



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

OPINION – Rebecca Heinrichs

Vol 15, No. 22, 15 SEP. 2021

China’s Destabilizing Nuclear Weapons ‘Strategic Breakout’

The head of US Strategic Command Admiral Charles Richard has been describing China’s nuclear weapons expansion as a “strategic breakout.” He used the term at an event recently hosted at Hudson Institute, where he said each Chinese ICBM could carry “a lot” of warheads. He began using the phrase strategic breakout after his command seemed to confirm the discoveries of civilian researchers who discovered two large fields of at least 230 nuclear ICBM silos in north-central China. Since then, researchers have discovered a third site.

The public discoveries put to rest a dispute among analysts over whether China is significantly expanding its nuclear arsenal. Indeed, it confirms what Pentagon officials have been warning. Recall, in Spring of 2019 Defense Intelligence Agency Director Lt. Gen. Robert P. Ashley, Jr., said, “China is likely to at least double the size of its nuclear stockpile in the course of implementing the most rapid expansion and diversification of its nuclear arsenal in China’s history.” He went on to allude

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to the distinct possibility that China is conducting explosive nuclear testing.

And, in 2020 Austin Long, Vice Deputy Director for Strategic Stability at the Joint Staff warned, “The nuclear arsenal of the People’s Republic of China and its plans to use it are in the middle of an unprecedented shift.” Before this unprecedented shift, Long reminded, the Chinese nuclear posture matched its declared policy of “no-first-use”. And Admiral Richard

made some waves when he penned in February 2021, "China's nuclear weapons stockpile is expected to double (if not triple or quadruple) over the next decade."

So for a couple of years, those with greater insight into China's nuclear activities, have been painting a foreboding, though accurate, picture: the PRC is making a dramatic shift in the scope of its nuclear arsenal, swelling it in numbers, and proving its reliability by explosively testing.

But it's not just about numbers and reliability. The PRC is adding types of delivery systems and is demonstrating its ability to quickly adapt, and change direction based on the decisions of its political leadership. The strategic breakout that Admiral Richard is talking about is the result of the PRC decision to change strategies. After patiently expanding its military conventionally and gaining power and influence economically and diplomatically it has chosen to move away from maintaining a nuclear force meant for purely defensive purposes; its nuclear force is no longer designed to defend itself by guaranteeing it can withstand and retaliate a first nuclear strike. PRC leadership has opted to build and prepare for an entirely different kind of nuclear force—one for coercive purposes to carry out its revanchist aims.

This is why thoughtful technical analysis about China's siloed ICBMs, while enlightening, only provides an incomplete picture of the challenge, and if not considered in a broader context, can lead to dangerously wrong assessments of the threat to US security. For example, some analysts, while agreeing the PRC's lurch forward in nuclear expansion is concerning, find comfort in the

technical machinations, noting that the PRC is merely seeking to match the US' nuclear force, something we should all expect and perhaps accept as reasonable for a rising power looking to match the US across all areas of military power.

After all, isn't further entrenching the US into a mutually vulnerable dynamic with yet another adversary nation stabilizing? But this conclusion about stability assumes a symmetry in PRC and American goals, in the value each nation places on the geopolitical stakes and therefore the degree of political will for taking on what would be a significant cost. But we already know

there is not a symmetry between the two nations in maintaining decades-old status between them and in respecting the sovereignty and autonomy of smaller nations.

The PRC's departure from decades-long minimum deterrence and a purported no first use policy, is occurring during an acceleration of rapid military expansion, threats against free and autonomous peoples such as its squashing of democratic institutions in Hong Kong, and now provocations and threats against free and democratic Taiwan.

If the PRC decides that seizing democratic Taiwan is worth a showdown with the US, then China's nuclear weapons will undoubtedly be used in a coercive way to threaten the US and our allies from intervening, and then from escalating conventionally to terminate the conflict on terms favorable to the US. This scenario was depicted when the CCP aired a video in which it threatened to use nuclear weapons first against Japan should it attempt to defend Taiwan. Recall, in 2020 the PRC released a video of a simulation of an attack with nuclear-capable bombers against

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the US territory of Guam.

From the perspective of an American committed to the US maintaining national objectives: a free and open Indo-Pacific, a secure democratic Taiwan, and credible nuclear assurances to our regional allies, China's dramatic departure away from a defensive nuclear strategy is destabilizing.

There is a clash of national objectives and an uncertainty about national wills in defending those objectives. And Beijing is seeking to buttress its capabilities to carry out its objectives and is flexing serious muscle to communicate its will. Are we?

Rumors swirl about the Biden administration's forthcoming nuclear policy guidance. During the presidential campaign, Biden was committed to adopting a policy of No First Use, though allies have expressed objections to doing so. And, there is some Congressional pressure to delay critical nuclear modernization efforts, despite studies that conclude doing so would cause the US to fail to meet the deterrence requirements that the previous administrations agreed were necessary; and it is good to keep in mind that the threat environment has deteriorated since those acquisition strategies from Democrat and Republican administrations were conceived.

The US must do more, not less, to demonstrate that US diplomats' verbal commitments to US security interests are supported by our ability and will to defend them. It is imperative we maintain a broad ambiguous nuclear declaratory policy, fully fund the nuclear weapons modernization project, and adapt in any way necessary including by adding weapons. Anything the Biden administration is considering to constrain US options, rather than grow them, risks tempting Chinese aggression.

Source: Rebecca L. Heinrichs is a senior fellow at Hudson Institute specializing in US national defense policy with a focus on strategic deterrence, <https://www.19fortyfive.com/2021/09/chinas-destabilizing-nuclear-weapons-strategic-breakout/>, 11 September 2021.

OPINION – Simon Lomax

Xcel Energy Joins Western Push for Next-Generation Nuclear Power

Back when I was an energy and environmental reporter, I took some time away from the newsroom to accept a fellowship with the American Political Science Association. The fellowship placed me on Capitol Hill, where I worked on climate change and energy issues in the US House of Representatives. My boss was former Congressman Wayne Gilchrest, a Maryland Republican who was working with the late Sen. John McCain on legislation to start reducing US carbon emissions. It was 2007, and McCain was about to enter the Republican primary for president.

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The next phase of the energy transition will be tougher. We will need a wider selection of technologies, including nuclear, which already produces roughly half of the nation's carbon-free electricity with very little fanfare.

Before working on climate legislation directly, I hadn't thought much about nuclear power. But McCain soon changed that. "Nuclear power is going to have to be part of any equation if we're truly going to reduce greenhouse-gas emissions," the senator told Grist in a 2007 interview.

Almost 15 years later, these words still ring true. Yes, the US has made excellent progress reducing emissions by substituting natural gas for coal in power generation, and by dramatically expanding the role of renewables like wind and solar on the electrical grid. But the next phase of the energy transition will be tougher. We will need a wider selection of technologies, including nuclear, which already produces roughly half of the nation's carbon-free electricity with very little fanfare.

But here's the good news: Western states are leading a new wave of nuclear energy development and Colorado's largest utility company – Xcel Energy – is supporting the effort. In mid-August 2021, Xcel and NuScale Power – a developer of small modular reactors – announced they are exploring the feasibility of new nuclear projects. Xcel, which operates across eight states including Colorado, already owns two large nuclear plants in Minnesota.

In 2018, Xcel set itself a goal of 100% carbon-free electricity by 2050. The utility company plans to meet 80% of that goal by 2030 using technologies that are, for the most part, commercially available today. But how Xcel will achieve the final 20% is still taking shape. "When I look beyond 2030, that last 20% will take different technology and it could be the next generation of nuclear," Ben Fowke, Xcel's executive chairman, said last year.

Xcel is also eyeing large-scale batteries, which can store electricity from wind and solar for use at any time of day, along with power plants that run on hydrogen and other technologies that are still in development. Xcel's work with NuScale follows strong moves by Western states on next-generation nuclear.

For example: NuScale already has an agreement to build new reactors for Utah Associated Municipal Power Systems (UAMPS), a utility that provides electricity to dozens of communities in six Western states. UAMPS is looking to build between four and 12 NuScale reactors, each with a capacity of 77 megawatts, at the US Department of Energy's Idaho National Laboratory in Idaho Falls. By comparison, individual reactors at today's nuclear plants typically have capacities closer to 1,000 megawatts each. The NuScale-UAMPS project would replace electricity from coal-fired power plants that are due for retirement.

Along those same lines, another developer of next-generation nuclear plants – TerraPower – plans to build a 345-megawatt reactor in Wyoming to replace a retiring coal-fired power plant. TerraPower will partner with utility company PacifiCorp to build the project at one of four potential locations where existing coal plants are due to close.

Repowering an existing plant with a different fuel source makes good business sense, because it uses existing transmission lines and other costly

infrastructure that's already in place. But it also preserves local jobs and the tax base of communities that would otherwise see major economic losses.

This approach doesn't just apply to new nuclear reactors, either. Large-scale solar and wind projects and combined-

cycle turbines that run on natural gas and hydrogen are other examples of low- and zero-carbon sources of electricity that can be connected to the power grid where coal plants stand today. To be sure, some advocates for aggressive climate action don't support nuclear, and only want to see technologies like wind and solar expand their presence on the power grid. But given the scale of the challenge ahead, we are going to need all the low- and zero-carbon sources we can get.

In addition to decarbonizing the electricity used by homes and businesses, utility companies are also bracing for a massive expansion of electric vehicles. That could increase the overall need for electricity in the US by 50% or more over the coming decades.

Building a cleaner, and much larger, power grid over the coming decades is a massive task. To succeed, we will need a wide range of sources, all pulling their weight, and all competing with one another, to provide the cheapest, cleanest and most reliable electricity possible.

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Betting the farm on a small number of technologies or even just one technology only increases the risk of failure. Thankfully, however, Western states are making sure many different technologies – including nuclear – will continue to drive the energy transition.

Source: Simon Lomax is a former Bloomberg News reporter and a former congressional fellow with the American Political Science Association.

https://www.thecentersquare.com/opinion/oped-xcel-energy-joins-western-push-for-next-generation-nuclear-power/article_d41ce56c-0a9c-11ec-8d62-c3845edde701.html, 31 August 2021.

OPINION – Anuar Kalmykov

Disarmament: Nuclear Weapons and Security are Irreconcilable

Kazakhstan has become a recognized leader of the global movement for the non-proliferation of nuclear weapons and their complete elimination since the years of independence. The “Stronger than Death” monument is a memorial to the victims of nuclear tests at the Semipalatinsk nuclear test site. It was opened on August 29, 2001, in Semey.

This year marks a major historical anniversary related to the non-proliferation of nuclear weapons. The world community celebrated the 30th anniversary of the closure of the Semipalatinsk Test Site. The Central Asian Nuclear-Weapon-Free Zone (CANWFZ) will celebrate its 15th anniversary Sept. 8, 2021. Kairat Sarzhanov, the director of the department of international security of the Kazakh Ministry of Foreign Affairs of Kazakhstan spoke about the creation of the CANWFZ in the region and its significance in an interview with *Kazakhstanskaya Pravda*.

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Kazakhstan has significantly suffered from nuclear weapons tests. Overall, 468 air, ground, and underground tests were carried out on the territory of our country (456 tests at the Semipalatinsk Test Site).

History of the Central Asian Nuclear-Weapon-Free Zone: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan signed the Treaty on the Central Asian Nuclear-Weapon-Free Zone (CANWFZ) in Semipalatinsk on 08 September in 2006. Kazakhstan has significantly suffered from nuclear weapons tests. Overall, 468 air, ground, and underground tests were carried out on the territory of our country (456 tests at the Semipalatinsk Test Site).

“We call it the Treaty of Semipalatinsk after the place of its signing. The treaties on the establishment of the other four previously established nuclear-weapon-free zones have similar names – these are the treaties of Tlatelolco, Bangkok, Rarotonga and Pelindaba,” said Sarzhanov. The parties to the Treaty of Semipalatinsk issued a statement to mark the 15th anniversary of the creation of the CANWFZ this year, 2021.

In the statement, the countries of the region reaffirmed their commitment to the historic Treaty on the CANWFZ, and noted the important and decisive role of the NPT, which is the cornerstone of international efforts to

prevent the proliferation of nuclear weapons and ultimately their complete elimination.

Semipalatinsk Test Site: The ministers expressed their continued support for the activities of the IAEA in promoting cooperation in the peaceful use of the atom, the application of safeguards and control over nuclear programs, and noted the entry into force of the new TPNW.

The parties called on their American partners to complete the ratification process of the Protocol on Negative Security Assurances to the Treaty on the CANWFZ as soon as possible. Moreover, they

asked the States listed in Annex 2 of the CTBT, on which the entry into force of the Treaty depends, to take measures to sign and ratify it as soon as possible. Sarzhanov noted that the parties also expressed interest in expanding partnership with existing nuclear-weapon-free zones.

“Given the current international tension and the threat of terrorist organizations acquiring nuclear weapons and their components, these messages are very relevant,” he added. It is planned to register this joint statement as an official document of the 76th session of the UN General Assembly and distribute it to all its member states.

According to Sarzhanov, the creation of the CANWFZ was made possible primarily due to the initiative of the parties to the treaty themselves, which increased the role and importance of Central Asia in the international arena and, above all, in the non-proliferation of nuclear weapons.

At the same time, the starting point in the process of gaining a nuclear-weapon-free status for the region was the decision of First President of Kazakhstan Nursultan Nazarbayev to close the Semipalatinsk Nuclear Test Site on Aug. 29, 1991. Years later, by a resolution of the UN General Assembly, August 29 was declared the International Day against Nuclear Tests.

“I would like to note the symbolism of the fact that the 15th anniversary of the Semipalatinsk Treaty coincides with the most important anniversary for the global anti-nuclear movement – the 30th anniversary of the closure of the Semipalatinsk Nuclear Test Site,” emphasized Sarzhanov. Kazakhstan has significantly suffered from nuclear weapons tests. Overall, 468 air, ground, and underground tests were carried out on the territory of our country (456 tests at the Semipalatinsk Test Site). To this day, the lingering effects of these tests remain.

Following the closure of the test site, after gaining independence, Kazakhstan voluntarily renounced its fourth largest nuclear stockpile in the world, inherited from the Soviet military machine. This arsenal included, in particular, over 110 intercontinental ballistic missiles with 1,200 warheads capable of reaching any point on earth.

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In cooperation with the US and Russia, warheads, bombs and nuclear explosive devices were disposed of and removed from the territory of Kazakhstan, and delivery vehicles and launchers were destroyed. Following the closure of the Semipalatinsk Test Site, all the leading nuclear powers suspended nuclear tests, and some of the test sites were mothballed. This created the conditions for an international legal ban on conducting nuclear tests on a global scale. All this paved the way for the adoption of the CTBT in 1996.

Development of the Nuclear-Free Zone in Central Asia: Sarzhanov noted that the necessary political impetus for joint efforts to create a nuclear-weapon-free zone was initially given during the summit of the heads of Central Asian States in Almaty Feb. 28 in 1997, when the Almaty Declaration was adopted, which called for supporting the idea of creating a nuclear-weapon-free zone.

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Following the results of the international conference held in Tashkent in September of the same year, a Group of Experts was established to prepare the main provisions of the relevant treaty. The discussion of its text took place in Ashgabat, Samarkand and Geneva with the active assistance and under the auspices of the UN. At various times, the UN General Assembly adopted the relevant resolutions.

“Following many years of work of many diplomats from the countries in the region, the Treaty on the CANWFZ, which entered into force in March 2009, was signed in Semipalatinsk Sept. 8 in 2006,

Then Minister of Foreign Affairs of Kazakhstan, now the Head of our State Kassym-Jomart Tokayev signed the Treaty on behalf of Kazakhstan," he said. The signing of the Protocol on Negative Assurances to the CANWFZ Treaty by representatives of the five nuclear-weapon states – Great Britain, China, Russia, the US and France – at the UN headquarters in New York on May 6, 2014, became an important step in the institutionalization of the zone.

"A major step in the legal process of forming the zone was made, and the five nuclear powers have given assurances not to use nuclear weapons and not to threaten to use them against the five parties to the Treaty," Sarzhanov explained. "Last year, in his speech at the UN General Assembly, President of Kazakhstan Tokayev urged the nuclear powers to ratify the protocols to the treaties on nuclear-weapon-free zones, including Semipalatinsk."

Since 2010, the states parties to the Treaty have been submitting a resolution of the UN General Assembly Treaty on a Nuclear-Weapon-Free Zone in Central Asia on a biennial basis. In December 2020, during the 75th session of the UN General Assembly, the resolution was reaffirmed by consensus. "Our countries intend to continue their efforts to strengthen the role and importance of the CANWFZ. In particular, work is underway in this direction to establish cooperation with other nuclear-weapon-free zones. This is stated in a Joint Statement following the Consultative Meeting of the Heads of State of Central Asian states held in Turkmenbashi in August this year," he said.

...Currently, the possibility of signing memorandums of understanding between the NWFZ and the African Commission on Nuclear

Energy (AFCONE), as well as between the NWFZ and the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL) is being considered. Its aim is to strengthen the global nuclear non-proliferation program by combining international efforts to ensure peace and security.

The first regional nuclear-weapon-free zone was established in 1967 in Latin America (the Treaty of Tlatelolco). In 1975, the UN General Assembly defined the general principles for the establishment of nuclear-weapon-free zones, which stipulates, "The support of nuclear powers and all countries of the world will contribute to strengthening the significance of the established zone."

Nuclear Free Zones in Other Parts of the World:

The establishment of nuclear-weapon-free zones is one of the most effective tools in the field of disarmament and non-proliferation of weapons of mass destruction, noted Sarzhanov. The first regional nuclear-weapon-free zone was established in 1967 in Latin America (the Treaty of Tlatelolco). In 1975, the UN General Assembly defined the general principles for the establishment of nuclear-weapon-free zones, which stipulates, "The support of nuclear powers and all countries of the world will contribute to strengthening the significance of the established zone." The nuclear-weapon-free zones were established in other regions of the world: in the South Pacific (The Treaty of Rarotonga of 1985), South-East Asia (the Bangkok Treaty of 1995) and Africa (the Pelindaba Treaty of 1996).

In addition, after the adoption of the treaties on Antarctica (1959), on Outer Space (1967) and on the Seabed (1971), these territories were recognized as nuclear-free zones. Moreover, Mongolia unilaterally proclaimed nuclear-weapon-free status. The nuclear-weapon-free zone in Central Asia has become the fifth nuclear-weapon-free territory in the world. Located in the heart of the Eurasian continent, it has several unique features.

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Kazakhstan is a leader in the field of disarmament, non-proliferation and peaceful use of atomic energy. This year marks the 30th anniversary of Kazakhstan's independence. During this period, the

country has formed its own effective model of the path to achieving a world free of nuclear weapons.

“We offer this model to all countries of the world,” said Sarzhanov. “It includes the following basic foundations. First, a voluntary decision to close the Semipalatinsk Nuclear Test Site, renounce the possession of nuclear weapons and prohibit their deployment. We have created and strengthened our newly-independent country, and achieved international respect without nuclear weapons.”

Kazakhstan is a party to all fundamental international treaties in the field of nuclear disarmament, non-proliferation and the peaceful use of atomic energy. Kazakhstan’s denuclearization model was based on our country’s international cooperation with Russia, the US and other countries, as well as international organizations. Kazakhstan, with the assistance of the international community, including the UN, the IAEA and donor countries, has been fighting the negative consequences of the nuclear tragedy for almost three decades.

On the eve of the 30th anniversary of the closure of the Semipalatinsk Test Site, the UN General Assembly also adopted an updated resolution on international cooperation during the rehabilitation of the Semipalatinsk region.

“Our country, having renounced its nuclear status, has retained the opportunity to develop civilian nuclear energy and the production of nuclear fuel. By supporting the initiative of the IAEA, Kazakhstan has placed a Bank of Low-Enriched Uranium on its territory,” Sarzhanov said.

In view of the stalemate in the process of nuclear disarmament, 122 UN member states developed and adopted the TPNW, which entered into force

in January 2021. Kazakh diplomats also took part in the negotiations on its text. The Treaty establishes an international legal prohibition on nuclear weapons, thereby outlawing them, and is considered a real step by like-minded States to implement their obligations under NPT Article VI.

Source: The article was originally published in Russian in Kazakhstanskaya Pravda newspaper. <https://astanatimes.com/2021/09/disarmament-nuclear-weapons-and-security-are-irreconcilable/>, 09 September 2021.

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NUCLEAR STRATEGY

CHINA

China Pushes for Nuclear Weapons Buildup after US Claims it will Surpass Russia’s Arsenal

The Global Times, a China state-run media outlet, denied its nuclear arsenal will surpass Russia’s nuclear capabilities anytime soon, but advocated for continuing to develop the weapons to deter a conflict with the US.

A top adversary of the US, China’s buildup of its nuclear arsenal raised concerns among US officials. US Air Force Lieutenant General Thomas Bussiere, who oversees America’s arsenal, warned that China’s rapid development was no longer

aligned with public comments that Beijing’s goal was a minimum nuclear deterrent and said in a few years, the nuclear threat presented by China could exceed that of Russia’s.

Hu Xijin, editor-in-chief of the *Global Times*, accused Bussiere of seeking to “sow discord” between Russia and China by implying Russia should be concerned about China’s nuclear capabilities. Xijin also denied China was rapidly building up its arsenal to the point that it could overtake Russia’s, writing in the op-ed that it’s “incredible” to consider the country capable of doing that in the “foreseeable future.”

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In early July 2021, the State Department called China's nuclear buildup concerning. Congressman Mark Turner saw it as a signal that the country was "deploying nuclear weapons to threaten the US and our allies" and Representative Mike Rogers said it highlights America's need to modernize its nuclear deterrent. *The Global Times* denied China's nuclear arsenal would surpass Russia's in the near future, but Hu Xijin, the editor-in-chief, advocated for China to continue advance its nuclear arsenal.

The Pentagon has estimated that China's nuclear warhead stockpile could double in size, which could bring it to more than 400 warheads, at least. Beijing's pushed back on concerns that China poses a nuclear threat, noting its arsenal is well below that of the US and Russia, the two largest nuclear powers.

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Along with increasing nuclear capabilities, Bussiere noted that the US and China don't have a mechanism for nuclear dialogues or treaties, as America has with Russia. Although the US has pushed China to join a nuclear arms treaty it has with Russia, Beijing has bucked the request, saying it has no intention of participating in it.

The relationship between China and the US has been consistently deteriorating and Beijing sees the bulk of America's actions as being a means of keeping China from advancing. The same is true for the issue of nuclear weapons and Hu said attempts to bring China into treaties and dialogue mechanisms were a means of restraining "China's nuclear arsenal development" that would continue the disparity in nuclear weapons.

Although Hu denied China was engaged in anything other than minimal nuclear deterrence, he advocated for China to continue developing its nuclear arsenal. He called for Beijing to have a "firm attitude" on the subject and not to be "dissuaded and impacted by the tricks played by US officials and generals."

A core part of China's national security, according to Hu, it's not the first time he's advocated for China to build up its arsenal. In June 2021, Hu penned an op-ed that called for the country to be prepared for an "intense showdown between China and the US," that required the rapid increase of nuclear warheads and missiles. "The number of China's nuclear warheads must reach the quantity that makes US elites shiver should they entertain the idea of engaging in a military confrontation with China," Hu wrote.

Source: Jenni Fink, <https://www.newsweek.com/china-pushes-nuclear-weapons-buildup-after-us-claims-it-will-surpass-russias-arsenal-1625643>, 02 September 2021.

INDIA

Sea Trials for Floating Missile Test Range INS Anvesh Begin this Month

Sea trials of India's first floating missile test range (FTR), INS Anvesh, are set to begin this month with the ship expected to be commissioned in the next two months. Built by Cochin Shipyard and designed by the DRDO, the nearly 9000 tonne ship will be used to test missiles up to range of 1500 kilometers deep inside the Indian Ocean without the threat to population or sea traffic as well as land mass limitation.

Once commissioned, the FTR INS Anvesh will bring futuristic missile projects up to speed as it will provide for a ready-made safety corridor without going through the tedious exercise of issuing NOTAMs to ships and aircraft flying in the area.

India is expected to commission at least four ships this year with ballistic missile tracking ship INS Dhruv being handed over to NTRO on 10 September 2021. Stealth guided missile destroyer INS Vishakapatnam and diesel attack submarine INS Vela, fourth of the Kalvari class, will also be commissioned by the end of the year.

Once commissioned, the FTR INS Anvesh will bring futuristic missile projects up to speed as it will provide for a ready-made safety corridor without going through the tedious exercise of issuing NOTAMs to ships and aircraft flying in the area. While the DRDO missile testing site at Wheeler

Island off Odisha is under the scanner of the adversaries, the FTR will also allow discreet testing of missiles and torpedoes 400 to 500 nautical miles into the sea.

...While only a select group of nations operate FTRs, the DRDO has specific plans to use the vessel, equipped with electro-optical missile tracking, S-band radar tracking, telemetry devices apart from a launch pad, control and mission control center, for testing its phase II of BMD interceptor missiles. The phase II of the BMD envisages intercepting and destroying enemy missile up to range of 2000 kilometers by kinetic force with the FTR allowing live testing of the interdicator missiles and not computer simulations. The FTR will also allow for live missile and torpedo firing by the Navy as well as surface-to-surface tactical missiles with the Indian Army.

Source: Shishir Gupta, [https:// www.hindustantimes.com/india-news/sea-trials-for-floating-missile-test-range-ins-anvesh-begin-this-month-101630984781024.html](https://www.hindustantimes.com/india-news/sea-trials-for-floating-missile-test-range-ins-anvesh-begin-this-month-101630984781024.html), 07 September 2021.

INS Dhruv: India Gets its First Nuclear Missile Tracking Ship Today

In what comes as a significant boost to the country's naval power, India is all set to launch its first satellite and ballistic missile tracking ship Dhruv on 10 September 2021. The 10,000-tonne vessel will be commissioned from Visakhapatnam in Andhra Pradesh in the presence of senior officials from the Indian Navy, the DRDO, and the NTRO, among others. INS Dhruv lies at the heart of India's future anti-ballistic capabilities and the ship will play a key role in advancing the country's presence in the Indo-Pacific region.

INS Dhruv, with its anti-ballistic missile capabilities, will act as an early warning system for enemy missiles headed towards Indian cities and military establishments. Dhruv also possesses a state-of-the-art active scanned array radar (AESA), developed by the DRDO.

INS Dhruv, the latest addition to the Indian Navy's arsenal, was built by the Hindustan Shipyard in collaboration with the DRDO and NTRO. The ship is equipped with multiple features that make it a state-of-the-art instrument in modern naval warfare. ...INS Dhruv, with its anti-ballistic missile capabilities, will act as an early warning system for enemy missiles headed towards Indian cities and military establishments.

Dhruv also possesses a state-of-the-art active scanned array radar (AESA), developed by the DRDO, which will enable it to scan various spectrums and monitor spy satellites watching over India, as well as monitor missile tests in the entire region.

Dhruv is India's first naval vessel that is capable of tracking nuclear missiles at a long range, which assumes a special significance with an increasing threat of nuclear ballistic warfare in the Indo-Pacific region. In addition to these, INS Dhruv is also equipped with the capability to map ocean beds for research and detection of enemy submarines.

How will India benefit from the addition of INS Dhruv to its arsenal? The Indian Navy is expected to be able to increase its presence in the Indo-Pacific region and beyond with the likes of INS Dhruv in its arsenal, considering largely persisting threats from its neighbours China and Pakistan. Here's a look at how the country is likely to benefit from the addition of INS Dhruv to its arsenal of naval warfare instruments:

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INS Dhruv will play a key role in India's maritime awareness in the Indo-Pacific since it is being commissioned at a time when an era of underwater warfare and surveillance drones with the use of advanced submarines has arrived. Both China and Pakistan currently have nuclear ballistic

capabilities and harbour land disputes against India. In such a scenario, INS Dhruv arrives as a major upgrade to India's fortification and force multiplier in the maritime security architecture.

INS Dhruv, with its state-of-the-art detection facilities, will also help the country's defence and military researchers understand the true missile capability of the adversary when they test their ballistic missiles. With Dhruv monitoring the seas for spy satellites across a variety of spectrums, the Indian Navy can now keep an eye out in the entire region from the Gulf of Aden to the ingress route to the South China Sea via Malacca, Sunda, Lombok, Ombai and Wetar straits. India's electronic intelligence-gathering spy agency, the NTRO, will be able to gather more data across these regions and be on the lookout for threats.

Moreover, with INS Dhruv on its side, the Indian Navy can now strategise its military operations better across all three dimensions of naval warfare – sub-surface, surface, and aerial. This is especially important since China has recently moved to a 'sea-based military doctrine' with huge investments in long-range aircraft carriers, warships, and submarines.

India's nuclear missile tracking ship will be manned by Indian Navy personnel with the SFC. With the addition of INS Dhruv, India will join an elite list of countries that presently consists of only France, the US, the UK, Russia, and China, who possess and operate such vessels.

Source: Joydeep Bose, edited by Meenakshi Ray. <https://www.hindustantimes.com/india-news/ins-dhruv-india-gets-its-first-nuclear-missile-tracking-ship-today-details-here-101631233967587.html>, 10 September 2021.

BALLISTIC MISSILE DEFENCE

USA

US Removes Key Missile Defences in Saudi Arabia Despite Looming Geopolitical Tensions

The US has removed its most advanced missile defence system and Patriot batteries from Saudi Arabia in recent weeks, even as the kingdom faced continued air attacks from Yemen's Houthi rebels. The redeployment of the defences from Prince Sultan Air Base outside of Riyadh came as America's Gulf Arab allies nervously watched the chaotic withdrawal of US troops from Afghanistan, including their last-minute evacuations from Kabul's besieged international airport.

While tens of thousands of American forces remain across the Arabian Peninsula as a counterweight to Iran, Gulf Arab nations worry about the US's future plans as its military perceives a growing threat in Asia that requires those missile defenses. Tensions remain high as negotiations appear stalled in Vienna over Iran's collapsed nuclear deal with world powers, raising the danger of future confrontations in the region.

...“From the Saudi point of view, they now see Obama, Trump and Biden — three successive presidents — taking decisions that signify to some extent an abandonment.” Prince Sultan Air Base, some 115 kilometers (70 miles) southeast of Riyadh, has hosted several thousand US troops since a 2019 missile-and-drone attack on the heart of the kingdom's oil production. That attack, though claimed by Yemen's Houthi rebels, appears instead to have been carried out by Iran, according to

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experts and physical debris left behind. Tehran has denied launching the attack, though a drill in January saw Iranian paramilitary forces use similar drones.

Just southwest of the air base's runway, a 1-square-kilometer (third-of-a-square-mile) area set off by an earthen berm saw American forces station Patriot missile batteries, as well as one advanced THAAD unit, according to satellite images from Planet Labs Inc. A THAAD can destroy ballistic missiles at a higher altitude than Patriots.

A satellite image seen by the AP in late August 2021 showed some of the batteries removed from the area, though activity and vehicles still could be seen there. A high-resolution Planet Lab satellite picture...showed the batteries' pads at the site empty, with no visible activity.

A redeployment of the missiles had been rumored for months, in part due to a desire to face what American officials see as the looming "great powers conflict" with China and Russia. However, the withdrawal came just as a Houthi drone attack on Saudi Arabia wounded eight people and damaged a commercial jetliner at the kingdom's airport in Abha. The kingdom has been locked in a stalemate war with the Houthis since March 2015.

Pentagon spokesperson John Kirby acknowledged "the redeployment of certain air defense assets" after receiving questions from the AP. He said the US maintained a "broad and deep" commitment to its Mideast allies. "The Defense Department continues to maintain tens of thousands of forces and a robust force posture in the Middle East representing some of our most advanced air power and maritime capabilities, in support of US national interests and our regional partnerships," Kirby said.

In a statement to the AP, the Saudi Defense Ministry described the kingdom's relationship with the US as "strong, longstanding and historic" even

while acknowledging the withdrawal of the American missile defence systems. It said the Saudi military "is capable of defending its lands, seas and airspace, and protecting its people."

"The redeployment of some defence capabilities of the friendly US of America from the region is carried out through common understanding and

realignment of defense strategies as an attribute of operational deployment and disposition," the statement said.

Despite those assurances, Saudi Prince Turki al-Faisal, the kingdom's former intelligence chief whose public remarks often track with the thoughts of its Al Saud ruling family, has linked the Patriot missile deployments directly to America's relationship to Riyadh. ... US Defense Secretary Lloyd Austin, on a tour of the Mideast in recent days, had been slated to go to Saudi Arabia but the trip was canceled due to what American officials referred to as scheduling problems. Saudi Arabia declined to discuss why Austin's trip didn't happen after the withdrawal of the missile defenses.

Saudi Arabia maintains its own Patriot missile batteries and typically fires two missiles at an incoming target. That's become an expensive proposition amid the Houthi campaign, as each Patriot missile costs more than \$3 million. The kingdom also claims to intercept nearly every missile and drone launched at the kingdom, an incredibly high success rate previously questioned by experts.

While Greece agreed in April 2021 to lend a Patriot missile battery to Saudi Arabia, the timing of the US withdrawals comes amid wider uncertainty over the American posture in the region. Saudi Arabia and other Gulf Arab countries have renewed diplomacy with Iran as a hedge. ...

Source: <https://www.firstpost.com/world/us-removes-key-missile-defences-in-saudi-arabia->

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despite-looming-geopolitical-tensions-9956091.html, 11 September 2021.

EMERGING TECHNOLOGIES AND DETERRENCE

CHINA

Chinese Military Presents Classified Evidence on how to Land Hypersonic Drone

China's PLA Air Force has reportedly made improvements on the Wuzhen 8 drone which was unveiled during its National Day military parade in 2019 as it makes rapid strides in drone technology. China has been deploying unmanned technologies on a large scale in the past few years with the PLA providing high tech support. Reports say Chinese military researchers may have found a way to land hypersonic drone which travels at over five times the speed of sound.

According to reports, China's Dai Fei along with his colleagues from the People's Liberation Army Air Force have made improvements on the classified model of the hypersonic drones. The improvements have reportedly been made on the air-launched, high-speed DR-8 or Wuzhen 8 unmanned drone which China had unveiled during its National Day military parade in 2019. The exact nature of the tactical changes are however unknown.

The Chinese military has reportedly developed the software connected to the complicated process of landing the hypersonic drone which travels at Mach 5 speed. Hypersonic drones can reportedly be used against American F-22 and F-35 stealth aircraft. China possesses the GJ-1 and GJ-2 armed reconnaissance drones which it had reportedly deployed along the LAC. The GJ-1 and GJ-2 drones are part of China's Wing Loong I and Wing Loong II systems capable of striking targets with the capability to launch small

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air-to-ground missiles.

GJ-2 is reportedly a remotely controlled drone used for surveillance including striking enemy targets. China has been ramping up its drone programme for several years and has even exported them. The country's Rainbow military drones were eyed by several countries including Saudi Arabia, Iraq and other nations. China's drone technology still is no

match for the US Predator drone with sophisticated hunter-killer capability and deadly Hellfire missiles. However, PLARF's recent innovation in drone technology may tilt the balance in China's favour.

The Chinese defence force had earlier unveiled the road-mobile DF-41 intercontinental ballistic

missile and JL-2 submarine-launched ballistic missile at Beijing's Tiananmen Square showcasing the country's nuclear deterrence capability.

Source: <https://www.wionews.com/world/chinese-military-presents-classified-evidence-on-how-to-land-hypersonic-drone-report-411337>, 07 September 2021.

NUCLEAR ENERGY

CHINA

China is about to Test its Thorium-Fueled Nuclear Reactor

An experimental nuclear reactor in China is making waves. Fuelled with thorium, the China-based nuclear reactor is about to start tests. While this radioactive element has seen reactor trials before, many scientists and industry experts agree that this could

make China the first country to come within leaping distance of developing the technology to a commercial scale, according to a report from the journal Nature. If it works, this could serve as a major milestone in the global community toward

creating safer, more efficient alternatives to conventional forms of nuclear power.

The novel reactor is unconventional because it circulates molten salts in its interior, instead of water. It could produce nuclear energy at relatively affordable costs, without sacrificing safety. And, crucially, the thorium-fueled reactor could generate far smaller amounts of radioactive waste than traditional reactors, potentially taking a step toward gutting long-standing objections to nuclear power. Construction of the Wuwei-based experimental thorium reactor near the edge of the Gobi desert was projected for completion in August, with trial operations slated to start this month, according to Gansu province's government, reports Nature. ...

Thorium can't Undergo Fission by itself:

China began its molten-salt reactor project in 2011, investing roughly \$500 million in the program, according to the former president Ritsuo Yoshioka of the International Thorium Molten-Salt Forum in Oiso, Japan. The Shanghai Institute of Applied Physics (SINAP) operates the Wuwei reactor, which was built to generate merely 2 megawatts of thermal energy. For reference, this amount could only power a maximum of 1,000 homes (hence why this is a test). But, should the experiment prove successful, China aims to construct another, 373-megawatt reactor by 2030. At this power level, a thorium nuclear reactor could power hundreds of thousands of homes. ...If China's thorium reactor proves effective, it could become a major milestone on the road to developing commercial-scale nuclear power based on the element.

Source: Brad Bergan, <https://interestingengineering.com/china-to-test-thorium-fueled-nuclear-reactor>, 13 September 2021.

GENERAL

WNA Stresses Nuclear's Resilience

Nuclear reactors generated a total 2553TWh of electricity in 2020, down from 2657TWh in 2019, according to the latest World Nuclear Performance Report released by the WNA. Despite the small

decline, WNA Director General, Sama Bilbao y León, said "the resilience and flexibility shown by the global nuclear fleet tell a very positive story."

The decrease in nuclear output was strongly influenced by the overall fall of around 1% in global electricity demand in 2020 caused by the COVID-19 pandemic, the report says. In addition, nuclear reactors

were increasingly being called upon to provide load-following support to the growing share of variable renewable generation.

"In any other year an almost 4% decline in nuclear generation would be an unequivocal disappointment," Bilbao y León says in the preface to the new report. "In 2020 the world's nuclear reactors have shown resilience and flexibility, adapting to changes in demand while ensuring stable and reliable electricity supply."

The capacity factor for the global fleet in 2020 was still high at 80.3%, down from 83.1% in 2019, but maintained the high performance seen over the past 20 years. Nearly two-thirds of reactors had a capacity factor greater than 80% last year. "There is no age-related trend

Crucially, the thorium-fueled reactor could generate far smaller amounts of radioactive waste than traditional reactors, potentially taking a step toward gutting long-standing objections to nuclear power. Construction of the Wuwei-based experimental thorium reactor near the edge of the Gobi desert was projected for completion in August, with trial operations slated to start this month.

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in nuclear reactor performance," the Association says. "The mean capacity factor for reactors over the last five years shows no significant overall variation with age. With some reactors now being licensed to operate for 80 years, the consistency in performance of reactors regardless of age is notable."

At the end of 2020 there were 441 operable nuclear reactors, with a combined capacity of 392GWe. This total capacity has remained almost unchanged for the last three years, with new capacity additions being matched by the amount of nuclear capacity being permanently shut down.

During 2020, five new reactors with a combined capacity of 5521MWe (net) started up: Barakah 1 in the UAE; Ostrovets 1 in Belarus; Leningrad II-2 in Russia; and, Fuqing 5 and Tianwan 5 in China. However, six reactors with a combined capacity of 5165 MWe (net) were shut down: Fessenheim units 1 and 2 in France; Indian Point 2 and Duane Arnold in the USA; Leningrad 2 in Russia; and, Ringhals 1 in Sweden.

Between 2018 and 2020 there have been 26 reactors permanently shut down with a total capacity of 20.8GWe, compared with 20 new reactors starting up, with a total capacity of 21.3GWe. "With global electricity demand expected to rebound sharply, there is a real risk that greenhouse gas emissions will do so as well," Bilbao y León said. "More than half of the reactors permanently shut down in the last few years have done so not because of technical limitations, but because of political phase-out policies or the failure of markets to adequately recognise the value of low-carbon reliable nuclear power. This is a loss of low-carbon generation that the world can ill afford to squander."

However, there are promising signs for nuclear,

WNA noted. Already in 2021, four new reactors have been connected to the grid and construction has started on seven reactors, although two reactors have permanently shutdown. ... Construction started last year of four new

reactors with a combined capacity of 4473MWe (net). Three of these are in China (Sanao 1, Taipingling 2 and Zhangzhou 2) and one in Turkey (Akkuyu 2). The median time for construction of reactors grid connected in 2020 was 84 months, down from

117 months in 2019.

... It also presents four case studies highlighting the contribution nuclear energy makes to greenhouse gas emissions reduction. These case

studies include: the Grohnde nuclear power plant in Germany, which has produced 400TWh of low-carbon electricity; the Haiyang plant in China, which is providing district heating; the Akkuyu plant, the first to be built in

Turkey; and Peach Bottom.

Source: <https://www.neimagazine.com/news/newswna-stresses-nuclears-resilience-9058084>, 06 September 2021.

INDIA

India Reiterates its Commitment to Promote Nuclear Programme

Calling for greater Indo-US cooperation in the field of clean and green energy, India reiterated its commitment to promote atomic/nuclear programme for providing not only a major source of clean energy, but also as a major tool of application in areas like healthcare and agriculture sector.

A high level US delegation led by Deputy Secretary of Energy, David M. Turk, called on

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Union Minister of State for Science and Technology, Jitendra Singh, on 14 Sep. Singh informed the delegation that in the next 10 years, India will produce more than three times the nuclear power and it is expected to reach 22,480 MW by the year 2031, from the current 6,780 MW as more nuclear power plants are planned for the future.

Referring to Prime Minister Narendra Modi's idea for joint ventures in the nuclear energy sector, the minister pointed out that Gamma irradiation technology for food preservation has already been shared with the private players and presently 26 Gamma radiation processing plants are operational in the country in private, semi-government and government sectors for irradiation of various products, a release from the Science and Technology Ministry said.

The minister also underlined the proposal for establishing a research reactor in PPP mode for production of medical isotopes to promote welfare of humanity through affordable treatment for cancer and other diseases. Turk assured Singh that the US will deepen its collaboration with India in nuclear energy as there is a lot of complementarity there. ...

Source: <https://economictimes.indiatimes.com/news/india/india-reiterates-its-commitment-to-promote-nuclear-programme/articleshow/86198930.cms>, 14 September 2021.

India's Dual Track Approach to Nuclear New-Build

With 22 operating reactors, one recently synchronised with the grid, ten under construction and ten more accorded firm sanction, India has one of the most active civil nuclear sectors in the

world. India's DAE expects to have 22,480MWe of nuclear capacity in operation by 2031.

Its civil nuclear portfolio is also becoming more diverse, with the addition of PWRs alongside the construction of larger and improved Indian PHWRs. DAE also intends to commence construction on commercial FBRs in the 2020s based on the experience of the PFBR at Kalpakkam, which DAE expects will be commissioned by October 2022.

While the domestic industrial base is being consolidated via the construction of new 700MWe IPHWR-700s, India is looking overseas for PWR technology — and that need not only mean Russia.

India continues to be interested in Western PWR technology, with NPCIL receiving a binding techno-commercial bid from France's EDF in April 2021 for the supply of engineering studies and equipment with regards to the construction of six EPR-1650s at Jaitapur in Maharashtra.

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New Build: On 10 January 2021, Kakrapar Atomic Power Station Unit 3 (KAPS-3) became the first IPHWR-700 to be synchronised with the grid. The grid synchronisation of this reactor, which attained first criticality in July 2020, marks a new phase in the IPHWR programme. KAPS-3 is, after all, the first of 16 indigenous 700MWe PHWRs, with the remaining 15 either at various stages of construction or at the pre-project stage having been accorded administrative approval and financial sanction.

Of the remaining 15, five IPHWR-700s (including KAPS-4, which is expected to attain first criticality sometime this year) are under construction and are expected to be commissioned progressively by 2027. Site clearance has also been accorded

by India's Atomic Energy Regulatory Board (AERB) to a further four IPHWR-700s, which along with six more are going to be built in fleet mode. Pre-project activities are currently under way for these 'fleet mode' reactors and all ten are expected to be operational by 2031.

The capital cost of IPHWR-700s is currently around \$2010/kWe. Taken together, these 16 IPHWR-700s will add 11,200MWe (gross) or 10,080MWe (net) to the Indian system. This fleet will not only consolidate India's domestic supply chain for PHWRs but also mark a new generation in CANDU technology development.

While retaining many features of the baseline IPHWR-540, the Gen III IPHWR-700 design has certain key improvements. Upgrading from 540MWe to 700MWe has been achieved by increasing the quantum of nuclear fissions in the uranium fuel bundles and by flux flattening in the core. Absorption of this additional heat is achieved by allowing up to 3% partial boiling at the coolant channel outlet, even though the number of coolant channels stays the same as before.

Particularly noteworthy are the enhanced safety features of the IPHWR-700, such as the interleaving of primary heat transport system feeders, to reduce the core void coefficient and minimise reactor over-power during a loss of coolant accident (LOCA). The IPHWR-700 also incorporates a passive decay heat removal system, regional over-power protection, a containment spray system, a mobile fuel transfer machine and a steel liner on the inner containment wall. The passive decay heat condenser is capable of removing up to three percent decay heat. The

IPHWR-700's emergency core cooling system (ECCS) consists of passive high-pressure injection, followed by an active long-term recirculation phase for removal of decay heat, using 'all-headers' injection for this purpose.

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Along with new IPHWR-700s, India also continues to build Russian VVER-1000s. End-June 2021 saw the first pour of concrete on Kudankulam Nuclear Power Station (KKNPS) 5&6. Both units are being built at a cost of \$6.65 billion at current exchange rates. Kudankulam 5 is scheduled to take 66 months from first pour of concrete to completion, while Kudankulam 6 is expected to take 75 months. At the moment, KKNPS 1&2 are operational, while KKNPS 3&4 have achieved about 50 percent physical progress in

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terms of construction. Though KKNPS 1 has achieved a decent plant load factor in recent times, KKNPS 2 seems to be operating at only around half its nameplate capacity at the moment.

Jaitapur Project: India continues to be interested in importing Western PWR technology. This is evidenced by recent forward movement on the

Jaitapur nuclear power project (JNPP), which received in-principle approval back in 2009.

Despite pandemic-related travel complications, the governments of India and France facilitated interactions between EDF and NPCIL which allowed EDF to submit to NPCIL a binding techno-commercial offer on 22 April 2021 to build six third-generation EPR-1650 nuclear reactors at Jaitapur. The fact that discussions took place in trying times pursuant to the delivery and receipt of the binding offer is itself being seen as a mark of seriousness in both countries.

According to EDF chairman and CEO Jean-Bernard Levy: 'The submission of EDF's binding techno-commercial offer for the Jaitapur project is a major step forward for the Group and the French nuclear industry. This key milestone has been achieved thanks to the trust-based relationship built over time with our Indian partner, and the excellent collaboration and continuous efforts of the EDF and NPCIL teams. This is yet another significant step towards the materialisation of this flagship project for our great nations, and the establishment of a long-term partnership in the civil nuclear field between both our leading nuclear industries.'

EDF's binding offer follows a non-binding offer made in 2018, which was preceded by an Industrial Way Forward Agreement (IWFA) signed between NPCIL and EDF the same year. It is the IWFA that outlined the broad terms of cooperation and the binding offer derives from the script of that document. As such, the binding offer in the main consists of:

- the detailed technical configuration of the reactors, taking into account the information provided by NPCIL on the Jaitapur site conditions and the joint comprehensive work performed by EDF and NPCIL
- the associated comprehensive commercial terms and conditions for the supply of engineering studies and equipment for six EPR reactors

As desired by NPCIL and enshrined in the IWFA, EDF has taken responsibility for engineering and procurement. EDF also guarantees the performance of each of the six EPR units under specific conditions and for a predefined period of time, and will train NPCIL's future operating teams.

In the assessment of this writer, the result is that the Indian-origin content of these reactors will be

far less than it could have been had the arrangement been similar to what was decided for Taishan 1, where the Chinese decided to keep most EPC activities for themselves. In fact, the first two units at JNPP are likely to have an overwhelming amount of imported content. EDF has said that it will rely upon the know-how of its subsidiary Framatome to supply the engineering studies and equipment for the six nuclear steam supply systems, and will partner with its historical

partner GE Steam Power for the supply of the engineering studies and equipment of the six conventional islands, all of which are to be equipped with the French Arabelle™ steam turbine.

The Indian nuclear establishment has perhaps decided that foregoing localisation is a necessary

tradeoff to reduce project risk — and to ensure performance safety, given China's recent experience with Taishan 1.

To mitigate Indian concerns about the EPR design, France's Alternative Energies and Atomic Energy Commission (CEA) has in the past shared with DAE the assessment of the French Nuclear Safety Authority (ASN) with respect to the EPR design's post-Fukushima safety appraisal and assured India that there will be no additional costs to ensure the EPR's safety in the post-Fukushima regulatory environment. It would be surprising if DAE does not desire further inputs with respect to the recent incident at Taishan 1. Importantly, EDF's binding offer specifies that 'as the owner and future operator of the plant, during the construction phase, NPCIL may benefit from EDF and its partners' assistance, notably regarding the sharing of other EPR project-related lessons learned'.

The Indian nuclear utility NPCIL will be responsible for the construction and commissioning of all of the six units at JNPP. It will also secure all necessary permits and consents in India. EDF and its industrial partners

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will assist NPCIL during the construction phase. Environmental and coastal regulation zone clearances for JNPP had already been granted by the relevant Indian Ministry in 2010, and this clearance seems to have been extended further.

The requisite land for JNPP is already in NPCIL's possession and pre-project activities such as geo-technical investigation, boundary wall construction, construction power supply, site office for construction staff, meteorological tower, laboratory buildings and approach road etc. have been completed by the company. NPCIL's application for site clearance for the project is currently under review by AERB.

Although NPCIL has agreed to forego high domestic content levels, it cannot compromise on the competitiveness of the project. Apparently, the objective is to keep the initial power tariff from these EPRs at or below Rs 6.5 (\$.087) per unit, which will be competitive with other baseload sources in a decarbonising environment.

Given that the project will be financed on a 70:30 debt-equity basis, the nature of the loan package secured for the JNPP project will be crucial towards meeting this objective. EDF has declined to be an investment partner, with finance for the project set to be generated from NPCIL's balance sheet and the Government of India. The French supplier will however facilitate discussions between NPCIL and financial institutions such as BPI France and SFIL, who support a French Government export credit scheme, for a significant portion of the required loans. A sovereign guarantee from the Government of India will be necessary to secure this loan package.

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Some 200 Indian companies have already been pre-qualified by EDF for this purpose. Moreover, EDF knows that for the JNPP project to be successful it has to enthuse India's political leadership with respect to industrialisation and employment goals.

EDF probably understands that JNPP's competitiveness will require some degree of localisation in any scenario and has therefore been working 'in-depth' towards identifying Indian suppliers for the JNPP project. Some 200 Indian companies have already been pre-qualified by EDF for this purpose. Moreover, EDF knows that for the JNPP project to be successful it has to enthuse India's political leadership with respect to industrialisation and employment goals. In any case, cross pollination between EDF's existing supply chain and various local players is a prerequisite for negotiating local environmental, labour and safety regulation issues.

For JNPP 3-6, EDF is likely to delegate some purchasing activities and studies to local companies. EDF believes that 35-40

percent localisation will be achieved for the JNPP project as a whole (i.e. all six units), which is expected to span some 15 years. The stepwise approach to localisation is acceptable to NPCIL, which wants to prepare Indian industry for building the IPWR in the future.

The IPWR design will incorporate both Western and Russian approaches and the desire to absorb French nuclear codes and standards remains a driver behind DAE's continued interest in JNPP. To build capacity EDF will setup an engineering platform in India, which will carry out part of the detailed engineering studies and all execution plans.

EDF's strategy also includes the launch of a pre-feasibility study, conducted by it in association with International Institute of Nuclear Energy and Veermata Jijabai Technological Institute, to establish a centre of excellence in India to train engineers and technicians, and to support the

development of the necessary set of skills for the project.

Long Term Goals: Overall, India continues to see the growth of its civil nuclear sector as an essential ingredient for meeting its industrial and decarbonisation goals. JNPP is expected to have an installed capacity of 9.6 GWe, and generate up to 75 terawatt hours per year thereby avoiding the emission of 80 million tons of CO₂ per year. Almost 10GWe of emission-free baseload power would be very welcome indeed for India's western grid, which will have to support considerable manufacturing growth in the next two decades.

France's involvement in India's nuclear expansion plans will also provide further legitimacy to India's peculiar nuclear liability regime and will help New Delhi set the tone for its negotiations with other potential Western partners for other light water reactor sites that have in-principle approval. Indeed, France could well emerge as a 'new Russia' for India. At the moment, all eyes are set on the signing of a binding framework agreement for JNPP, something that EDF expects to have in the bag sooner rather than later.

Source: Saurav Jha, Nuclear Engineering International, <https://www.neimagazine.com/features/featureindias-dual-track-approach-9079860/>, 14 September 2021.

KAZAKHSTAN

Kazakhstan Banks on Nuclear Energy for Transition to Low-Carbon Future

During the State of the Nation address given on 1 September, Kazakh President Kassym-Jomart

Tokayev outlined Nur-Sultan's plans to accelerate Kazakhstan's transition to a low-carbon economy. Tokayev announced that over the course of the next year, the Kazakh government, along with the country's Samruk Kazyna sovereign wealth fund, will "study the possibility of developing a safe and environmentally-friendly nuclear power industry in Kazakhstan" in order to maintain sufficient supplies of electricity while fulfilling Nur-Sultan's goal of achieving carbon neutrality by 2060.

JNPP is expected to have an installed capacity of 9.6 GWe, and generate up to 75 terawatt hours per year thereby avoiding the emission of 80 million tons of CO₂ per year. Almost 10GWe of emission-free baseload power would be very welcome indeed for India's western grid, which will have to support considerable manufacturing growth in the next two decades.

Kazakhstan's interest in developing a nuclear energy programme comes as many countries in Europe are still hotly debating what role nuclear energy should play in efforts to curb emissions. A coalition of German and Austrian investors recently wrote to the European Commission, urging the institution to leave nuclear energy off of the list of sustainable economic activities under the bloc's green taxonomy. At the same time, this summer has seen regular protests at Germany's six remaining reactors, with pro-nuclear groups calling on Berlin to rethink its policy of phasing out nuclear energy by the end of next year, given the urgent need to tackle

The United Nations Economic Commission for Europe recently argued that nuclear power is essential to achieving climate goals, while some prominent energy experts have echoed the warnings that the imperative to shift to low-carbon sources of energy as swiftly as possible makes this an inopportune time to move away from nuclear energy.

climate change.

The United Nations Economic Commission for Europe (UNECE) recently argued that nuclear power is essential to achieving climate goals, while some prominent energy experts have echoed the warnings that the imperative to shift to low-carbon sources of energy as swiftly as possible makes this an inopportune time to move away from nuclear energy. ...

It's a pragmatic and forward-looking sentiment that President Tokayev seems to share. In his recent address to the nation, his third since

becoming President in 2019, the Kazakh leader laid out the challenge of becoming carbon neutral while ensuring sufficient energy supply for Kazakhstan's growing population and economy. Nur-Sultan has long relied on an energy mix dominated by fossil fuels—in 2018, coal was responsible for roughly 70% of Kazakhstan's electricity generation, followed by natural gas with 20%—yet has been quick to embrace the need for a low-carbon future. In fact, Kazakhstan was the first member of the CIS to ratify the Paris Agreement and to lay out a climate policy to achieve the Sustainable Development Goals.

As Tokayev acknowledged in his recent speech, following through on these commitments will be a formidable challenge. While Nur-Sultan is seeking to increase the share of renewable energy to 15% by 2030 and is cooperating with the EU as well as international institutions such as the European Bank for Reconstruction and Development in its efforts to kickstart renewable industries, it is clear that renewable energy sources cannot be developed fast enough to meet the needs of what is already one of the world's most energy-intensive economies.

"With the gradual decline of the coal era," Tokayev underscored in his address, "in addition to renewables, we will have to think about sources of reliable basic energy generation. By 2030, there will be a shortage of electricity in Kazakhstan. Global experience suggests the most optimal solution—a peaceful atom". Two days after the address to the nation, Tokayev was even more explicit in remarks at the Eastern Economic Forum in Vladivostok: "Kazakhstan needs a nuclear power plant", the president emphasized.

Kazakhstan previously had one Russian-made nuclear reactor, which operated from 1972 to 1999, though its primary purpose was to

desalinate water. The country is nevertheless well-placed to return to the industry. The world's leading uranium producer with 12% of global uranium reserves, Kazakhstan already has a major plant making nuclear fuel pellets and plays host to the IAEA's LEU bank.

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Central Asia currently does not have any operational nuclear power plants, though Uzbekistan has signalled its intent to build

two VVER-1200 pressurised water reactors. As the region's countries attempt to meet ambitious climate goals, however, more governments may follow Kazakhstan's lead by determining that peaceful nuclear power is the most logical path to reducing emissions while growing the economy.

Source: <https://www.europeanscientist.com/en/energy/kazakhstan-banks-on-nuclear-energy-for-transition-to-low-carbon-future/>, 09 September 2021.

POLAND

Poland Advances Prospects for Small Reactor Deployment

Barakah-2, the United Arab Emirates' second nuclear power reactor, has started up. The 1,345 MWe (net) South Korean APR1400 unit is the second of four reactors built at Barakah as part of the UAE's efforts to diversify energy supplies away from gas.

Polish chemicals group Synthos and energy group ZE PAK have signed an investment agreement to explore the construction of four to six BWRX-300 small modular reactors at the site

of ZE PAK's Płnów coal-fired power plant in eastern Poland. Synthos, which has exclusive rights in the country for GE Hitachi Nuclear Energy's small nuclear reactors, will participate in the project as both an investor and the technology provider.

Source: World Nuclear News, 01 September 2021.

UAE

Second New Reactor Starts Up in UAE

Barakah-2, the United Arab Emirates' second nuclear power reactor, has started up. The 1,345 MWe (net) South Korean APR1400 unit is the

second of four reactors built at Barakah as part of the UAE's efforts to diversify energy supplies away from gas. It was built by a consortium led by KEPCO and is located between Abu Dhabi city and Qatar. Barakah 2 was completed last year and received an operating licence in March, units 3 & 4 are 94% and 89% complete respectively. Construction began in April 2013. Unit 1 was connected to the grid in August 2020. The UAE is the first country in the Arab world, and the 33rd nation globally, to develop a civil nuclear power program. It will supply about one quarter of the country's electricity.

Source: World Nuclear News, 27 August 2021.

UKRAINE

Ukraine to Build Westinghouse Reactors Rather than Russian

A Memorandum of Cooperation between Ukraine's Energoatom and Westinghouse envisages significant expansion of Ukraine's nuclear capacity with four Westinghouse AP1000 reactors built at established sites. But before that, a pilot project will be joint completion of Khmel'nitsky unit 4, a part-built Russian VVER-1000 reactor about one quarter complete. It will now have some AP1000 components. The agreement covering the five reactors is valued at about \$30 billion and could lead to 70% of Ukraine's electricity being from nuclear power, similar to France today. There are four AP1000 reactors operating in China.

Westinghouse already has some involvement with Energoatom in providing an increasing proportion of the fuel for its 15 Russian reactors, providing monitoring instrumentation systems at the Zaporozhe plant, and since 2016 it has been working with Turboatom and Energoatom to uprate the capacity of 13 VVER-1000 turbine generator sets by up to 10%. The agreement is subsidiary to a government-level one on

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enhancing bilateral energy and climate cooperation involving "a comprehensive energy sector plan, one that provides for mutually beneficial cooperation in nuclear energy, solar and wind energy, hydrogen, energy storage, carbon capture utilisation and storage, cyber and physical security, and other supply and demand-side technologies."

Khmel'nitsky unit 3 is still nominally under construction. It was about 75% complete when work was halted in 1990. Since

then, Khmel'nitsky 3&4 together have been the subject of a political saga over 30 years as Ukraine has sought to diminish Russian involvement in its nuclear and other affairs. Skoda JS (Czech) and Korea Hydro & Nuclear Power have been leading contenders to complete the two units.

Source: World Nuclear News, 01 September 2021.

NUCLEAR COOPERATION

ARMENIA-UKRAINE

Armenia Interested in Cooperation with Ukraine in Field of Nuclear and Renewable Energy

Within the framework of the 8th meeting of the Armenian-Ukrainian Intergovernmental Commission on Economic Cooperation, Deputy Energy Minister of Ukraine for European Integration Yaroslav Demchenkov and Deputy Minister of Energy Infrastructures and Natural Resources of the Republic of Armenia Hakob Vardanyan held a bilateral meeting.

"Armenia is interested in strengthening cooperation in the fields of nuclear energy, renewable energy, the use of energy saving technologies, and energy efficiency. Ukraine is interested in potential investments in energy transformation projects. We plan to hold a joint Energy Day for such a dialogue," Demchenkov commented on the results of the meeting.

Armenia has several powerful thermal and hydroelectric power plants, as well as nuclear energy. Therefore, potential projects for cooperation are the participation of Ukrainian enterprises in the construction, repair, and modernization of power plants in the country. In particular, Armenia is interested in Ukraine's experience in ensuring the safe long-term operation of nuclear power plants and carrying out modernization measures to increase the level of safety at nuclear power plants.

The director-general of the IAEA said in a report that indications of the operation of the radiochemical laboratory at the Yongbyon Site from mid-February to early July 2021 are consistent with previous reprocessing campaigns of irradiated fuel discharged from the 5-megawatt reactor at the same site.

Source: <https://www.ukrinform.net/rubric-economy/3315520-armenia-interested-in-cooperation-with-ukraine-in-field-of-nuclear-and-renewable-energy.html>, 14 September 2021.

NUCLEAR PROLIFERATION

NORTH KOREA

Deeply Troubling': UN Atomic Agency Raises Concern over North Korea's Nuclear Activities

The UN atomic agency has raised concerns over the nuclear activities of North Korea, saying there were indications of the operation of its main nuclear reactor used to produce weapon fuels. The director-general of the IAEA said in a report that indications of the operation of the radiochemical laboratory at the Yongbyon Site from mid-February to early July 2021 are consistent with previous reprocessing campaigns of irradiated fuel discharged from the 5-megawatt reactor at the same site.

"The DPRK's nuclear activities continue to be a cause for serious concern. Furthermore, the new indications of the operation of the 5MW(e) reactor and the Radiochemical Laboratory are deeply troubling," the report noted. The UNSC has passed multiple resolutions to impose a wide range of sanctions on North Korea over its nuclear activities but the secretive regime continues to violate international regulatory norms.

The US and several other countries have imposed separate sanctions but that hasn't deterred North Korea from nuclear tests and missile programmes. The 5-megawatt reactor is widely believed to have produced plutonium for nuclear weapons and is at the heart of North Korea's nuclear programme, reported news agency ANI. "The continuation of the DPRK's nuclear programme is a clear violation of relevant UNSC resolutions and is deeply regrettable," the IAEA director-general said.

The IAEA called upon Pyongyang to comply fully with its obligations under relevant Security Council resolutions and cooperate promptly with the atomic agency in the full and effective implementation of its NPT Safeguards Agreement. ... the UN spokesperson Stephane Dujarric said that Secretary-General Antonio Guterres was aware of the reports from North Korea "and concerned by the latest developments." ...

Source: <https://www.hindustantimes.com/world-news/deeply-troubling-un-atomic-agency-raises-concern-over-north-korea-nuclear-activities-101630403828799.html>, 31 August 2021.

NUCLEAR NON-PROLIFERATION

CHINA

NATO Chief Urges China to Join Nuclear Arms Control Talks

NATO Secretary-General Jens Stoltenberg urged China...to join international efforts to limit the spread of nuclear weapons amid concerns that the Asian superpower is rapidly developing missiles capable of carrying atomic warheads. Laying out his priorities for nuclear disarmament at NATO's annual arms control conference, Stoltenberg said that more countries must be included in future missile restriction talks, not just Russia.

"As a global power, China has global responsibilities in arms control. And Beijing, too,

would benefit from mutual limits on numbers, increased transparency, and more predictability," Stoltenberg said. "These are the foundations for international stability." Warning that Beijing's nuclear arsenal is rapidly expanding, he said "China is building a large number of missile silos, which can significantly increase its nuclear capability. All of this is happening without any limitation or constraint. And with a complete lack of transparency."

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In 2019, the US pulled out of the 1987 INF, treaty, blaming Russia for violating the bilateral pact. It was the first arms control measure to ban an entire class of weapons: ground-launched cruise missiles with a range between 500 kilometers (310 miles) and 5,000 kilometers (3,100 miles). Russia denies that it broke the rules.

As the pact fell apart, China continued to build such weapons and it has shown little sign that it's inclined to join in such arms proliferation talks. Stoltenberg welcomed the agreement between the US and Russia to extend for another five years the New START treaty limiting their strategic nuclear weapons. But he said that more kinds of arms should be added to non-proliferation talks, including new technologies like Artificial Intelligence.

Iran's violation of basic obligations under the NPT or the comprehensive safeguards agreement with the IAEA, because these documents do not impose any restrictions on Iran in this area. "But from the angle of restoring the JCPOA, the situation is getting more complicated, because Tehran is moving further and further from the initial terms of the agreement.

Source: https://apnews.com/article/europe-china-9374925e86e57697c264ed0a74587b88?mkt_tok=MDk1LVBQVi04MTMAAAF_YOD1fudLWCoierf2YDpy9iUejvTJ7eZvj4X9snWmUCL9i5eUKY-2_uqPQ49Fc1_tfVjrxnFEFqO5IQbGWFOvxhmyIEOmMKk4AKZIKmn02il, 06 September 2021.

IRAN

Russia Concerned About Iran's Nuclear Capabilities

From the angle of restoring the Joint Comprehensive Plan of Action, the situation is getting more complicated, because Tehran is

moving further and further from the initial terms of the agreement, Sergey Ryabkov noted. "We are definitely concerned about the rapid progress that is being observed in Iran's nuclear capabilities," Ryabkov said.

The Russian diplomat explained that the concern was not in terms of Iran's violation of basic obligations under the NPT or the comprehensive safeguards agreement with the IAEA, because these documents do not impose any restrictions on Iran in this area. "And the transparency of the corresponding Iranian efforts has been ensured," Ryabkov went on to say. "But from the angle of restoring the JCPOA, the situation is getting more complicated, because Tehran is moving further and further from the initial terms of the agreement."

"However, this is also reversible if we return to the negotiations and continue to develop compromise solutions to the remaining problems, proceeding with the talks from the point at which they stopped - when they were interrupted," the deputy foreign minister noted.

Since April 2021, negotiations have been held in Vienna between Iran and the five nuclear countries, namely Russia, the UK, China, France and Germany, in terms of restoring the Iranian nuclear agreement in its original form. The parties touched upon the lifting of US sanctions on Iran, the fulfillment of nuclear obligations by Iran as well as the return of the US to the JCPOA. Representatives of the parties to the agreement are also holding separate consultations with the US delegation without the participation of Iran. Initially, the delegations expected to complete the work in late May, then in early June.

Source: https://tass.com/politics/1335133?mkt_tok=MDk1LVBQVi04MTMAAAF_a2Q9qdcQMczNEm8hMeipoP3a2QFbgCfZuKzJX8B18v

RwxkxBhEy6bA8c4H 1575w QL1Xwclmu Ya2 meSJ6ePSnUG75xs70QMUwq-KANmUuZU, 08 September 2021.

Iran to Allow IAEA to Service Nuclear Monitoring Cameras After Talk

Iran is to allow the U.N. nuclear watchdog to service monitoring cameras at Iranian nuclear sites after talks with IAEA head Rafael Grossi, according to the head of Iran's atomic energy body and a joint statement.

The talks with IAEA chief Grossi were aimed at easing a standoff between Tehran and the West just as it threatens to escalate and scupper negotiations on reviving the Iran nuclear deal. ...The IAEA informed

member states that there had been no progress on two central issues: explaining uranium traces found at several old, undeclared sites and getting urgent access to some monitoring equipment so the agency can continue to keep track of parts of Iran's nuclear programme as provided for by the 2015 deal.

Source: <https://economictimes.indiatimes.com/news/international/world-news/iran-to-allow-iaea-to-service-nuclear-monitoring-cameras-after-talk/presser-soon/slideshow/86140631.cms>, 12 September 2021.

URANIUM PRODUCTION

GENERAL

Uranium Prices Soar as Investors Scoop up Nuclear Power Fuel

Nuclear power companies are facing competition for supplies of uranium from financial investors, who are betting on sharply higher prices and demand for the radioactive material used to fuel reactors. The price of raw uranium, known as yellowcake, has risen to its highest level since 2014, driven by a newly launched investment trust run by Canadian asset

The supply of uranium is set to fall 15 per cent by 2025 and by 50 per cent by 2030 due to a lack of investment in new mines. "Financial players are clearly accelerating price discovery, but this would not be occurring if there was not a fundamental and substantial deficit."

manager Sprott. Investors are betting that nuclear power will be a key part of the move away from fossil fuels and that a lack of new uranium mines will mean the price has to move higher.

The Sprott Physical Uranium Trust has snapped up about 6m pounds of physical uranium, worth about \$240m, since launching on July 19, helping to push uranium prices to more than \$40 per pound, up from \$30 at the start of the year. Global mine supply is expected to be about 125m pounds in 2021.

Its aggressive buying will put pressure on utilities that need to secure supplies of the commodity for electricity generation. It also comes as China is planning a big increase to

its nuclear power capacity over the next decade. Added to the holdings of a fund it acquired, Sprott currently holds 24m pounds of uranium, worth about \$1bn, in the form of yellowcake.

Other financial players have also been buying the commodity in a bet that its price will rise. Yellow Cake Plc, a vehicle listed in London in 2018, holds about 16m pounds of uranium. ...Demand for uranium is expected to climb from about 162m pounds this year to 206m pounds in 2030 — and even further to 292m pounds in 2040 — according to the World Nuclear Association, largely driven by increased power generation in China as Beijing seeks to cut emissions.

At the same time, the supply of uranium is set to fall 15 per cent by 2025 and by 50 per cent by 2030 due to a lack of investment in new mines. "Financial players are clearly accelerating price discovery, but this would not be occurring if there was not a fundamental and substantial deficit"

analysts at Canaccord Genuity said.

The pandemic has also disrupted supply from some of the largest mining operations in Canada

and Kazakhstan. In December, Canada's Cameco temporarily suspended production at its Cigar Lake mine due to a shortage of workers, before restarting it in April. "This is against a backdrop of growing energy demand as the economy recovers and a focus on carbon-free generation, with nuclear being a key element of non-fossil fuel baseload generation," said Jonathan Guy, analyst at Berenberg.

Shares in Cameco have risen 70 per cent year-to-date on the Toronto Stock Exchange. Overnight, shares in Japanese utility companies rose sharply after Fumio Kishida, a leading contender to become the country's next prime minister, said restarting nuclear power plants was necessary to achieve the country's net zero goals. Nuclear power was shut down in Japan after the Fukushima Daiichi disaster in 2011 and has only slowly been restored.

Last month, the Spratt fund announced it would issue \$300m worth of new shares, which would be backed by new purchases of physical uranium. Currently listed on the Toronto Stock Exchange, the Spratt uranium trust is also looking to list on the New York Stock Exchange next year, which could spur further purchases, according to Canaccord. The Spratt trust buys uranium through WMC Energy, which stores it in Canada, the US and France. Spratt receives a management fee of 0.35 per cent, as well as a commission of 1 per cent on the gross value or any purchases or sales of uranium.

If investors keep buying uranium, analysts expect utility companies will come under pressure to replace long-term supply agreements before they expire. At the moment, long-term contracts cover 98 per cent of the uranium needed by US utility companies. But that figure drops to 84 per cent next year, and 55 per cent by 2025, according to Yellow Cake. ...

Source: Henry Sanderson and Neil Hume, <https://www.ft.com/content/624e3ac6-ffb0-49ee-959f-e59c27e96c80>, 10 September 2021.

NUCLEAR SECURITY

BURKINA FASO

IAEA Completes Nuclear Security Advisory Mission in Burkina Faso

An IAEA team of experts completed a nuclear security advisory mission in Burkina Faso, which was carried out at the request of its Government. The scope of the two-week International Physical Protection Advisory Service (IPPAS) mission included the legislative and regulatory framework for the security of radioactive material, regulatory practices (licensing, inspections and enforcement) and coordination between all stakeholders involved in nuclear security. The conduct of the mission included a review of the security systems and practices in place at selected facilities. In August 2014, Burkina Faso ratified the 2005 Amendment to the CPPNM, and its incorporation into the country's nuclear security regime was also included in the scope of the mission.

The team observed that Burkina Faso has established a nuclear security regime with essential elements of the IAEA's guidance on the fundamentals of nuclear security. The team offered recommendations and suggestions to support Burkina Faso in further enhancing and sustaining nuclear security.

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The team included four experts from Lebanon, Niger, Senegal and the IAEA. They met in the capital Ouagadougou with officials from the Ministry of the Environment, as well as with representatives of other relevant ministries and governmental organizations, including the Ministry of Transport, the Ministry of Foreign Affairs, the Ministry of Justice, Gendarmerie, National Intelligence, National Police, Customs, Civil Protection and the National Radiation

Protection and the Nuclear Safety Authority (ARSN). As part of the review, the team visited six facilities where radioactive sources are in use, including the Nantou Mining Company, two medical facilities, a construction laboratory and two research centres.

The mission was the 93rd IPPAS mission conducted by the IAEA since the programme began in 1995. IPPAS missions are intended to assist States in strengthening their national nuclear security regime. The missions provide peer advice on implementing international instruments, along with IAEA guidance on the protection of nuclear and other radioactive material and associated facilities. During a mission, a team of international experts observes a nation's system of physical protection, compares it with international good practices and makes recommendations for improvement. IPPAS missions are conducted both on a nationwide and facility-specific basis.

Source: <https://www.iaea.org/newscenter/pressreleases/iaea-completes-nuclear-security-advisory-mission-in-burkina-faso>, 10 September 2021.

NUCLEAR SAFETY

JAPAN

IAEA, Japan Agree on Timeline for Safety Review of Water Release at Fukushima Daiichi

The IAEA and Japan have agreed on an initial mission schedule and other arrangements for the implementation of the Agency's multi-year review and monitoring of the safety of the planned treated water release at the Fukushima Daiichi Nuclear

Power Station. Japan is expected to start discharging the treated water in 2023. In line with the commitment of Director General Rafael Mariano Grossi to provide IAEA support before, during and after the water discharge, the first of a series of IAEA preparatory technical on-site review missions will take place later this year. The IAEA's special Taskforce for the water disposal will meet in the coming weeks to prepare the reviews.

An IAEA team, led by Lydie Evrard, IAEA Deputy Director General and Head of the Department of Nuclear Safety and Security, met with senior officials in Japan...to officially launch the review process and agree on the timeline, the preliminary scope of each mission, and other details.

...During its 7–9 September visit to Japan, the IAEA team met with senior officials from the Ministry of Foreign Affairs, the Ministry of Economy, Trade and Industry, and Japan Nuclear Regulation Authority. They

agreed on the three main parts of the IAEA review:

- Safety related aspects.
- Regulatory activities.
- Environmental monitoring.

The Agency's assistance to Japan will consist of reviews and monitoring to help confirm that the operation to discharge the water over the coming decades is consistent with international safety standards. This review will be based in particular on material submitted by Japan, and on-site technical missions to Japan. The IAEA team also travelled to the Fukushima Daiichi site...to gain an updated understanding of the situation by observing on-site activities and visiting key

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locations that will feature within the review project.

... In April this year 2021, Japan announced its decision to release the treated water into the sea and requested the assistance of the IAEA to ensure that the discharge takes place in line with the international safety standards. IAEA safety standards constitute a global reference for protecting people and the environment and contribute to a harmonized high level of safety worldwide. The IAEA and Japan agreed on the project's Terms of Reference in July 2021.

The IAEA Taskforce for the water discharge, which includes internationally recognized experts from Member States, was set up to oversee the programme of technical assistance and review the related plans and actions. The IAEA has provided technical assistance to support Japan's efforts at Fukushima Daiichi in areas such as radiation monitoring, remediation, waste management and decommissioning since 2011.

Source: <https://www.iaea.org/newscenter/pressreleases/iaea-japan-agree-on-timeline-for-safety-review-of-water-release-at-fukushima-daiichi>, 09 September 2021.

SLOVAKIA

IAEA Safety Mission Sees Significant Progress at Slovakia's Mochovce Nuclear Power Plant, Encourages Continued Improvement

An IAEA team of experts said the operator had strengthened operational safety at Unit 3 of Slovakia's Mochovce Nuclear Power Plant (NPP) ahead of commercial operation. They said the plant management had made significant progress in addressing the findings of a previous IAEA review in 2019. At the same time, the team encouraged the operator to improve the plant's

safety performance further. The five day Pre-Operational Safety Review Team (OSART) follow-up mission...was conducted at the request of the Nuclear Regulatory Authority of the Slovak Republic to evaluate progress made in addressing the findings of the Pre-OSART review two years ago.

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With its OSART programme, the IAEA aims to improve operational safety by objectively assessing a plant's performance in this field. Teams of experts conduct the review against the IAEA's safety standards and propose recommendations and suggestions for improvements, where appropriate. Safety is an essential element during

commissioning and the subsequent safe operation of a nuclear power plant. Therefore, Pre-OSART reviews typically take place before first fuel loading.

Mochovce NPP is located about 100 km east of Slovakia's capital Bratislava. It is owned and operated by Slovenske Elektrarne, a.s. Two 470 megawatts electric (MW(e)) pressurized water reactors (PWR) units have been operational since 1998 and 1999. Unit 2 was upgraded to 501 MW(e) in 2020. Unit 3, a 471 MW(e) reactor, started commissioning in 2018. Unit 4 is under construction at the site. Slovakia's four operational nuclear reactors at Mochovce and Bohunice produce 53.1 per cent of the country's electricity.

... The IAEA OSART team was led by Fuming Jiang, Head of the Operational

Safety Section at the IAEA. "The plant has implemented many actions to address the findings of the 2019 mission. We are pleased to observe significant improvements," he said. "The team encourages the plant to complete the remaining planned actions to improve its safety performance further". The five-member team comprised experts from Canada, Germany, and the United Kingdom

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and two IAEA officials.

The team observed that several findings from the 2019 review were fully addressed, including: The plant has improved the Unit 3 operator training, for example, by using an upgraded simulator and through strengthened formal evaluations. The plant has enhanced its practice in the labelling and safe use of chemical substances, for example, through additional training and regular checks. The plant has improved the maintenance of its emergency response facilities and equipment.

- The team noted that further efforts are required to fully implement some actions drawn up after the 2019 mission, including:
- The plant should continue to improve the promotion of high standards in staff behaviours and plant conditions to ensure personnel safety.
- The plant should continue to improve its maintenance work practices.
- The plant should continue to enhance the coordination and internal communication for planning and execution of commissioning activities.

The team provided a draft report of the mission to the plant management on the final day. The plant management and the Nuclear Regulatory Authority of the Slovak Republic, which is responsible for nuclear safety oversight in the country, will have the opportunity to make factual comments on the draft. The IAEA will review them and will submit the final report within three months.

Source: <https://www.iaea.org/newscenter/pressreleases/iaea-safety-mission-sees-significant-progress-at-slovakias-mochovce-nuclear-power-plant-encourages-continued-improvement>, 10 September 2021.

NUCLEAR WASTE MANAGEMENT

ITALY

Italy Launches National Debate on Waste Repository

The plant has improved the Unit 3 operator training, for example, by using an upgraded simulator and through strengthened formal evaluations. The plant has enhanced its practice in the labelling and safe use of chemical substances, for example, through additional training and regular checks. The plant has improved the maintenance of its emergency response facilities and equipment.

The opening plenary session of Italy's National Seminar, which aims at deepening the analysis of the technical aspects related to the national repository for radioactive waste and technological park project with all interested parties, was held...The National Seminar, a series of consultative meetings, follows the publication in

January 2021 of a list of 67 potential sites for a radioactive waste storage facility.

Following approval by the Ministry of Economic Development and the Ministry of the Environment and Protection of the Territory and the Sea, Societa Gestione Impianti Nucleari SpA (Sogin) - the Italian state-owned company responsible for dismantling the country's nuclear power plants - published on 05 January 2021 the National Charter of Potentially Suitable Areas (CNAPI) to host the national radioactive waste store and a technological park. It also released all the documents related to the

The store will have the capacity to hold about 78,000 cubic metres of very low and low-level radioactive waste, as well as about 17,000 cubic metres of intermediate and high-level waste, pending the availability of a deep geological repository suitable for its disposal. The technology park will be a research centre, open to international cooperation, where activities in the energy, waste management and sustainable development fields can be carried out.

project.

The planned surface-level waste store and technology park will be built in an area of about 150 hectares, of which 110 are dedicated to the repository and 40 to the park. The store will have

the capacity to hold about 78,000 cubic metres of very low and low-level radioactive waste, as well as about 17,000 cubic metres of intermediate and high-level waste, pending the availability of a deep geological repository suitable for its disposal. The technology park will be a research centre, open to international cooperation, where activities in the energy, waste management and sustainable development fields can be carried out.

The opening plenary session of the National Seminar, during which the technical aspects of the CNAPI and of the national repository project will be discussed in depth, was opened by Vannia Gava, Undersecretary of State at the Ministry of Ecological Transition and by Sogin CEO Emanuele Fontani. The session ended with a live response to 14 questions collected on the subject during the meeting.

Gava said...the location of the national repository will arise only from a wide participatory procedure, which includes the concerted evaluation of every radiological, territorial and environmental element, useful for optimally selecting the site." ...The National Seminar will consist of nine meetings, broadcast online. In addition to the opening and closing plenary sessions, seven

sessions are scheduled, a national one and six dedicated to the potentially suitable areas belonging to the regions involved: Piedmont, Tuscany, Lazio, Puglia, Basilicata, Sardinia and Sicily. The National Seminar will end on 15 December with the publication of the overall report of the sessions, which will end on 24 November.

After the publication of the documents, a second phase of the public consultation will start, lasting 30 days, during which further observations and technical proposals, in view of the preparation and publication of CNAPI, may be sent. At the end of this phase, the regions and local authorities may express their non-binding statements of interest to further investigate the subject.

Italy's radioactive waste is currently stored in about 20 temporary sites, which are not suitable for final disposal. In addition to

waste generated through the operation and decommissioning of its fuel cycle facilities and nuclear power plants, it includes radioactive wastes from medical, industrial and research activities.

Source: World Nuclear News, 08 September 2021.

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Composed by: CAPS

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