry about Russia modernizing its aging nukes, the West may be better off worried that Russia doesn't pay attention enough.

Source: <https://nationalinterest.org/blog/buzz/russias-nuclear-forces-are-slowly-falling-apart/>, 25 January 2025.

NUCLEAR STRATEGY

GENERAL

Risk of Clash between Nuclear Powers is Growing, Russian Security Official Says

NATO says it is Russia that is raising tensions, including by announcing in 2023 that it was deploying tactical nuclear weapons in its ally Belarus, which borders three NATO countries. Russian security official Shoigu warned in an interview that the risk of an armed clash between nuclear powers was rising.

Shoigu, the secretary of President Putin's Security Council, told TASS news agency: "Against

..including". Shoigu said that Russia, which sent tens of thousands of troops into Ukraine in February 2022, and Belarus were taking preventive measures against Western attempts aimed at "destabilizing the situation... from within". The

Russian 'nuclear umbrella' now ensures the protection of our closest ally in the same framework scenarios in which Russia allows a nuclear response for its own defence.

Source: <https://www.deccanherald.com/world/risk-of-clash-between-nuclear-powers-is-growing-russian-security-official-says-3371197>, 24 January 2025.

SAUDI ARABIA

Saudi Arabia's New Nuclear Frontier: Uranium Enrichment and Sales

Saudi Arabia plans to enrich and sell uranium as part of its broader strategy to monetize its minerals, according to the country's energy minister, Prince Abdulaziz bin Salman. Speaking at a conference in Dhahran on Monday, Prince Abdulaziz stated that they will enrich it and will sell it and will do a 'yellowcake', referring to the powdered concentrate of uranium used to prepare fuel for nuclear reactors. He emphasised that while yellowcake requires careful handling, it poses minimal radiation risks. Saudi Arabia is pursuing the development of a nuclear program, with aspirations to eventually include uranium enrichment. This move is considered sensitive, given the potential connection to nuclear weapons production. The kingdom has expressed its intention to use nuclear power as a means to diversify its energy sources. Prince Abdulaziz's comments come amidst Saudi Arabia's ongoing nuclear ambitions, which have raised concerns in the region. In 2018, Crown Prince Salman stated that Saudi Arabia would seek to develop nuclear weapons if regional rival Iran were to do so.

Neighboring Gulf state the UAE operates the Arab world's first multi-unit nuclear energy plant.

Saudi Arabia is pursuing the development of a nuclear program, with aspirations to eventually include uranium enrichment. This move is considered sensitive, given the potential connection to nuclear weapons production. The kingdom has expressed its intention to use nuclear power as a means to diversify its energy sources.

However, the UAE has pledged not to engage in uranium enrichment or the reprocessing of spent fuel. Additionally, Saudi Arabia is planning to end its current light-touch oversight of its nuclear facilities by the United Nations atomic watchdog, the IAEA. The kingdom intends to shift to more regular safeguards by the end of 2024. At present, Saudi Arabia has yet to

activate its first nuclear reactor, which allows its nuclear program to be monitored under the Small Quantities Protocol (SQP). This agreement, which the IAEA has with less advanced nuclear states, exempts them from certain reporting obligations and inspections.

Source: <https://tribune.com.pk/story/2522052/saudi-arabias-new-nuclear-frontier-uranium-enrichment-and-sales>, 14 January 2025.

UK

Rolls-Royce Secures £9 B Deal for UK's Naval Nuclear Reactors

Rolls-Royce has been awarded a £9 B contract to design and maintain nuclear reactors for the UK's submarine fleet, boosting the Royal Navy's deterrent capabilities. The deal will save £400 M and create 1,000 jobs while supporting the AUKUS pact with the U.S. and Australia. The UK government has sealed a significant £9 B contract with Rolls-Royce to advance the design and support of nuclear reactors for its submarine fleet. This move fortifies the Royal Navy's nuclear deterrent strategy, ensuring at least one nuclear-armed submarine is always patrolling at sea.

This 8-year deal is poised to enhance the AUKUS

Rolls-Royce has been awarded a £9 B contract to design and maintain nuclear reactors for the UK's submarine fleet, boosting the Royal Navy's deterrent capabilities. The deal will save £400 M and create 1,000 jobs while supporting the AUKUS pact with the U.S. and Australia. The UK government has sealed a significant £9 B contract with Rolls-Royce to advance the design and support of nuclear reactors for its submarine fleet.

defense partnership involving the USA and Australia while promising a £400 M saving for Britain by consolidating multiple contracts. Defense Minister Healey highlighted its economic benefits, projecting the creation of 1,000 new jobs and preserving 4,000 others under the Unity contract. Simultaneously, the agreement underlines the

defense sector's role in the UK's economic growth, as the government anticipates its Strategic Defence Review. Amid rising geopolitical challenges, Britain plans to increase defense spending, aiming for 2.5% of GDP in response to NATO's advisories against threats from nations like Russia.

Source: <https://www.devdiscourse.com/article/headlines/3237418-rolls-royce-secures-9-B-deal-for-uks-naval-nuclear-reactors>, 24 January 2025.

BALLISTIC MISSILE DEFENCE

INDIA

Pralay Missile Makes Debut at Republic Day Parade

For the first time, indigenously developed short-range tactical missile. Pralay was showcased at the Republic Day parade at Kartavya Path. The missile, developed by the DRDO, is capable of carrying a nuclear warhead. It is a short-range surface-to-surface missile with a payload capacity of 500-

1,000 kg. It has a range of 150 to 500 kms. The grand parade in the national capital featured an array of indigenously built missiles, surveillance systems and weapon systems reflecting India's growing military prowess. The DRDO displayed

Rolls-Royce has been awarded a £9 B contract to design and maintain nuclear reactors for the UK's submarine fleet, boosting the Royal Navy's deterrent capabilities. The deal will save £400 M and create 1,000 jobs while supporting the AUKUS pact with the U.S. and Australia. The UK government has sealed a significant £9 B contract with Rolls-Royce to advance the design and support of nuclear reactors for its submarine fleet.

some of its path-breaking innovations to boost national security. Its tableau, with the theme 'Raksha Kavach — Multi-layer Protection against Multi-domain Threats', comprised quick reaction surface-to-air missile, airborne early warning and control system, 155 mm/52 calibre advanced towed artillery gun system and drone detect, deter and destroy system.

It also included a satellite-based surveillance system, medium-power radar Arudhra, advanced lightweight torpedo, electronic warfare system Dharashakti, laser-based directed-energy weapon and very short-range air defence system. At Republic Day celebrations, India showcased its rich cultural diversity, development and military prowess with a special focus on 75 years of enactment of the Constitution. 31 tableaux rolled down Kartavya Path on the theme 'Swarnim Bharat: Virasat Aur Vikas' as part of the celebrations. In a first, a tri-services tableau displaying the spirit of jointness and integration among the armed forces was also part of the ceremonial event. The Republic Day flypast did not feature indigenously designed and developed Advanced Light Helicopter (ALH) Dhruv. The armed forces have grounded the fleet following the crash of one of the ALHs this month. The Army, Indian Air Force, Navy and Coast Guard are operating around 330 ALHs.

Source: <https://economictimes.indiatimes.com/news/defence/pralay-missile-makes-debut-at-republic-day-parade/articleshow/117575744.cms>, 26 January 2025.

NORTH KOREA

North Korea Fires Short-Range Ballistic Missiles Before Trump's Return

North Korea fired several short-range ballistic missiles into the sea, according to Seoul's military, in what experts said could be a message to US

President-elect Trump's incoming administration. The launch came as Japanese Foreign Minister Iwaya visited South Korea for a series of meetings with top officials, with the Asian neighbours seeking to boost bilateral ties before Trump returns to office. South Korean and US intelligence agencies had monitored Pyongyang's launch preparations, the military said, with Seoul maintaining "full readiness" and sharing information with Washington and Tokyo.

The USA Indo-Pacific Command condemned the test, calling on North Korea "to refrain from further unlawful and destabilising acts". Seoul's acting president Sang-mok also slammed the launch, saying it violated UN Security Council resolutions. Experts said the latest launch could be intended as a message to the incoming US president. The location of the test site was undisclosed but images released by North Korean state media KCNA showed leader Jong Un observing last week's launch with his teenage daughter Ae. KCNA

North Korea fired several short-range ballistic missiles into the sea, according to Seoul's military, in what experts said could be a message to US President-elect Trump's incoming administration. The launch came as Japanese Foreign Minister Iwaya visited South Korea for a series of meetings with top officials, with the Asian neighbours seeking to boost bilateral ties before Trump returns to office.

cited the use of a "new compound of carbon fibre" in the missile's engine, which experts warned could allow Pyongyang to hit further targets with technology to which only the USA, Russia and China currently have access.

Source: <https://www.msn.com/en-us/news/world/north-korea-fires-short-range-ballistic-missiles-before-trumps-return/ar-BB1rp0WZ>, 15 January 2025.

NUCLEAR ENERGY

CHINA

Major Chinese Operators Report Nuclear Output for 2024

China General Nuclear has reported a 6% increase in nuclear electricity output in 2024, compared with 2023, while China National Nuclear Corporation said its nuclear generation was 1.8%

lower in 2024, a decrease mainly attributed to reactors being offline for maintenance. In an announcement to the Hong Kong Stock Exchange, China General Nuclear (CGN) said that, as of 31 December 2024, it had a total of 28 power reactors in operation with a combined generating capacity of 31,798 MWe.

Total power generation last year of reactors operated and managed by the group totalled about 242.2 TWh, a year-on-year increase of 6.08%, it said. Meanwhile, the total amount of electricity supplied to the grid was 227.3 TWh, an increase of 6.13%. CGN said that during 2024, it completed, as scheduled, 13 annual refuelling outages (including one annual refuelling outage conducted over to the next year), five ten-year outages (including one ten-year outage conducted over to the next year) and one initial outage.

Meanwhile, China National Nuclear Corporation (CNNC) subsidiary China National Nuclear Power announced to the Shanghai Stock Exchange that its nuclear power units generated a total of 183.1 TWh of electricity in 2024, a year-on-year decrease of 1.8%. The amount of electricity supplied to the grid was 171.260 B kWh, also a year-on-year decrease of 1.8%.

While CNNC and CGN are the main nuclear operators in China, State Power Investment Corporation (via its nuclear power business State Nuclear Power Technology Corporation) and Huaneng Group are the country's third and fourth nuclear operators, respectively. Other companies - including Huadian, Datang and Guodian - own stakes in some plants. China's total fleet of 58 operable reactors supply about 5% of the country's electricity.

Source: <https://www.world-nuclear-news.org/articles/major-chinese-operators-report-nuclear-output-for-2024>, 14 January 2025.

GENERAL

IEA Sees Rapid Potential Growth in Nuclear, if Key Challenges Overcome

With nuclear power generation set to reach a record level in 2025, a new report from the International Energy Agency says costs, schedules and financing of nuclear projects need to be overcome for nuclear to play an important role in the future energy landscape.

The report, *The Path to a New Era for Nuclear Energy*, reviews the status of nuclear energy around the world and explores risks related to policies, construction and financing. It provides the long-term outlook for nuclear power in light of policies and ambitions, quantifying nuclear power capacity and the related investment over the period to 2050. The report shows that with

continued innovation, sufficient government support and new business models, SMRs can play a pivotal role in enabling a new era for nuclear energy.

According to the IEA, interest in nuclear energy is at its highest level since the oil crises in the 1970s: support for expanding the use of nuclear power is now in place in more than 40 countries. There are currently around 63 nuclear reactors under construction, representing more than 70 GW of capacity, one of the highest levels seen since 1990. In addition, over the last five years, decisions have been taken to extend the operating lifetimes of more than 60 reactors worldwide, covering almost 15% of the total nuclear fleet. Annual investment in nuclear – for both new plants and lifetime extensions of existing ones – has increased by almost 50% in the three years since 2020,

The report, *The Path to a New Era for Nuclear Energy*, reviews the status of nuclear energy around the world and explores risks related to policies, construction and financing. It provides the long-term outlook for nuclear power in light of policies and ambitions, quantifying nuclear power capacity and the related investment over the period to 2050. The report shows that with continued innovation, sufficient government support and new business models, SMRs can play a pivotal role in enabling a new era for nuclear energy.

exceeding USD 60B.

Innovations in nuclear technologies are helping to drive momentum behind new projects, the report finds. SMRs are drawing increasing interest from the private sector.

The report highlights how the introduction of SMRs could lead to lower financing costs. With the right support, the IEA says, SMR installations could reach 80 GW by 2040, accounting for 10% of overall nuclear capacity globally. However, the success of the technology and speed of adoption will depend on the industry's ability to bring down costs by 2040 to a similar level to those of large-scale hydropower and offshore wind projects (around USD60-80 per MWh). At the COP29 UN climate change conference held in Baku, Azerbaijan in November last year, six more countries - El Salvador, Kazakhstan, Kenya, Kosovo, Nigeria and Turkey - added their support for the tripling of global nuclear energy capacity by 2050.

Source: <https://www.world-nuclear-news.org/articles/iea-highlights-challenges-in-maintaining-growth-in-nuclear>, 16 January 2025.

INDIA

Reactor Vessel Shipped for Kudankulam's Sixth Unit

The 320-t VVER-1000 reactor vessel is travelling by sea from Russia to India's Kudankulam NPP. The reactor vessel was produced at AEM-Technology's Atomash production site in Volgodonsk, Rostov Oblast, travelling by road, and then river, to the port of Novorossiysk from where it takes its lengthy journey by sea. Kryzhanovsky, General Designer of OKB Gidropress, the main designer of VVER plants, said: "Despite...our products."

Rosatom says the production cycle for manufacturing a VVER-1000 reactor vessel is two years and includes 289 control points. It added that representatives from India have been at the site since the start of equipment manufacturing for Kudankulam in 2016.

Kudankulam, about 100 km from the port city of Tuticorin in the state of Tamil Nadu at the southern tip of India, is already home to two operating Russian-VVER 1000 pressurised water

reactors: Kudankulam 1 has been in commercial operation since 2014 and Kudankulam 2 since 2017. Four more VVER units are currently under construction in two phases: construction of units

3 and 4 began in 2017, with work on units 5 and 6 beginning in 2021. Two further units - Kudankulam 7 and 8, larger AES-2006 units with VVER-1200 reactors - have been proposed as the fourth phase of the plant.

Source: <https://www.world-nuclear-news.org/articles/reactor-vessel-shipped-for-kudankulams-sixth-unit>, 15 January 2025.

ITALY

Italy to Finalise Nuclear Energy Return Plan by 2027

The Italian government is drafting legislation to withdraw the ban on nuclear power, with the first draft expected to be submitted for cabinet approval within the next few weeks. Italy plans to finalise its strategy to reintroduce nuclear power by the end of 2027, as part of its broader efforts to achieve a more sustainable energy mix. In an interview with Italian daily *Il Sole 24 Ore*, Italian Minister of the Environment and Energy Security Fratin said that the country is seeking to resume nuclear power operations as part of its future energy strategy. Notably, Italy abandoned

At the COP29 UN climate change conference held in Baku, Azerbaijan in November last year, six more countries - El Salvador, Kazakhstan, Kenya, Kosovo, Nigeria and Turkey - added their support for the tripling of global nuclear energy capacity by 2050.

The Italian government is drafting legislation to withdraw the ban on nuclear power, with the first draft expected to be submitted for cabinet approval within the next few weeks. Italy plans to finalise its strategy to reintroduce nuclear power by the end of 2027, as part of its broader efforts to achieve a more sustainable energy mix.

nuclear-fired power plants following referendums in 1987 and 2011.

Currently, the government is drafting legislation to withdraw the ban, with the first draft expected to be submitted for cabinet approval within the next two weeks. The government has highlighted that SMRs and advanced modular reactors will help in decarbonising the most polluting industries in the country including steel, glass and tilemaking. It is estimated that Italy can save €17bn (\$17.7bn) in decarbonising costs by 2050, provided nuclear power accounts for at least 11% of its energy mix. Despite the ban, Italian state-controlled utility Enel runs nuclear power stations in Spain. Eni, another Italy-based energy company, has also invested in the development of a nuclear fusion reactor in the US. Last year, Minister Fratin said that Italy held discussions with several companies including US energy group Westinghouse and French firm EDF as potential partners for a state-backed entity that will develop advanced nuclear reactors in the country. Recently, Italy's Edison signed a MOU with EDF and ENEA to partner on industrial applications of SMRs.

Source: <https://www.neimagazine.com/news/italy-to-finalise-nuclear-energy-return-plan-by-2027/>, 24 January 2025.

RUSSIA

Russia's Floating NPP Marks Milestone

The world's first floating NPP, Russia's Akademik Lomonosov, has delivered its first Billion kWh to the isolated Arctic network of the Chown-Bilibinsky energy station of Chukotka in Pevek since its inclusion in the network in December 2019. Akademik Lomonosov began commercial operation in May 2020. The total power supplied to the coastal network of Pevek without consumption of thermal energy by the shore, is about 76 MWe, and 44 MWt. The population of Pevek is just over 4,000. However, the floating NPP (PATES – Plavuchaya Atomnaya TeploElektroStantsiya) can potentially provide electricity to a city with a population of up

to 100,000. In 2025, the station will celebrate its first five-year anniversary.

The purpose of the PATES was to solve two key tasks. Firstly, it is a replacement of the outgoing capacities of the Bilibino NPP, which has been operating since 1974, as well as the Chown thermal power plant, which is already more than 70 years old. Secondly, it supplies energy to the main mining enterprises located on western Chukotka in the Chown-Bilibinsk energy complex – a major ore-metal cluster, including gold mining companies and projects related to the development of the Baim ore zone.

Rosatom said that after the completion of the modernisation, which is being carried out with the aim of increasing the operational reliability and safety of the power unit, its service life will be extended for another 30 years.

Source: <https://www.neimagazine.com/news/russias-floating-npp-marks-milestone/>, 24 January 2025.

Rostov's First Unit Set for 30-Year Life Extension

The first unit at Rostov NPP was launched in 2001 and its operating licence is due to expire in 2030. A large-scale work programme has been approved as part of plans for a 30-year life extension. The Rostov plant features four VVER-1000 units and is about 13 km from the city of Volgodonsk in southwest Russia. It is part of Rosatom's plant operating division Rosenergoatom, which carried out modernisation work at all four units during 2024. The most extensive work was carried out on the first unit, with the control system, uninterruptible power supply and electric motors of the pump units modernised, while the reinforcement cables of the protective shell, neutron flux control equipment and parts of the ventilation system were replaced. ...

Rosatom said that after the completion of the modernisation, which is being carried out with the aim of increasing the operational reliability and safety of the power unit, its service life will be extended for another 30 years. Since it entered operation in 2001 Rostov 1 has supplied 171.66 terawatt hours of electricity.

Source: <https://www.world-nuclear-news.org/articles/rostovs-first-unit-set-for-30-year-life-extension>, 24 January 2025.

USA

Climate and Energy in Trump’s Day One Executive Orders

New US President Trump has declared a national energy emergency, announced the country’s withdrawal from the Paris Agreement, and named cabinet-level appointees including new heads of the DoE and the US NRC. In an inauguration address that made no direct mention of climate or the environment, the President promised to “drill, baby, drill” and to use the country’s oil and gas reserves to underpin a resurgence of US manufacturing. Trump went on to sign some 26 executive orders within hours of his inauguration: according to the Washington Post, in the first day of his previous administration, he signed only one of the 220 orders he would later go on to sign over the next four years. Many of the orders signed by the President on 20 January could be challenged in court, the Washington Post points out, in a legal process that could slow down or halt their implementation.

National Energy Emergency: The executive order Declaring a National Energy Emergency says insufficient energy production, transportation, refining, and generation “constitutes an unusual and extraordinary threat to our Nation’s economy, national security, and foreign policy” and says expansion of energy infrastructure is an “immediate and pressing priority”.

Paris Rescinded: Under this order The USA Ambassador to the United Nations shall

immediately submit formal written notification of the USA’ withdrawal from the Paris Agreement under the United Nations Framework Convention on Climate Change to the Secretary-General of the United Nations. The USA will consider its withdrawal from the Agreement and any attendant obligations to be effective immediately upon this provision of notification. It also instructs the Ambassador to the United Nations to immediately submit formal notice of the USA’s withdrawal from “any agreement, pact, accord, or similar commitment made under the United Nations Framework Convention on Climate Change” and to “cease or revoke” any financial commitment made by the USA under the convention.

New US President Trump has declared a national energy emergency, announced the country’s withdrawal from the Paris Agreement, and named cabinet-level appointees including new heads of the DoE and the US NRC.

Source: <https://www.world-nuclear-news.org/articles/climate-and-energy-in-trumps-day-one-executive-orders>, 21 January 2025.

New York State Looks to Advanced Nuclear

As New York Governor Hochul announces a master plan for advanced nuclear development, the state’s energy research and development authority has joined Constellation on a grant proposal to help it pursue an early site permit for advanced nuclear reactors at its Nine Mile Point Clean Energy Center. The creation of a Master Plan for Responsible Advanced Nuclear Development in New York is part of a USD 1B proposal to achieve a “more sustainable and affordable future in New York State” was included in Hochuls’ 14 January State of the State address.

Guided by the newly published ‘Blueprint for Consideration of Advanced Nuclear Energy Technologies’ from the New York State Energy Research and Development Authority (NYSERDA). The Blueprint - which was itself drawn up following public comments on a draft released at the Future Energy Economy Summit in September - envisages that the process to develop the Master Plan will take place over 2025 and 2026 and include opportunities for stakeholder involvement. A completed Master Plan is expected to be published by the end of 2026.

It will be guided by the newly published ‘Blueprint for Consideration of Advanced Nuclear Energy Technologies’ from the New York State Energy Research and Development Authority (NYSERDA).

The Blueprint - which was itself drawn up following public comments on a draft released at the Future Energy Economy Summit in September - envisages that the process to develop the Master Plan will take place over 2025 and 2026 and include opportunities for stakeholder involvement. A completed Master Plan is expected to be published by the end of 2026.

New York State will also co-lead a multi-state initiative facilitated by the National Association of State Energy Officials and the US DOE Office of Nuclear Energy Gateway for Accelerated Innovation in Nuclear (GAIN) on advanced nuclear energy, anticipated to launch in February 2025, and support Constellation Energy Corporation in pursuing federal planning grant funding to support the exploration of the addition of one or more new advanced nuclear reactors at Nine Mile Point, NYSERDA said.

Source: <https://www.world-nuclear-news.org/articles/new-york-state-looks-to-advanced-nuclear>, 17 February 2025.

Sabey Considers Natrium Deployment at its Data Centres

TerraPower and US data centre developer Sabey Data Centers have signed a MoU to explore the deployment of Natrium power plants at current and future data centres. The strategic collaboration includes exploring new Natrium plants in the Rocky Mountain region, as well as Texas, to support growing power needs for Sabey Data Centers-owned data centres. TerraPower and Sabey Data Centers (SDC) will explore multiple project execution structures to meet the exponential demand in data centre energy needs with TerraPower's Natrium technology. SDC - one of the largest privately-owned multi-tenant data centre owners/ developers/operators in the USA - is a joint venture between Sabey Corporation and

National Real Estate Advisors LLC, acting as the investment manager on behalf of its institutional clients.

Natrium technology features a 345 MWe sodium-cooled fast reactor using high-assay low-enriched uranium fuel, with a molten salt-based energy storage system that can boost the system's output to 500 MWe for more than five and a half hours when needed. According to the company, the growth of AI and data centres is projected to increase US electricity demand by 323 TWh by 2030. The agreement between TerraPower and

SDC follows several announcements by global tech giants related to nuclear energy. Microsoft announced in September it had signed a 20-year power purchase agreement with Constellation that will see Three Mile Island unit 1 restarted. Google announced in October it had agreed to purchase energy from Kairos Power under a deal that would support the

first commercial deployment of its fluoride salt-cooled high-temperature advanced small modular reactors by 2030 and aim for a fleet totalling 500 MW of capacity by 2035. Amazon also announced a series of agreements that will see it taking a stake in advanced nuclear reactor developer X-energy and rolling out its Xe-100 advanced SMR initially at a project in Washington State.

TerraPower - a company largely funded by Microsoft founder Bill Gates - noted it is the first and only advanced nuclear developer with a permit application for a commercial advanced reactor submitted to the US Nuclear Regulatory Commission. That application was submitted in March 2024 and is on track for approval in December 2026. TerraPower is constructing the Natrium demonstration plant near a retiring coal facility at Kemmerer in Wyoming. A ground-breaking ceremony held in June last year marked the start of non-nuclear construction at the site. Nuclear construction will begin after the

TerraPower and US data centre developer Sabey Data Centers have signed a MoU to explore the deployment of Natrium power plants at current and future data centres. The strategic collaboration includes exploring new Natrium plants in the Rocky Mountain region, as well as Texas, to support growing power needs for Sabey Data Centers-owned data centres.

application is approved: the company is eyeing the start of work on the nuclear island in 2026.

Source: <https://www.world-nuclear-news.org/articles/sabey-considers-natrium-deployment-at-its-data-centres>, 22 January 2025.

SM ALL MODULAR REACTORS

FRANCE-ITALY

French-Italian Collaboration on SM R Deployment

France's EDF, its Italian subsidiary Edison and Italy's nuclear research organisation ENEA have signed a MoU to collaborate on the industrial applications of small modular reactors. In particular, the collaboration will focus on the analysis of thermo-hydraulic systems and passive safety systems, new technologies, integral system operation and the opportunity to provide electricity and heat in cogeneration mode for industrial needs. The agreement also provides for training activities and exchange of know-how between researchers and PhD students.

In March 2023, EDF signed a Letter of Intent with Italy's Ansaldo Energia, Ansaldo Nucleare and Edison to assess potential industrial cooperation for the development of nuclear power in Europe, including in Italy, specifically in the field of SMRs. In particular, the companies plan to explore potential industrial cooperation, drawing on their respective skills. In July last year, an MoU was signed between EDF, Edison, Federacciai, Ansaldo Energia and Ansaldo Nucleare aimed at promoting cooperation in the use of nuclear energy to boost

France's EDF, its Italian subsidiary Edison and Italy's nuclear research organisation ENEA have signed a MoU to collaborate on the industrial applications of small modular reactors. In particular, the collaboration will focus on the analysis of thermo-hydraulic systems and passive safety systems, new technologies, integral system operation and the opportunity to provide electricity and heat in cogeneration mode for industrial needs.

the competitiveness and decarbonisation of the Italian steel industry.

Italy operated a total of four NPPs starting in the early 1960s but decided to phase out nuclear power in a referendum that followed the 1986 Chernobyl accident. It closed its last two operating plants, Caorso and Trino Vercellese, in 1990. In late March 2011, following the Fukushima Daiichi accident, the Italian government approved a moratorium of at least one year on construction

of NPPs in the country, which had been looking to restart its long-abandoned nuclear programme. In May 2023, the Italian Parliament approved a motion to urge the government to consider incorporating nuclear power into the country's energy mix. Italy's government included potential new nuclear capacity in its National Integrated Energy and

Climate Plan, which was submitted to the European Commission on 1 July 2024.

Source: <https://www.world-nuclear-news.org/articles/french-italian-collaboration-on-smr-deployment>, 17 January 2025.

Italy operated a total of four NPPs starting in the early 1960s but decided to phase out nuclear power in a referendum that followed the 1986 Chernobyl accident. It closed its last two operating plants, Caorso and Trino Vercellese, in 1990. In late March 2011, following the Fukushima Daiichi accident, the Italian government approved a moratorium of at least one year on construction of NPPs in the country, which had been looking to restart its long-abandoned nuclear programme.

SOUTH KOREA-SWEDEN

KHNP to Cooperate with Scandinavian SM R Project Developers

Korea Hydro & Nuclear Power announced it has signed MoU on cooperation with Norway's Norsk Kjernekraft and Sweden's Kärnfull Next to "strengthen its foothold in the European market with its innovative SMR (i-SMR)". On 20 January, in

Oslo, Korea Hydro & Nuclear Power (KHNP) signed a MoU with Norsk Kjernekraft. The

following day, it also signed an MoU with Kärnfull Next in Stockholm. Through these agreements, KHNP and the two companies agreed to actively cooperate in sharing information for the introduction of i-SMR, conducting preliminary feasibility studies on candidate sites, and developing SMR Smart Net-zero City (SSNC) models. KHNP said the agreements reflect changes in the global market. Recently, it said, the SMR market has been attracting attention for its new business structure led by energy consumers and developers, moving away from the existing business model centred on NPP operators.

Local governments in Norway and Sweden are also accelerating the movement to introduce SMRs to boost the local economy and achieve energy independence, Norsk Kjernekraft noted. In line with this trend, KHNP plans to actively discuss ways to promote i-SMR projects that are tailored to regional characteristics by expanding cooperation with local companies.

Norsk Kjernekraft aims to build, own and operate SMR power plants in Norway in collaboration with power-intensive industry. It says it will prepare licence applications in accordance with national regulations and international standards. It will follow the IAEA's milestones approach, and focus on what creates value in the early phase. Financing will take place in collaboration with capital-strong industry and solid financial players.

The Korean-designed i-SMR is an integrated pressurised water reactor type NPP with an electrical output of 170 MW. It is being developed according to a development roadmap, with the goal of completing the standard design by

the end of 2025 and obtaining standard design approval in 2028. According to KHNP, it requires just one-third of the investment, and can be constructed in half the time compared with large reactors.

KHNP has also signed an MoU on mutual cooperation with the Jordan Atomic Energy Commission for the deployment of the i-SMR in Jordan. The two organisations agreed to cooperate in comprehensive technology and information exchange on the i-SMR and to jointly conduct a feasibility study. Jordan is currently considering the introduction of SMRs after 2030 in preparation of expected increased electricity demand.

Source: <https://www.world-nuclear-news.org/articles/khnp-to-cooperate-with-scandinavian-smr-project-developers>, 23 January 2025.

UK-THE NETHERLANDS

UK-Dutch Partnership for Deployment of SMRs at Industrial Parks

Dutch nuclear energy development and consultancy company ULC-Energy BV has signed a Letter of Intent with UK-based zero emissions energy and technology developer Chiltern Vital Group to collaborate on delivering innovative clean

energy solutions for CVG's business park properties. This collaboration will initially focus on the Berkeley Science and Technology Park and the Yorkshire Energy Park, with plans to expand across other sites in the UK and the EU.

With its partners - including Western Gateway, SGSC, University of Bristol, Vital Energi and Rolls-Royce SMR - CVG intends to create a

Local governments in Norway and Sweden are also accelerating the movement to introduce SMRs to boost the local economy and achieve energy independence, Norsk Kjernekraft noted. In line with this trend, KHNP plans to actively discuss ways to promote i-SMR projects that are tailored to regional characteristics by expanding cooperation with local companies.

The Rolls-Royce SMR is a 470 MWe design based on a small pressurised water reactor. It will provide consistent baseload generation for at least 60 years. Around 90% of the SMR will be built in factory conditions, limiting on-site activity primarily to assembly of pre-fabricated, pre-tested, modules which significantly reduces project risk and has the potential to drastically shorten build schedules.

world-first net-zero and nuclear technologies campus at the Berkeley Science and Technology Park. This will be the first step towards a 'net-zero super cluster' investment zone, encouraging the roll out of Rolls-Royce SMRs alongside an array of net-zero technologies. The Rolls-Royce SMR is a 470 MWe design based on a small pressurised water reactor. It will provide consistent baseload generation for at least 60 years. Around 90% of the SMR will be built in factory conditions, limiting on-site activity primarily to assembly of pre-fabricated, pre-tested, modules which significantly reduces project risk and has the potential to drastically shorten build schedules.

The DOE opened the applications for the grant funding to spur the first deployments of Gen III+ SMR in the USA last October. In the solicitation, a Gen III+ SMR is defined as a nuclear fission reactor that uses light water as a coolant and low-enriched uranium fuel, with a single-unit net electrical power output of 50-350 MWe, that maximises factory fabrication approaches, and the same or improved safety, security, and environmental benefits compared with current large NPP designs.

includes Bechtel, BWX Technologies, Duke Energy, Electric Power Research Institute, GE Hitachi Nuclear Energy (GEH), American Electric Power company Indiana Michigan Power, Oak Ridge Associated Universities, Sargent & Lundy, Scot Forge, other utilities and advanced nuclear project developers and the State of Tennessee.

The DOE opened the applications for the grant funding to spur the first deployments of Gen III+ SMR in the USA last October. In the solicitation, a Gen III+ SMR is defined as a nuclear fission reactor that uses light water as a coolant and low-enriched uranium fuel, with a single-unit net electrical power output of 50-350 MWe, that maximises factory fabrication

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.

Source: <https://www.world-nuclear-news.org/articles/uk-dutch-partnership-for-deployment-of-smrs-at-industrial-parks>, 15 January 2025.

USA

US Companies Join Forces to Accelerate SMR Deployment

A TVA-led coalition including BWRX-300 developer GE Hitachi Nuclear Energy is applying for federal funding to support the US deployment of small modular reactors. Subsidiaries of American Electric Power are also seeking funding for the early stages of SMR development at sites in Indiana and Virginia. The TVA-led coalition has submitted an application for USD800 M in funding from the US DOE's Generation III+ SMR programme. As well as the Tennessee Valley Authority (TVA), the coalition

approaches, and the same or improved safety, security, and environmental benefits compared with current large NPP designs.

The DOE opened applications for funding to support the initial domestic deployment of Generation III+ SMR technologies last October, with up to USD800 M to go to two "first-mover" teams and USD100 M to address so-called gaps that have hindered plant deployments.

Source: <https://www.world-nuclear-news.org/articles/us-companies-join-forces-to-accelerate-smr-deployment>, 20 January 2025.

TVA Names Contractors for Clinch River SMR Project

The Tennessee Valley Authority's collaborative contractors Bechtel, Sargent & Lundy and GE Hitachi will use an integrated approach as they carry out initial planning for a potential SMR at Clinch River in Tennessee. The contractors will work with GE Hitachi - designer of the BWRX-300 SMR - and Tennessee Valley Authority (TVA) as an integrated project team to plan, design, and potentially procure, construct and commission Clinch River Unit 1, the companies said.

The integrated project delivery approach to contracting they will use promotes integration of work processes and is a different approach to that used in previous US nuclear construction projects. The integrated project delivery team approach is also said to suit developing the potential for multiple SMRs, and the team scope will also provide preliminary plans with estimated cost reduction forecast as it relates to constructing multiple SMRs to identify innovations and to provide a progression of cost reduction for additional reactors.

The US Nuclear Regulatory Commission awarded TVA an early site permit for the construction of SMRs at Clinch River in 2019, certifying that the site is suitable for the construction of a NPP from the point of view of site safety, environmental impact and emergency planning, but without specifying the choice of technology. A separate licence would be required to construct and operate a plant. TVA entered an agreement with GE Hitachi in 2022 to support its planning and preliminary licensing for the potential deployment of a BWRX-300 at the site, which is near Oak Ridge. TVA's board has yet not voted to approve an SMR at Clinch River, although in August it approved USD 150M in additional advanced funding to support the project, bringing the authority's investment since the February 2022 launch of its New Nuclear Program to USD 350M.

Source: <https://www.world-nuclear-news.org/articles/tva-names-contractors-for-clinch-river-smr-project>, 24 January 2025.

NUCLEAR COOPERATION

FRANCE-SLOVAKIA

Newcleo Joint Venture Aims to Develop Slovakia Units

France-based Newcleo has signed framework agreements with Slovakian companies JAVYS and

VUJE which could lead to up to four of its 200 MWe lead-cooled fast reactors at the Bohunice site. The agreement with JAVYS – the state-owned radioactive waste management company - establishes a joint venture tasked with developing and constructing an Advanced Modular Reactor based NPP of up to four LFR-AS-200 reactors at the Jaslovské Bohunice V1 site in the Slovak Republic.

It will also aim to develop a nuclear fuel supply route with French government support, with the ultimate goal of the reprocessing and use of Slovak Republic spent nuclear fuels and enables long-term multi-recycling as part of a closed fuel cycle. The agreement with engineering company VUJE establishes a framework for technical and commercial cooperation, aiming to leverage VUJE's decades of experience in NPP construction and commissioning, and position Slovak nuclear expertise at the forefront of the next generation of nuclear technology deployment worldwide.

According to Paris-headquartered Newcleo's delivery roadmap, the first non-nuclear pre-cursor prototype of its reactor is expected to be ready by 2026 in Italy, the first reactor operational in France by the end of 2031, while the final investment decision for the first commercial power plant is expected around 2029.

Source: <https://www.world-nuclear-news.org/articles/newcleo-joint-venture-aims-to-develop-slovakia-plant>, 15 January 2025.

RUSSIA-IRAN

Russia Discussing New Nuclear Energy Units with Iran

Russian President Putin has said that progress on two reactors under construction is "going well" and the two countries are "now discussing the possibility of building additional units". The comments came during a joint press conference

France-based Newcleo has signed framework agreements with Slovakian companies JAVYS and VUJE which could lead to up to four of its 200 MWe lead-cooled fast reactors at the Bohunice site. The agreement with JAVYS – the state-owned radioactive waste management company - establishes a joint venture tasked with developing and constructing an Advanced Modular Reactor based NPP of up to four LFR-AS-200 reactors at the Jaslovské Bohunice V1 site in the Slovak Republic.

following talks with Iran's President Pezeshkian in Moscow and the signing of a Comprehensive Strategic Partnership treaty. Putin said that energy remains a crucial area of Russian-Iranian cooperation. The flagship joint project for the construction of two new units of the Bushehr NPP by Rosatom is making strides. Once implemented, this project will undoubtedly make a weighty contribution to enhancing Iran's energy security, spur national economic growth, and provide affordable and environmentally friendly electricity for Iranian households and industrial enterprises.

Later, when asked more generally about energy links and "challenges" faced, he referred to gas supply volumes, saying he believes that they should start small with up to 2B cubic m, but with an option to eventually increase annual shipments to Iran to up to 55B cubic m of gas. The oil sector also offers opportunities for cooperation. They operate a major nuclear project. One unit is operational and things are going well, and are now discussing the possibility of building additional units. Indeed, they have to push certain deadlines back, mainly due to payment and settlement issues.

The first unit at the Bushehr plant, which was connected to the grid in 2011, has generated more than 70 B kWh and according to Russia's official news agency, Rosatom DG Likhachev told reporters at the Kremlin event that construction of the second and third units continues "despite the sanctions and pressure" and, according to Iran's Islamic Republic News Agency (IRNA), he said negotiations for the construction of another NPP in Iran would begin "in the near future". He said there would also be cooperation on potential small modular reactors. A Russian-designed VVER unit with a capacity of

Once implemented, this project will undoubtedly make a weighty contribution to enhancing Iran's energy security, spur national economic growth, and provide affordable and environmentally friendly electricity for Iranian households and industrial enterprises.

915 MWe is already in operation at Bushehr, on the Persian Gulf coast. Two further units featuring VVER-1000 units are under construction - unit 2, which had first concrete poured in 2019 and the core catcher installed last year, had a scheduled installation of its reactor pressure vessel "30 months later", and physical start-up scheduled "55 months later", which would suggest 2029. That timeline was outlined by Iran at an event at the IAEA's General Conference last September, when it also said that the plan was for first concrete for unit 3 in the last quarter of 2024.

Source: <https://www.world-nuclear-news.org/articles/russia-discussing-new-nuclear-energy-units-with-iran>, 20 January 2025.

UK-CANADA

Partnership to Enhance UK-Canadian Nuclear Cooperation

The Advanced Nuclear Research Centre at the University of Strathclyde has signed a MoU on cooperation with the Candu Owners Group and the University Network of Excellence in Nuclear Engineering. The Advanced Nuclear Research Centre (ANRC) undertakes research and translation for industry-led projects and acts as a hub for all nuclear activities at the University of Strathclyde. The Candu Owners Group (COG) is a Toronto-based nuclear energy not-for-profit corporation whose members are nuclear operators who invest in achieving operational excellence through collaboration. The University Network of Excellence in Nuclear Engineering (UNENE) is a network of Canadian universities, industry, government and international institutions dedicated to excellence in nuclear science, technology and engineering.

A Russian-designed VVER unit with a capacity of 915 MWe is already in operation at Bushehr, on the Persian Gulf coast. Two further units featuring VVER-1000 units are under construction - unit 2, which had first concrete poured in 2019 and the core catcher installed last year.

Under the MoU, with a five-year renewable term, the three organisations will cooperate on nuclear engineering, science and technology initiatives in the areas of research and development, education and training, knowledge management, and nuclear operations support. “

Source: <https://www.world-nuclear-news.org/articles/partnership-to-enhance-uk-canadian-nuclear-cooperation>, 20 January 2025.

VIETNAM –RUSSIA

Vietnam Holds Russia Talks - and Sets Up Nuclear Project Steering Committee

The two PMs signed a joint communique in Hanoi, which covered a comprehensive plan for cooperation between the two countries to 2030 and a MoU between Rosatom and Electricity of Vietnam (EVN). In its report on the talks, the Vietnamese government said it would allow the clear defining of key areas of cooperation, spanning from economy, trade, energy, and science and technology, to education, culture and defence. It noted that bilateral trade had increased from USD3.3 B in 2023 to USD4.57 B in 2024, and added that there were 60,000 Vietnamese people living in Russia.

The Vietnamese PM also held talks with Rosatom DG Likhachev and, according to the official Vietnamese government account, he said he hopes that Russia and Rosatom will continue their cooperation with and support for Vietnam, not only in the development of nuclear power but also in the development of nuclear science and technology for peaceful purposes, contributing to socio-economic development and urged Russia and Rosatom to support Vietnam in

The two PMs signed a joint communique in Hanoi, which covered a comprehensive plan for cooperation between the two countries to 2030 and a MoU between Rosatom and Electricity of Vietnam (EVN). In its report on the talks, the Vietnamese government said it would allow the clear defining of key areas of cooperation, spanning from economy, trade, energy, and science and technology, to education, culture and defence.

human resource training and technology transfer to help Vietnam develop its nuclear technology sector. Vietnam and Russia are already cooperating in the nuclear sector on the construction of a Centre for Nuclear Science and Technology in Vietnam, as well as holding discussions last year over future options for large-scale and small modular

reactors in the country.

Source: <https://www.world-nuclear-news.org/articles/vietnam-and-russia-expand-nuclear-energy-cooperation>, 14 January 2025.

NUCLEAR SAFETY

CHINA

Flushing of Safety Systems Under Way at Tianwan 7

Flushing of all the safety systems to the open reactor has begun at China’s Tianwan NPP’s unit 7, which is one of two VVER-1200 units under construction at the site. The flushing process, using demineralised water, is designed to check everything has been installed correctly and remove impurities from pipelines, check pump sets, process safety systems and normal operation systems. Rosatom said that after it is completed reactor assembly will take place, and then testing of the reactor primary circuit and hot and cold trials.

The flushing process, using demineralised water, is designed to check everything has been installed correctly and remove impurities from pipelines, check pump sets, process safety systems and normal operation systems. Rosatom said that after it is completed reactor assembly will take place, and then testing of the reactor primary circuit and hot and cold trials.

According to a report published by the China Nuclear Energy Association, the coolant storage system pump was started at 09:19 on 19 January, marking the official start of the nuclear loop flushing work. In June 2018, Russia and China signed four agreements, including for the

construction of two VVER-1200 reactors as units 7 and 8 of the Tianwan plant. Construction of unit 7 began in May 2021, with that of unit 8 starting in February 2022. The units are scheduled to be commissioned in 2026-2027. The Tianwan NPP is owned and operated by Jiangsu Nuclear Power Company, a joint venture between China National Nuclear Corporation (50%), China Power Investment Corporation (30%) and Jiangsu Guoxin Group (20%).

Source: <https://www.world-nuclear-news.org/articles/flushing-of-safety-systems-under-way-at-tianwan-7>, 21 January 2025.

FINLAND

Regulator in Final Stages of Finnish Repository Licence Review

Finland's Radiation and Nuclear Safety Authority has said it is on track to complete its assessment of Posiva Oy's operating licence application for the world's first used nuclear fuel repository and submit its statement to the Ministry of Economic Affairs and Employment "well before the end of the year". Radioactive waste management company Posiva submitted its application, together with related information, to the Ministry of Economic Affairs and Employment on 30 December 2021 for an operating licence for the used fuel encapsulation plant and final disposal facility currently under construction at Olkiluoto. The repository is expected to begin operations in the mid-2020s. Posiva is applying for an operating licence for a period from March 2024 to the end of 2070.

The government will make the final decision on Posiva's application, but a positive opinion by the Radiation and Nuclear Safety Authority (STUK) is required beforehand. The regulator began its review in May 2022 after concluding Posiva had provided sufficient material. The ministry had requested STUK's opinion on the application by the end of 2023. However, in January last year,

STUK requested the deadline for its opinion be extended until the end of 2024. In December, the ministry extended the deadline for the regulator's opinion to 31 December 2025.

Source: <https://www.world-nuclear-news.org/articles/regulator-in-final-stages-of-finnish-repository-licence-review>, 23 January 2024.

NUCLEAR DISARMAMENT

JAPAN

Japan May Sit Out Meeting on Treaty to Ban Nuclear Weapons

PM Ishiba has begun making arrangements to forgo participating as an observer at a meeting of signatories to the Treaty on the Prohibition of Nuclear Weapons to be held in the USA in March, it has been learned. As the security environment surrounding Japan is becoming increasingly severe, Ishiba has concluded that it would be appropriate to take a pragmatic approach based on the importance of deterrence capabilities supported by the U.S. nuclear umbrella, according to several government sources.

Nuclear powers do not participate in the treaty, which prohibits the development and use of nuclear weapons. The Liberal Democratic Party's ruling coalition partner Komeito and the Nobel Peace Prize-winning group Hidankyo (Japan Confederation of A- and H-Bomb Sufferers Organizations) have requested of Ishiba that Japan, a nonsignatory state, participate in the meeting as an observer.

Ishiba was considering the matter carefully, stressing the need to study the case of Germany and other countries that have experience participating as observers. Germany, as a member of the North Atlantic Treaty Organization, depends on nuclear deterrence. It is believed that domestic political circumstances have played a role in

Finland's Radiation and Nuclear Safety Authority has said it is on track to complete its assessment of Posiva Oy's operating licence application for the world's first used nuclear fuel repository and submit its statement to the Ministry of Economic Affairs and Employment "well before the end of the year".

Germany's decision to participate as an observer, such as the demands by the Greens, a party in the ruling coalition that advocates an anti-nuclear policy as its basic stance.

Japan's participation as an observer would lead to a decline in trust from Washington, and there is a risk that Japan's neighboring countries could mistakenly conclude that "Japan does not want defense by U.S. nuclear weapons," according to the sources. Under such circumstances, Ishiba has concluded that forgoing observer participation would be in the national interest.

Source: <https://www.phnompenhpost.com/international/japan-may-sit-out-meeting-on-treaty-to-ban-nuclear-weapons>, 27 January 2025.

URANIUM PRODUCTION

KAZAKISTAN

Kazatomprom Overall Sales Volumes Fall Amid Higher Sales of Enriched Uranium

Kazatomprom said sales volumes for the fourth quarter declined while sales of enriched uranium to the Ulba-FA nuclear fuel assembly plant rose. The world's largest uranium producer posted a 14% on-year fall in group sales volumes to 5,030 metric t of uranium for the three months through Dec. 31. This reflected higher sales of enriched uranium to the Kazakh-Chinese Ulba-FA joint venture as well the group's efforts to ensure sufficient level of inventories for future periods, it said.

For the quarter, production rose to 6,519 tons of uranium from 5,795 tons a year earlier. Average realized prices for both the fourth quarter and the

whole year were higher due to increased uranium spot prices, it added. Kazatomprom expects 2025

production to be in the range of 25,000 to 26,500 tons of uranium and attributable output to be in the 13,000 to 14,000-ton range. It also anticipates uranium sales of between 17,500 and 18,500 tons range.

Source: <https://www.marketwatch.com/story/kazatomprom-overall-sales-volumes-fall-amid-higher-sales-of-enriched-uranium-ec515e4e>, 27 January 2025.

Japan's participation as an observer would lead to a decline in trust from Washington, and there is a risk that Japan's neighboring countries could mistakenly conclude that "Japan does not want defense by U.S. nuclear weapons," according to the sources. Under such circumstances, Ishiba has concluded that forgoing observer participation would be in the national interest.

MONGOLIA-FRANCE

Orano and Mongolian Government Finalise Agreement for \$1.6bn Uranium Project

France's Orano and Mongolia's government have signed an investment agreement to develop a \$1.6B uranium project in Dornogovi province located in the south-east of Mongolia. The investment agreement was signed on Friday in Ulaanbaatar by Mongolian and French officials, marking a significant step for both countries in the mining sector.

This project is expected to bolster Orano's uranium supply and expand its operations in the region. Orano has joined forces with MonAtom Group, the state-owned entity of Mongolia, to collaborate on the development of major uranium deposits,

Zuuvch-Ovoo and Dulaan Uul/Umnut, which are believed to hold around 90,000 tonnes (t) of the resource. Badrakh Energy, the joint venture between Orano Mining and MonAtom, is also responsible for the operation of the Zuuvch-Ovoo project. This announcement follows a preliminary agreement signed in December 2024 with Orano Mining for the development of the Zuuvch Ovoo

The world's largest uranium producer posted a 14% on-year fall in group sales volumes to 5,030 metric t of uranium for the three months through Dec. 31. This reflected higher sales of enriched uranium to the Kazakh-Chinese Ulba-FA joint venture as well the group's efforts to ensure sufficient level of inventories for future periods, it said.

uranium mining project located in Dornogovi province. The project's preparatory phase will continue until 2027, involving an initial investment of \$500m.

Source: <https://www.msn.com/en-us/news/world/orano-and-mongolian-government-finalise-agreement-for-16bn-uranium-project/ar-AA1xxUL6>, 20 January 2025.

NUCLEAR PROLIFERATION

IRAN

Iran Reaffirms Commitment to Global Nuclear Non-Proliferation

Iranian Foreign Minister Araghchi reiterated Iran's "longstanding" and "clear" commitment to global nuclear non-proliferation. "Iran signed, in 1968, the NPT as a founding member. Iran's Supreme Leader (Khamenei) has issued a religious edict outlawing all WMDs," Araghchi wrote on social media platform X. Iran signed a nuclear deal, formally known as the JCPOA, in 2015, which "imposed the most intrusive inspection regime in IAEA history" and which stated "Iran reaffirms that under no circumstances will Iran ever seek, develop or acquire any nuclear weapons," he wrote. This is a permanent and clear commitment which Iran has remained committed to – even after the U.S. unilaterally withdrew from the deal in 2018, he wrote.

Araghchi's remarks came as UN Secretary-General Guterres said Wednesday at the World Economic Forum in Davos that he hopes -the Iranians understand that it is important to once and for all make it clear that they will renounce to have nuclear weapons. Iran signed the JCPOA with world powers in July 2015, agreeing to put some curbs on its nuclear program in return for the removal of sanctions. The USA, however, pulled out of the deal in May 2018 and reimposed sanctions on Iran, prompting Tehran to scale back

its commitments under the deal. The talks to revive the JCPOA began in April 2021 in Vienna, Austria. Despite several rounds of talks, no significant breakthrough has been achieved.

Source: <http://www.chinaview.cn/20250123/70ecb155a2234c74847db3be0851a74a/c.html>, 23 January 2025.

NORTH KOREA

North Korea Tells United Nations it is a 'Responsible Nuclear State'

North Korea defended its right to maintain a nuclear weapons program at a United Nations disarmament conference in Geneva on Tuesday, shortly after U.S. President Trump surprised allies by referring to the North as a "nuclear power." As a responsible nuclear weapons state, we will continue to make efforts to prevent all forms of war and to protect peace and stability, said Su, North Korea's permanent representative to the UN Office at Geneva, said during the conference. Jo blamed the USA for an "astronomical amount of arms buildup and undisguised nuclear proliferation." The North Korean representative pointed to recent trilateral air exercises held by the USA, South Korea and Japan, which included U.S. B-1B strategic bombers, as creating a dangerous climate in the region.

North Korea defended its right to maintain a nuclear weapons program at a United Nations disarmament conference in Geneva on Tuesday, shortly after U.S. President Trump surprised allies by referring to the North as a "nuclear power." As a responsible nuclear weapons state, we will continue to make efforts to prevent all forms of war and to protect peace and stability, said Su, North Korea's permanent representative to the UN Office at Geneva, said during the conference.

Source: <https://www.msn.com/en-us/news/world/north-korea-tells-united-nations-it-is-a-responsible-nuclear-state/ar-AA1xEcGC>, 22 January 2025.

USA

US to Study Proliferation Risk of HALEU Nuclear Fuel, after Warning by Scientists

The U.S. agency in charge of nuclear security is commissioning a study on the proliferation risks of a more-enriched uranium fuel that nuclear power developers want to fuel new high-tech reactors, the head of the agency said this week.

Hruby, administrator of the National Nuclear Security Administration, said in a statement published in the journal Science that it is important to address proliferation concerns of so-called high assay, low-enriched uranium fuel, or HALEU.

... Planned new nuclear plants, known as small modular reactors, or advanced reactors, must set high standards for safety and security, “especially...NPP,” she said. Russia in 2022 took the

Zaporizhzhia plant, the largest nuclear plant in Europe, by force after it invaded Ukraine. Hruby’s statement was in response to an article published last year in which scientists said HALEU poses a security risk because it can be used without further enrichment as fissile material in a crude nuclear weapon. HALEU is uranium fuel enriched up to 20% instead of the 5% level of uranium fuel used in today’s commercial reactors.

Several companies are hoping to develop a wave of reactors that would use HALEU, including the Bill Gates-backed TerraPower, which wants to build a \$4 B plant in Wyoming by 2030. Nuclear has gotten attention from technology companies seeking new ways to power data centers and as U.S. power demand is growing for the first time in decades. None of the plants have yet to be built. TerraPower did not immediately respond to a request for comment.

In October, the U.S. Energy Department rolled out initial contracts to four companies hoping to produce HALEU domestically. Currently, commercial amounts of HALEU are only produced in Russia. The U.S. contracts will last up to 10 years and each awardee received a minimum of \$2 M, with up to \$2.7 B available subject to

congressional appropriations. Hruby said NNSA has regularly collected data and evaluated HALEU risks, and is finalizing plans to commission a National Academies report. The reports are largely classified, she said. But the information will be used to inform programs, develop actions, and make recommendations to stakeholders.

Source: <https://www.reuters.com/business/energy/us-study-proliferation-risk-haleu-nuclear-fuel-after-warning-by-scientists-2025-01-08/>, 15 January 2025.

Several companies are hoping to develop a wave of reactors that would use HALEU, including the Bill Gates-backed TerraPower, which wants to build a \$4 B plant in Wyoming by 2030. Nuclear has gotten attention from technology companies seeking new ways to power data centers and as U.S. power demand is growing for the first time in decades. None of the plants have yet to be built.

NUCLEAR WASTE MANAGEMENT

SOUTH KOREA

Korean Robot Aims for Nuclear Decommissioning Market

The Korea Atomic Energy Research Institute has transferred the technology behind Armstrong, its dual-arm robot which can move up to 200 kg, to robot company Victex, which aims to develop models targeting the nuclear decommissioning market. The terms of the technology transfer is KRW180 M (USD125,000) and 3% of sales revenue, and the transfer includes the manipulator that acts as the arm, the control system and remote control technology. It also includes five patents as well as blueprints, programmes and operating technologies. Victex plans to develop a decontamination robot platform by combining its radioactive waste hybrid decontamination technology with Armstrong’s robot technology.

A research team led by Park has been working on developing robots for nuclear disaster response

The Korea Atomic Energy Research Institute has transferred the technology behind Armstrong, its dual-arm robot which can move up to 200 kg, to robot company Victex, which aims to develop models targeting the nuclear decommissioning market. The terms of the technology transfer is KRW 180 M (USD125,000) and 3% of sales revenue, and the transfer includes the manipulator that acts as the arm, the control system and remote control technology.

and recovery work since 2015 and the Armstrong robot was deployed in 2024 for government-led disaster response training in 2024. A separate agreement with Korea Expressway Corporation was signed last year which aims to commercialise the robot technology for unmanned operation in high-risk environments such as highways. The Armstrong robot has caterpillar tracks, allowing it to move in rough terrain and can be equipped with a variety of tools and can undertake complex movements. Han-kyu, Korea Atomic Energy Research Institute (KAERI) president, said that this technology transfer is an important case of cutting-edge robotics technology being applied to the NPP decommissioning field. KAERI also said that Victex plans to combine its radioactive waste hybrid decontamination technology with Armstrong's robot technology and develop robots for use at NPP dismantling sites, for tasks such as decontamination, cutting and transporting hazardous materials.

Most of the short-lived waste deposited in the SFR comes from Swedish NPPs, but radioactive waste from hospitals, veterinary medicine, research and industry is also deposited within it Sweden's radioactive waste management company Svensk Kärnbränslehantering AB (SKB) is extending the repository so that it can accommodate waste from the decommissioning and dismantling of the country's NPPs. This will include reactor components, concrete and other building materials.

Source: <https://www.world-nuclear-news.org/articles/korean-robot-aims-for-nuclear-decommissioning-market>, 22 January 2025.

SWEDEN

Expansion of Swedish Repository Underway

Blasting work 45 m below ground has begun, marking the start of the expansion of Sweden's existing SFR final repository for low and intermediate-level waste at Forsmark. The extension - expected to take six years to complete - will triple the capacity of the repository. The SFR repository is situated 60 m below the bottom of the Baltic Sea and began operations in 1988. The facility comprises four 160-metre-long rock vaults and a chamber in the bedrock with a 50-metre-high concrete silo for the most radioactive waste. Two parallel kilometre-long access tunnels link the facility to the surface. The facility currently has a total final disposal capacity of about 63,000

cubic m of waste.

Most of the short-lived waste deposited in the SFR comes from Swedish NPPs, but radioactive waste from hospitals, veterinary medicine, research and industry is also deposited within it Sweden's radioactive waste management company Svensk Kärnbränslehantering AB (SKB) is extending the repository so that it can accommodate waste from the decommissioning and dismantling of the country's NPPs. This will include reactor components, concrete and other building materials.

The plan is that the repository, when extended, will have six new rock vaults, 240-275 m long. The intention is to construct the extension at a depth of 120-140 m, level with the lowest part of the current SFR repository. On completion the facility will have a total storage capacity of approximately 180,000 cubic m.

Source: <https://www.world-nuclear-news.org/articles/expansion-of-swedish-repository-under-way>, 24 January 2025.

UK

UK Opts for Disposal of Plutonium Inventory

The UK government has announced that the country's stockpile of some 140t of civil plutonium - currently stored at the Sellafield site in Cumbria - will be immobilised and eventually disposed of in a geological disposal facility. The inventory arose from the reprocessing of used fuel undertaken over many decades. Continued, indefinite, long-term storage leaves a burden of security risks and proliferation sensitivities for future generations to manage said Shanks, Parliamentary Under-Secretary of State at the Department for Energy Security and Net Zero, in a written statement to the House of Commons. "It is the government's objective...GDF." He noted that, following a public consultation in 2011, the government at the time formed a preliminary policy view to pursue reuse of plutonium as MOX fuel but to remain open to any alternative

proposals for plutonium management.

The Nuclear Decommissioning Authority (NDA)

has since carried out technical, deliverability and economic analysis to identify a preferred option for a long-term disposition solution, including options for immobilisation and reuse. The outcome of this work recommended immobilisation as the preferred way forward to put the material beyond reach soonest and with greatest delivery

confidence. The NDA welcomed the decision, saying the next phase will be to seek approval for a major programme on plutonium disposition, requiring a nuclear material processing plant and interim storage capability to be built at Sellafield, bringing major investment to the area and supporting thousands of skilled jobs for decades.

Source: <https://www.world-nuclear-news.org/articles/uk-opts-for-disposal-of-plutonium-inventory>, 24 January 2025.

Funding Aims to Scale-Up Medical Use of UK Nuclear 'Waste'

A project to develop the case for scaling-up the harvesting of lead-212

from reprocessed uranium for use in treating cancer has been selected for funding by UK Research and Innovation. The UK's Medicines Discovery Catapult and UK National Nuclear Laboratory (UKNNL) will use the funding - they are among 15 projects sharing GBP1.3 M (USD1.6 M) - to explore potential options for making the material available to researchers and drug development companies. The long-term aim is to enable commercial production and routine use within the NHS (National Health Service) for the benefit of patients and the development of a new community. Targeted Alpha Therapy is an emerging form of high-precision targeted

treatment which provides few side-effects, with particular interest in lead-212 which has a half-life of nearly 11 hours - as it decays its emissions can be used to target and destroy cancer cells without damaging the surrounding healthy tissue.

This funding will help to clarify how lead-212 can progress to the next step, to provide life-saving therapies for cancers in patients in the UK and ensure that the next generation of scientists can

continue this vital work. What is most remarkable is the fact that this uranium has already powered our homes, and it is now being reused to potentially save lives.

UKNNL has been collaborating with researchers to enable access to radionuclides for investigations into new treatments and diagnosis, including for cancer, Alzheimer's and complex heart conditions. Researchers are keen to get materials to test and develop new treatments, and scale-up treatments where trials have been successful. There have been on-going discussions in the UK about how the valuable radioisotopes in the nuclear legacy material

in the country can be recognised and influence future plans for the material.

Source: <https://www.world-nuclear-news.org/articles/funding-aims-to-scale-up-medical-use-of-uk-nuclear-waste>, 17 January 2025.

UKRAINE

Chernobyl Gets Go-Ahead for Solid Radioactive Waste Processing

The State Nuclear Regulatory Inspectorate of Ukraine has given approval for the commissioning of the Solid Waste Retrieval Facility and Solid Waste Processing Plant at the Chernobyl NPP site.

The Nuclear Decommissioning Authority (NDA) has since carried out technical, deliverability and economic analysis to identify a preferred option for a long-term disposition solution, including options for immobilisation and reuse. The outcome of this work recommended immobilisation as the preferred way forward to put the material beyond reach soonest and with greatest delivery confidence.

This funding will help to clarify how lead-212 can progress to the next step, to provide life-saving therapies for cancers in patients in the UK and ensure that the next generation of scientists can continue this vital work. What is most remarkable is the fact that this uranium has already powered our homes, and it is now being reused to potentially save lives.

The inspectorate's decision came in the form of an amendment to the site's licence, granting the right to conduct activities relating to the processing and storage of radioactive waste. The two facilities are part of the site's Industrial Complex for Solid Radioactive Waste Management (ICSRM).

The State Nuclear Regulatory Inspectorate of Ukraine has given approval for the commissioning of the Solid Waste Retrieval Facility and Solid Waste Processing Plant at the Chernobyl NPP site. The inspectorate's decision came in the form of an amendment to the site's licence, granting the right to conduct activities relating to the processing and storage of radioactive waste.

The facility will be able to process solid radioactive waste accumulated during the plant's operation as well as waste generated during the plant's decommissioning and also operational radioactive waste from the shelter object - the emergency structure that was built at pace in 1986 to cover unit 4 after the accident. The Chernobyl operators said "the commencement of ICSRMs industrial operation marks a significant step in the safe and efficient management of radioactive waste" at the site. The ICSRMs was majority funded by the EU and encompasses four facilities for solid radioactive waste management integrated in a single technology cycle.

'Lot 0' is temporary storage for low- and

intermediate-level long-lived waste as well as high-level waste. This is within the Liquid and Solid Waste Storage Facility and was commissioned in 2010. 'Lot 1' will retrieve solid wastes from an existing solid waste storage facility. It will handle 3 cubic m of waste per day over an operational life of 30 years. 'Lot 2' will sort solid wastes and process low- and

intermediate-level wastes at the rate of 20 cubic m per day. Some solid and liquid wastes will be incinerated, and some will be cemented. It can package 1.5 cubic m of low- and intermediate-level long-lived waste per day, and can store 3500 cubic m of them and high-level waste. 'Lot 3' is a near-surface storage facility for low- and intermediate-level short-lived waste with a capacity of 55,000 cubic m. It will accept waste for 30 years and store it for 300 years. The Chernobyl NPP lies about 130 km north of Kiev and about 20 km south of the border with Belarus.

Source: <https://www.world-nuclear-news.org/articles/chernobyl-gets-licence-for-solid-radioactive-waste-processing-to-begin>, 13 January 2025.



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).

Centre for Air Power Studies

P-284

Arjan Path, Subroto Park,

New Delhi - 110010

Tel.: +91 - 11 - 25699131/32

Fax: +91 - 11 - 25682533

Email: capsnetdroff@gmail.com

Website: www.capsindia.org

Edited by: Director General, CAPS

Editorial Team: Dr. Sitakanta Mishra, Rishika Singh, Sanaa Alvira, Dr. Ngangom Dhruba Tara Singh, Prahlad Kumar Singh, Javed Alam.

Composed by: CAPS

Disclaimer: Information and data included in this newsletter is for educational non-commercial purposes only and has been carefully adapted, excerpted or edited from sources deemed reliable and accurate at the time of preparation. The Centre does not accept any liability for error therein. All copyrighted material belongs to respective owners and is provided only for purposes of wider dissemination.