



**OPINION – Manpreet Sethi**

**Vol 16, No. 07, 01 FEB 2022**

**Unchecked and Unaffected: North Korea’s Nuclear Capability Marches On**

The first month of 2022 is not yet over and North Korea has already conducted four missile test launches of varying ranges and capabilities. The fireworks appear to have started quite early this year. By contrast, in 2021, Pyongyang’s missile testing had begun only in March, presumably to allow time for President Biden to settle into the White House.

The recent tests re-tested technologies first demonstrated last year. Two of these were hypersonic missiles and the other two were short-range rail-based tactical guided missiles; the launches reportedly tested their response time and alert posture. Interestingly, the conduct of the hypersonic missile, especially its flight control, was graphically described by the state-owned Korean Central News Agency (KCNA): “The missile made a 120 kilometres lateral movement in the flight distance of the hypersonic gliding warhead from the initial launch azimuth to the target azimuth and precisely hit a set target 700 kilometres away.” In addition, the missile demonstrated an ability to combine “multi-step glide jump flight and strong lateral manoeuvring.” North Korea’s first hypersonic boost-glide vehicle, Hwasong-8, flew only 200 km at an altitude of 60 km in its September 2021 test.

**The fireworks appear to have started quite early this year. By contrast, in 2021, Pyongyang’s missile testing had begun only in March, presumably to allow time for President Biden to settle into the White House.**

**CONTENTS**

- ☞ **OPINION**
- ☞ **NUCLEAR STRATEGY**
- ☞ **BALLISTIC MISSILE DEFENCE**
- ☞ **EMERGING TECHNOLOGIES AND DETERRENCE**
- ☞ **NUCLEAR ENERGY**
- ☞ **URANIUM PRODUCTION**
- ☞ **NUCLEAR PROLIFERATION**
- ☞ **NUCLEAR NON-PROLIFERATION**
- ☞ **NUCLEAR SAFETY**
- ☞ **NUCLEAR WASTE MANAGEMENT**

New technological advances are evidently being made.

The types of missiles being tested by North Korea indicate several things. These hypersonic capabilities are intended to sow doubt in the US and its East Asian allies about the efficacy of the deployed THAAD missile defence systems. Speed and manoeuvring ability are being acquired to evade interception. Rail-based launches are meant to demonstrate new dimensions of mobility, and hence increasing the survivability of the arsenal. Taken together, the two technologies signal that the US can’t be confident either about conducting a disarming first strike or the ability of missile

defences to assure complete security. In both cases, North Korea seems to be playing well by the deterrence playbook.

Meanwhile, the US continues to look at North Korea's nuclear capabilities as a proliferation problem that it must roll-back and eliminate to denuclearise the country—and till that happens, it must defend against the threat. US responses are, therefore, of two types. One, continue to impose economic sanctions to check Pyongyang's spending on military advancements. And two, seek technological solutions through the deployment of a mix of advanced offensive and defensive systems to protect the region and US mainland.

Unfortunately, neither of these responses has brought or will bring greater security to the region. Sanctions have proved to be of little consequence, especially when there is an escape valve as big as China that allows the pressure to be let off. Missile defences, too, will become porous over time as North Korea's hypersonic delivery systems become more sophisticated. So it is that despite facing the harshest sanctions for decades now, North Korea's stance has only hardened, not least because of a growing confidence in its capability. In fact, every day, week, month, and year lost in not being able to engage North Korea on its nuclear capability allows it to continue testing, perfecting, and mastering new technologies. On 19

January, Kim Jong-un presided over a Politburo meeting that hinted at developing "without delay more powerful physical means to definitely overpower the daily intensifying hostile moves of

the United States." This is an obvious reference to re-starting some of the longer-range missile tests that were suspended during the summit diplomacy of 2018-19.

By now it should be clear to anyone who has been studying the North Korean nuclear problem that the only way to resolve this issue is to first arrest capability growth by negotiating a freeze on the nuclear and missile programmes. To do so, Washington will have to make this a priority, build consensus among the allies, and invite Pyongyang to the table with a clear strategy in mind. Now may be a good time to do this for at least two reasons. One, North Korea has travelled a fair distance towards building nuclear deterrence and can afford to halt this development with some sense of confidence. Two, its economy is in dire straits owing to the pandemic and climatic disasters.

It is worth noting that in his address to the party plenum in December 2021, Kim stressed a push towards economic development. He indicated a keen desire to develop and modernise the country's agricultural and food production practices. This may offer a starting point to launch interactions with the kingdom. Pyongyang may be ripe for negotiations on a phased lifting of economic sanctions and help on the COVID-19 front in exchange for suspension of nuclear and missile activities, including missile testing and fissile material build-up. These incentives must be clearly communicated to North Korean citizens, perhaps through South Korea's help. Once the masses are given hope of a life that is different from the one

**So it is that despite facing the harshest sanctions for decades now, North Korea's stance has only hardened, not least because of a growing confidence in its capability. In fact, every day, week, month, and year lost in not being able to engage North Korea on its nuclear capability allows it to continue testing, perfecting, and mastering new technologies.**

**Pyongyang may be ripe for negotiations on a phased lifting of economic sanctions and help on the COVID-19 front in exchange for suspension of nuclear and missile activities, including missile testing and fissile material build-up. These incentives must be clearly communicated to North Korean citizens, perhaps through South Korea's help.**

they seem to be living today, things could slowly change.

Undoubtedly, it is going to be a long haul to resolve the North Korean nuclear issue. But the more it is allowed to carry on unchecked down the road of nuclear capability, the more difficult it will be to get it to pedal back. It is imperative that the country be gradually pulled into some kind of international nuclear verification system since its proliferation history, and that of its friends and allies, is replete with leakages. As its economic miseries grow and temptations of nuclear lucre rise, any nuclear material and technology pilferage or leakage from Pyongyang to other state or non-state actors would have severe consequences for regional and global security.

Source: [http://www.ipcs.org/comm\\_select.php?articleNo=5804](http://www.ipcs.org/comm_select.php?articleNo=5804), 26 January 2022.

**OPINION – Manpreet Sethi**

**PacNet #5 AUKUS' Opportunities and Risks for India**

While China's economic rise had been a reality for over a decade, its belligerence and assertive behavior has become prominent only in recent years. For India, China's aggressive tendencies, evident since 2017, came into sharper focus with the border clashes in Galwan valley in June 2020. In India's view, China planned serial incursions into disputed territory, taking advantage of New Delhi's (and the rest of the world's) preoccupation with the pandemic and its socio-economic fallout.

The bloody clashes in the Himalayas brought India face to face with China's new reality. The hope that carefully curated high-level political engagements, steadily growing economic trade, or even boundary agreements that maintained peace at the disputed borders since the 1990s

could sustain a cooperative bilateral relationship quickly evaporated. A heightened threat perception of China today influences India's security strategy.

It is not surprising, therefore, that AUKUS, the trilateral security arrangement between Australia, the United Kingdom, and the United States is perceived through this prism. While the three allies have not mentioned China explicitly in the context of the new pact, concerns about China clearly motivated their taking of their relationship to a new level. AUKUS envisages sharing of information and knowhow in technologies like artificial intelligence, long-

**AUKUS envisages sharing of information and knowhow in technologies like artificial intelligence, long-range strike capabilities, and transfer of technology to Australia to build and operate eight nuclear-powered submarines (SSNs). Transfer of SSN technologies is typically avoided, even among allies, due to its proliferation risks. Even the Russia-India deal in this regard was for lease of an SSN, not transfer of its technology. AUKUS, therefore, is unique.**

range strike capabilities, and transfer of technology to Australia to build and operate eight nuclear-powered submarines (SSNs). Transfer of SSN technologies is typically avoided, even among allies, due to its proliferation risks. Even the Russia-India deal in this regard was for lease of an SSN, not transfer of its technology. AUKUS, therefore, is unique.

At first, the Indian government offered no comment on AUKUS when it was announced in September 2021. It was not until a week later, before the visit of the Indian prime minister to the United States for the first in-person summit meeting of the Quadrilateral Security Dialogue ("Quad"), that Foreign Secretary Harsh Vardhan Shringla mentioned it at a press conference. When asked if it would cast a shadow over the Quad summit, Shringla said, "From our perspective, [AUKUS] has neither relevance to Quad, nor will it have any impact on its functioning." In truth, the implications of AUKUS have both positive and negative dimensions for India.

**Positives:** From an Indian perspective, there are two positives. First, AUKUS targets China's expansionist tendencies and aggressive behaviour.

Anything that distracts China and complicates its security offers the potential to ease pressure on India. By equipping a Quad member with nuclear-powered submarines that have the advantages of greater stealth, endurance, and carrying capacity, AUKUS will strengthen overall military power projection in the Indo-Pacific. Therefore, in India's view, AUKUS will not diminish the role of the Quad; it will enhance deterrence.

Second is the precedent it sets on the transfer of naval nuclear propulsion technology. The Indian Navy is interested in designing and building modern SSNs. Upon a recommendation by the Indian Navy, a decision to this effect was made by the cabinet committee of security in March 2021, which amended the 30-year submarine-building plan to replace the construction of conventional attack vessels with SSNs. A foreign original equipment manufacturer for this project is yet to be identified. India's traditional partner for SSN lease has been Russia. A third deal to lease another Akula class SSN from 2025 onwards was signed in 2019. US sanctions could complicate future Russia-India cooperation in this area, however.

France could be a natural alternative. Paris is furious at being cut out of the submarine deal with Australia and may not be averse to sharing nuclear submarine technology with India. The Indian Navy is already working with the French DCNS (Naval Group) for its P-75 Scorpene class of submarines, the last of which is being completed. A new deal with the French for SSNs would then build upon the existing partnership. Interestingly enough, the

same French company is also constructing SSNs for Paris.

While help on naval nuclear propulsion could supplement India's indigenous efforts substantively, it is unclear whether any bilateral arrangement between France and India will emerge. Given the tradition of long-winding debates in the two democracies and the long-time

need to reach decision points on military procurements in India, there is no certainty that India and France will use the precedent set by AUKUS.

**Negatives:** One negative aspect of AUKUS for India would be the use of this precedent by others, especially adversaries. The United States has described the tripartite deal as a "one-off special arrangement" for an ally with a good non-proliferation record (and implicitly directed against a common adversary). But that the common adversary, China, could make similar exceptions.

Beijing, which has strongly criticised AUKUS, may attempt to get back at the United States by making a similar offer to Pakistan. Given China's desire for parity with the United States as a global rule-maker, Beijing could use AUKUS as an opportunity to establish its own credentials as a great

power. The defense relationship between the "iron brothers" China and Pakistan goes as far back as the 1980s; ties have only grown stronger since. Pakistan would be thrilled to equip its naval Strategic Forces Command with SSNs. As a matter of fact, Pakistan's National Institute of Maritime Affairs, a think tank conducting research on maritime issues, has already suggested that

**The Indian Navy is interested in designing and building modern SSNs. Upon a recommendation by the Indian Navy, a decision to this effect was made by the cabinet committee of security in March 2021, which amended the 30-year submarine-building plan to replace the construction of conventional attack vessels with SSNs. A foreign original equipment manufacturer for this project is yet to be identified.**

**While help on naval nuclear propulsion could supplement India's indigenous efforts substantively, it is unclear whether any bilateral arrangement between France and India will emerge. Given the tradition of long-winding debates in the two democracies and the long-time need to reach decision points on military procurements in India, there is no certainty that India and France will use the precedent set by AUKUS.**



Islamabad should take advantage of AUKUS and use it as a pretext to build nuclear submarines with the help of its allies.

North Korea and Iran could also be potential Chinese customers. The irony would be that while AUKUS countries iron out the procedures of technology transfer, including safeguards arrangements with the International Atomic Energy Agency, China would settle for less cumbersome transfer agreements, even if its clients have poor nonproliferation records. Proliferation dangers, therefore, could increase in India's neighborhood.

The second negative dimension of AUKUS, from India's perspective, relates to its timeframe. The three countries will likely work out the details of the arrangement over the next 18 months. It will then take up to a decade or more for the first vessels to become operational, even though the threat from China is here and now. Therefore, there will be no real instantaneous dividends for India, except for some distractions and disturbances that the announcement of the deal has already caused China. Of course, China will likely respond by strengthening its own naval capabilities and presence in the region, in addition to using the precedent to its own advantage.

AUKUS has been crafted, primarily by Washington, to address its looming security concern vis-à-vis China. The intent is to strengthen the deterrent capability of allies. But the arrangement may open the possibility of new security dilemmas in the long term, including for India. New Delhi, however, should not hope for immediate help in addressing its China threat. It must continue to build its capability to keep both its flanks covered, in the Himalayas and at sea.

Source: <https://pacforum.org/publication/pacnet-5- aukus-opportunities-and-risks-for-india>, 22 January 2022.

**OPINION – G. Parthasarathy**

**India's N-Project Going Strong**

An important feature of India's nuclear deterrent has been the calibrated secrecy surrounding its growth. This is essential, as India's nuclear weapons and missile programmes have a large involvement of dedicated scientists and engineers from the DRDO, the DAE, academic institutions, and commercial organisations from the public and private sectors. India's nuclear weapons programme is under continuing worldwide scrutiny, including by specialist organisations like

the Federation of American Scientists and similar organisations in the UK, France, Russia, and doubtless, China and Pakistan.

While Indian scientists have made discreet statements about our ballistic missile tests, one finds more details of our nuclear weapons and ballistic missiles in studies by American scientific publications like the Bulletin of Atomic Scientists and other organisations like the MacArthur Foundation. Such studies are carefully researched and counterchecked. These are not significantly different from what one periodically finds in writings in India.

According to the Bulletin of Atomic Scientists, India has enough weapons grade plutonium to produce 150 to 200 nuclear weapons, with a current estimated stockpile of 150 nuclear weapons. There is potential to step up production of fissile material significantly through the growing numbers of fast breeder and other plutonium reactors. According to the

**North Korea and Iran could also be potential Chinese customers. The irony would be that while AUKUS countries iron out the procedures of technology transfer, including safeguards arrangements with the International Atomic Energy Agency, China would settle for less cumbersome transfer agreements, even if its clients have poor nonproliferation records.**

**AUKUS has been crafted, primarily by Washington, to address its looming security concern vis-à-vis China. The intent is to strengthen the deterrent capability of allies. But the arrangement may open the possibility of new security dilemmas in the long term, including for India.**

infamous Dr AQ Khan, Pakistan provided China with the centrifuge technology for enriched uranium, whose details he had purloined in Europe in the 1970s and 1980s. China, in turn, provided Pakistan the knowhow to utilise enriched uranium produced in Pakistan for nuclear weapons. The then US President Jimmy Carter looked the other way at these developments after he was swept off his feet by his 'friendship' with Chinese leader Deng Xiaoping.

China now possesses 350 nuclear warheads, while Pakistan has 165, and India 156, according to the latest assessment of SIPRI. Apart from its land-based nuclear missiles, India launched its third nuclear submarine barely a month ago. It is said to have a capability to launch eight ballistic missiles. The two earlier submarines can reportedly launch four missiles each. India now has the capability of 'canisterising', or storing the missiles in a sealed, climate-controlled tube to protect them during transportation. This would apply to the entire range of missiles, including the recently tested Agni-P and the Agni-V, which has a range of 5,500 km. Many studies allude to an important role of the French-built Mirage 2000 and Rafale, as carriers of India's nuclear weapons.

China has provided Pakistan with the designs for its nuclear weapons and a wide range of missiles. The missiles provided by China to Pakistan extend from the short range (320 km) Ghaznavi missiles to Shaheen 2 (2,500 km) and Shaheen 3 (2,750 km). The Chinese nuclear weapons designs given to Pakistan were transferred by AQ Khan to Islamic countries with nuclear ambitions, like Libya and Iraq. While India now has produced three nuclear-powered submarines, there are reports that a fourth submarine could be inducted next year. There are also reports that India is developing the

technology for multiple warheads on its missiles. A recent report by the Federation of American Scientists noted that India carried out the second test of its Agni-P missile. The first test of the missile was reportedly carried out in January 2020. This could lead to the missile being berthed in the growing fleet of India's nuclear submarines. This would be complemented by submarine-launched Agni-V missiles with multiple warheads.

China will inevitably continue to pretend it has no interest in having any nuclear dialogue with India. India is, in the meantime, also developing a K-4 submarine-launched missile, with a 3,500-km range. It is a naval version of Agni-3, an IRBM. The K-4 has undergone a number of tests but it has yet to be deployed. The missile was tested in January 2020. Though the DRDO did not

confirm the test, media reports, quoting officials, claimed that the launch was successful. While Pakistan has not formally enunciated a nuclear doctrine, the long-time head of the Strategic Planning Division of its Nuclear Command Authority, Lt Gen Khalid Kidwai, told a team of physicists from Italy's Landau Network in 2002 that Pakistan's nuclear weapons were 'aimed solely at India'. Kidwai added that Pakistan would use nuclear weapons if India conquers a large part of Pakistan's territory, or destroys a large part of Pakistan's land and air forces, or if India tries to 'economically strangle' Pakistan, or pushes it to political destabilisation.

This elucidation, by the man who has been the de facto custodian of Pakistan's nuclear arsenal for over a decade and a POW in India in 1971-73, was a precise formulation of Pakistan's nuclear thresholds. It is now clear that a bankrupt Pakistan

**According to the infamous Dr AQ Khan, Pakistan provided China with the centrifuge technology for enriched uranium, whose details he had purloined in Europe in the 1970s and 1980s. China, in turn, provided Pakistan the knowhow to utilise enriched uranium produced in Pakistan for nuclear weapons.**

**While Pakistan has not formally enunciated a nuclear doctrine, the long-time head of the Strategic Planning Division of its Nuclear Command Authority, Lt Gen Khalid Kidwai, told a team of physicists from Italy's Landau Network in 2002 that Pakistan's nuclear weapons were 'aimed solely at India.'**

facing pressure from international finance organisations will have to think carefully before resorting to support for terrorists seeking to destabilise India. With the Taliban supporting Pashtun aspirations on issues like the Durand Line, India's readiness to provide essential economic assistance to Kabul should be taken forward. Defence Minister Rajnath Singh recently noted that while India presently stood by its commitment of 'no first use' of nuclear weapons, 'what happens in future depends on the circumstances'.

**With the Taliban supporting Pashtun aspirations on issues like the Durand Line, India's readiness to provide essential economic assistance to Kabul should be taken forward. Defence Minister Rajnath Singh recently noted that while India presently stood by its commitment of 'no first use' of nuclear weapons, 'what happens in future depends on the circumstances.'**

The nation needs to always remember the contribution of Dr APJ Abdul Kalam, his team of engineers and scientists, and the distinguished scientists in the Department of Atomic Energy for developing the country's nuclear and missile potential to meet the challenges to national security, posed jointly by China and Pakistan. There is also need to remember those in the private sector, who discreetly played a key role in this effort.

**Notwithstanding this encouraging trend, the role and share of coal in India's power generation capacity continues to be substantial and even growing, negating the renewable push and hindering the efforts towards achieving the 'zero emission goal.'**

Source: <https://www.tribuneindia.com/news/comment/indias-n-project-going-strong-362708>, 20 January 2022.

**OPINION – Sitakanta Mishra**

**Weaning India Off its Coal Dependency: Nuclear Energy Just Might be the Solution**

During the last few years, India is aggressively making efforts to increase renewable energy production, with an investment of more than \$42 billion. The efforts have surely shown results as India has crossed 100 GW power generation capacity through green sources. An additional 50 GW is under installation and 27 GW is under

tendering. Notwithstanding this encouraging trend, the role and share of coal in India's power generation capacity continues to be substantial and even growing, negating the renewable push and hindering the efforts towards achieving the 'zero emission goal'. According to the Ministry of Coal, India's total coal production increased by 6.74 % to 74.78 million tonnes (MT) during December 2021 as compared to the same period in 2019; also, coal-based power generation registered a growth of 11.84 % in the month of December

2021. This indicates India's crippling dependence on coal and the necessity for serious introspection.

With the increasing demand for energy from industrial and commercial sectors, and pressure of meeting climate change obligations, India is making big push towards green energy. While this push is vital in making the country's energy-mix sustainable, the challenge of weaning India off its coal dependency remains a strong impediment. More than 70 per cent of India's

power production is sourced from coal, which is quickly depleting. In this carbon-constraint world, it has become vital to shift to sustainable energy resource that can keep up with rising needs while reducing CO2 emissions. Given the seriousness of the challenge, India urgently needs to garner the most viable alternative source of energy available to reduce dependency on coal, i.e., nuclear energy.

Contrary to common perception, nuclear energy is one of the most sustainable forms of energy owing to its baseload potential and environment friendliness, compared to other energy sources. On a life-cycle basis, nuclear power emits approximately 12g CO2 equivalent/kWh, which is significantly lower as compared to coal, which

emits 950g CO2 equivalent/kWh. Unlike solar and wind energy, nuclear energy is available round the clock regardless of the weather conditions.

Furthermore, nuclear energy is advantageous when compared with other renewables like wind or solar which are intermittent in nature and cannot meet heavy industries' energy demand. With the advancement in nuclear power technology, remote regions cut-off from grid, in a short time span, can host a cost-effective SMR such as the ones developed by Russian state nuclear energy company, Rosatom.

Comparatively, nuclear plants are more economical and financially feasible to implement vis-a-vis other traditional sources of power projects. Because of the optimized processes, the cost of energy production, which includes the cost of maintenance, production, and waste disposal, is significantly lower than fossil fuel-based energy sources of scale. While the investment cost of nuclear energy might be higher than coal power plants, the maintenance costs are substantially lower over the long term. In addition, nuclear energy is not subject to market fluctuations, unlike all other sources. The latest tariff rate for nuclear energy produced by NPCIL operating nuclear plants ranges from Rs. 2.41 to 4.09 per kWh (average Rs. 3.47 per unit) which is comparable with Thermal power (Rs.3.25/kWhr), but lesser than Solar power that costs Rs. 4.04–Rs. 4.30k/kWhr.

While renewable energy push will certainly help in reducing emissions and meet the short-term targets, for India to achieve the zero-emission goal without compromising the production capacity, nuclear might just be the best bet against coal. India, therefore, stands at a historic

moment to make an epoch changing decision.

*Source: <http://www.businessworld.in/article/Weaning-India-Off-Its-Coal-Dependency-Nuclear-Energy-Just-Might-Be-the-Solution/20-01-2022-418359/>, 20 January 2022.*

**OPINION – William J Perry, Philip W. Yun**

**What Failed U.S.-North Korea Nuclear Talks can Teach us about Negotiating with Iran**

The nuclear talks between the U.S. and Iran are a rare second chance to use negotiations to make sure Iran does not get a nuclear device. As government officials, we participated in high-level nuclear talks with North Korea more than 20 years ago. Based on those discussions, we believe now is the best — and likely only — opportunity to accomplish this task peacefully because Iran still does not have a nuclear weapon.

The alternative? Iran becomes a nuclear weapons state like North Korea, and we risk catastrophic conflict in the Middle East to stop it. If you think a nuclear North Korea is a problem, Iran with the bomb will be so much worse. Recent events have proved how important nuclear talks are. North Korea launched its second ballistic missile Tuesday — its second such test in a week — as the country pursues the development of hypersonic missiles amid stalled nuclear talks. Meanwhile, officials close to the talks with Iran warned late last month that the window to negotiate a return to the 2015 Iran nuclear deal is nearly shut. In five essential respects Iran and North Korea are eerily similar. It has nothing to do with their respective cultures and histories. It has everything to do with organizational behavior, the difficulty of building a viable nuclear weapon — and politics.

**Furthermore, nuclear energy is advantageous when compared with other renewables like wind or solar which are intermittent in nature and cannot meet heavy industries' energy demand. With the advancement in nuclear power technology, remote regions cut-off from grid, in a short time span, can host a cost-effective.**

**While renewable energy push will certainly help in reducing emissions and meet the short-term targets, for India to achieve the zero-emission goal without compromising the production capacity, nuclear might just be the best bet against coal. India, therefore, stands at a historic moment to make an epoch changing decision.**



First, Iran in 2021 is like North Korea more than two decades before. Iran does not yet have a nuclear weapons capability and does not know when it will. In addition, Iran is concerned about preemptive attacks from enemies, just as North Korea was. Developing a nuclear weapon costs time and money. From a negotiating standpoint, it is so much easier to get a country to agree to give up the possibility of nuclear weapons in exchange for something concrete, such as sanctions relief and security assurances. But once Iran has a nuclear device, it becomes more difficult, if not impossible, to get them to give it up. This is a fundamental insight that many did not fully recognize with respect to North Korea long ago.

Second, the perfect often becomes the enemy of the good. The previous Iran nuclear deal could have been stronger — and a new deal may yet still be. But holding out for a better deal, even for legitimate policy reasons, can be a never-ending spiral and therefore has limited value in high-stakes negotiations. No side gets everything it wants. That is usually the case when the U.S. enters into nuclear-related agreements.

Robert Gallucci, the chief American negotiator with North Korea in 1994, said that critics were unhappy with the deal he brought back to the U.S. because we gave too much and got too little. However, no one had a better alternative to stop the North's nuclear program.

The germane questions now are: Will we get enough from Iran? And will an agreement give us time to come to a more durable solution?

Third, Iran's leadership is not a monolith. Complicated international talks are not only negotiations between governments, but also debates between power centers domestically —

typically those who favor opening up and engaging versus those who wish to stay closed and confront. It took time to understand this when the U.S. was engaged in nuclear-related talks with North Korea

from 1998 to 2001. Kim Jong Il, then the country's leader, had to cater to key constituencies, which limited his flexibility. Practically, this meant delays, contradictory statements and unexpected behaviors. We need to anticipate more of these same elements from Iran. Failure to do so may

cause us to jump to wrong conclusions.

Fourth, the U.S. withdrawal from the Iran deal in 2018 empowered Iran hardliners, who argue that negotiations with the U.S. are a waste of time and that Iran — by remaining engaged in talks — loses critical defense development opportunities. This also happened in North Korea. When the U.S. reversed policy in 2001, and the 1994 nuclear deal subsequently fell apart, we believe the hardliners think they were proved right: North Korea had given up eight years' worth of weapons-grade plutonium production in exchange for just a few million metric tons of heavy fuel oil.

Finally, no one really knows what Iran's long-term strategic objective is with respect to nuclear weapons. Are its leaders serious about negotiation, or are the talks a ploy? Debating Iranian intent — as was endlessly done and still is about Kim Jong Un, his father and grandfather — is a cottage industry. Speculating is not worth the time. Finding out their objective is.

Our greatest regret about North Korea is that we remain convinced, even in hindsight, that the early 2000s provided the best opportunity to secure an agreement because the country did not yet have

**The previous Iran nuclear deal could have been stronger — and a new deal may yet still be. But holding out for a better deal, even for legitimate policy reasons, can be a never-ending spiral and therefore has limited value in high-stakes negotiations. No side gets everything it wants. That is usually the case when the U.S. enters into nuclear-related agreements.**

**The U.S. withdrawal from the Iran deal in 2018 empowered Iran hardliners, who argue that negotiations with the U.S. are a waste of time and that Iran — by remaining engaged in talks — loses critical defense development opportunities. This also happened in North Korea.**

a nuclear weapon. Our task was to find out what North Korea really wanted, how much we would have to give up and whether we could pay that price. We still don't know today.

North Korea has conducted six nuclear tests since 2006 and developed more sophisticated ballistic missiles — some capable, theoretically, of hitting the continental U.S. Our nuclear policy with North Korea has failed. This need not be the case with Iran. We must learn from past mistakes. With careful benchmarks and monitoring as part of a new Iran nuclear deal, the U.S. and its partners can truly test Iranian intent. But if we succumb to speculation and ideological politics, it may push Iran toward becoming a nuclear weapons state — or potentially set the stage for a deadly conflict to prevent it.

**North Korea has conducted six nuclear tests since 2006 and developed more sophisticated ballistic missiles — some capable, theoretically, of hitting the continental U.S. Our nuclear policy with North Korea has failed. This need not be the case with Iran.**

Source: <https://www.latimes.com/opinion/story/2022-01-12/north-korea-iran-nuclear-deal-talks-negotiations>, 12 January 2022.

**OPINION – Frank Kane**

**Nuclear Power could be Key to Climate Change Challenge**

The world has had an uncomfortable relationship with nuclear power from the very beginning, when early work on nuclear fission became part of the US-led effort to build the first atomic weapons, subsequently used against Japan in 1945. The peaceful civilian nuclear industry — through which the world could generate all the energy it needed by using the power of the atom — could never quite shake off those sinister origins.

Since then, accidents in places like Three Mile Island in the US, Chernobyl in Ukraine and Fukushima in Japan seemed only to reinforce the

belief that, while the potential for limitless energy was there, the danger of it all going tragically wrong was too high. In the Middle East, the peaceful use of nuclear power got wrapped up in the expansionist ambitions of the Iranian regime, which seems hell-bent on developing its own nuclear weapon in the face of international opposition. But now, under pressure from the race against climate change and new technological advances in the nuclear sector, sentiment is perceptibly changing. Some countries — like France, Russia and China — never gave up the peaceful pursuit of nuclear power; others, like the

US and Japan, are wondering whether to slow down the phase-out of atomic plants, or even to begin building the next generation, especially as parts of the world face an energy crisis.

In the Middle East, the situation was clouded by the fact that oil-producing countries were sitting on an abundance of hydrocarbon reserves and did not seem to need the nuclear option.

But economic and environmental arguments are now winning the day. The UAE was an early adopter of a peaceful nuclear power generation program and its Barakah plant is already generating electricity as part of a plan that will see 85 percent of the country's clean electricity coming from the plant by 2025, according to the CEO of the Emirates Nuclear Energy Corporation.

**Some countries — like France, Russia and China — never gave up the peaceful pursuit of nuclear power; others, like the US and Japan, are wondering whether to slow down the phase-out of atomic plants, or even to begin building the next generation, especially as parts of the world face an energy crisis.**

Saudi Arabia, the world's largest oil exporter, was also an early enthusiast for nuclear power. The King Abdullah City for Atomic and Renewable Energy was set up in 2010 to oversee a program that envisaged two big nuclear power plants as part of the Kingdom's broader renewables strategy. That was given a boost by the Vision

2030 strategy for diversification, which put renewables at the heart of national policymaking, and received a further stimulus last year, when the Saudi Green Initiative was launched.

The Kingdom's thinking on nuclear power has crystalized just as many energy experts are won over to its potential to satisfy future energy needs. Jason Bordoff, dean of the Climate School at New York's Columbia University, said this month: "There is growing recognition that the pathway to net-zero emissions will be faster, easier and cheaper if nuclear energy is part of the mix of options."

The International Energy Agency, noting that nuclear power currently comprises about 10 percent of global electricity generation, said it has "historically been one of the largest global contributors of carbon-free electricity." The message is: If the net-zero targets are to be met, at least some of the global energy mix will have to come from nuclear, which is the ultimate net-zero fuel source. There will be public objections to overcome, with that history of tragic accidents leaving a deep footprint. But the technology behind the building and operation of nuclear power plants has advanced dramatically, reducing costs, waste and safety concerns.

Microsoft founder and philanthropist Bill Gates, for example, is working on high-tech nuclear plans via his TerraPower organization to "produce a more affordable, secure and environmentally friendly form of energy." Furthermore, modern nuclear reactors are increasingly different from the archetypal domed monstrosities seen in the movies. Small modular reactors can be mass-produced in parts and assembled on site in a kind

of IKEA-style version of the nuclear process.

While Saudi Arabia has yet to launch a definitive program to build nuclear reactors, all the signs are that such a plan is on the runway ready for imminent takeoff. Prince Abdulaziz bin Salman, the energy minister, recently highlighted the precious reserves of uranium — a key resource in the nuclear process — the Kingdom enjoys and also noted the potential for "pink" hydrogen, which is generated by nuclear energy. With the climate change clock ticking, nuclear power's time is

**The International Energy Agency, noting that nuclear power currently comprises about 10 percent of global electricity generation, said it has "historically been one of the largest global contributors of carbon-free electricity."**

coming.

Source: <https://www.arabnews.com/node/2013421>, 27 January 2022.

**OPINION – Isabeau van Halm**

**The Netherlands Opens the Door to New Nuclear with €5bn**

On 15 December 2021, four Dutch parties reached a coalition agreement after months of negotiations. The formation of the new government took 299 days, a record in Dutch history. One of the new government's main aims is to tackle climate change: "To be climate neutral in 2050, the Netherlands will tighten the target for 2030 in the Climate Act to at least 55 per cent CO2 reduction." In the Climate Act of 2019, this figure was 49%. After that, the Netherlands aims for a reduction of 70% by 2035 and 80% by 2040.

**The International Energy Agency, noting that nuclear power currently comprises about 10 percent of global electricity generation, said it has "historically been one of the largest global contributors of carbon-free electricity."**

To meet these ambitious goals, the country needs to change course. The Netherlands lags other EU countries on net-zero actions such as renewable energy generation. Under EU law, 14% of final energy consumption in the Netherlands had to be renewable in 2020 but the country only managed 11%. To meet the EU target, the government had

to make an agreement with Denmark for a statistical transfer of renewable energy.

In the coalition agreement, the new government says it wants the Netherlands to be a frontrunner in Europe when it comes to combatting global warming. It announced a ten-year €35bn climate fund, in addition to an existing subsidy scheme for sustainable energy. The country's first-ever climate and energy minister will oversee the new fund. A CO2 road pricing system will be introduced in 2030 and "energy networks will be made future-proof". The government also wants to make "binding customized agreements" with the ten to 20 biggest greenhouse gas emitters in the country.

"It is definitely an improvement compared with the last coalition deal," says Heleen de Coninck, professor in socio-technical innovation and climate change at the Eindhoven University of Technology. De Coninck is an author of the IPCC Sixth Assessment Report that will be published later this year. "The new government has more ambition and that is very necessary, as the Netherlands is currently not in line with EU goals and other climate targets," she adds.

One of the most remarkable measures is the ambition to construct two new nuclear power plants. "Nuclear energy could supplement solar, wind and geothermal energy in the energy mix and can be used for the production of hydrogen," the Dutch government writes in the coalition agreement. "It will make us less dependent on gas imports." While the Netherlands was known as a large gas supplier, in recent years its reliance on imports has grown due to extraction cuts at the Groningen gas field. Since 2018, the Netherlands has become

a net importer of gas.

***The Netherlands' Limited Experience with Nuclear:*** Currently, the Netherlands has one nuclear power plant in operation. The plant in

Borssele has been playing a small but steady part in Dutch energy generation over the years, with a total capacity of 482MW in 2021, according to data from GlobalData, Energy Monitor's parent company.

That equates to just 1% of the total installed electricity generation capacity in the Netherlands, the lowest among European countries that produce nuclear power. Yet the new cabinet has pledged to take the necessary steps for the construction of two new nuclear power plants. It has committed €5bn to this and will facilitate market parties in their explorations.

In addition to the two new plants, the Borssele plant will stay open longer.

Borssele was due for decommissioning in 2033 and has been in use since 1973. Its decommissioning has been delayed before; in 2006, the government decided it would stay open until 2033 instead of 2013. Borssele is already one of the oldest operational nuclear plants in Europe. The plant had an intended lifespan of 40 years, but under current plans it will be operational for 70–80 years. If a nuclear plant has consistently invested in

maintenance and improvements, this should not be a problem, says Jan Leen Kloosterman, a professor in nuclear reactor physics at Delft University of Technology (TU Delft). "A lot of nuclear plants are still in good condition after those initial 40 years, including the one at Borssele," he says. "The government set the benchmark that Borssele has to stay in the top

**While the Netherlands was known as a large gas supplier, in recent years its reliance on imports has grown due to extraction cuts at the Groningen gas field. Since 2018, the Netherlands has become a net importer of gas.**

**France, Europe's primary nuclear proponent, plans to invest €1bn in small modular reactors. No decision on big new nuclear plants has been made; likely that will wait until after the elections. Meanwhile, Belgium and Germany are headed for nuclear exits. Germany is planning to close the last of its nuclear plants by the end of 2022 and Belgium by the end of 2025. Across the Channel, the UK has announced £1.7bn in funding for a new large-scale nuclear power plant, likely Sizewell C, to be built by EDF as a successor to its Hinkley Point C project.**



25% of safest plants. So far, it has been able to keep achieving that."

*EU Taxonomy – a positive Dutch signal?* The Dutch decision to invest in nuclear energy comes at a time of heated debate over nuclear in the EU. The European Commission's proposal to include nuclear and gas in an EU Taxonomy for green investment has instigated fierce arguments. France, Europe's primary nuclear proponent, plans to invest €1bn in small modular reactors. No decision on big new nuclear plants has been made; likely that will wait until after the elections. Meanwhile, Belgium and Germany are headed for nuclear exits. Germany is planning to close the last of its nuclear plants by the end of 2022 and Belgium by the end of 2025. Across the Channel, the UK has announced £1.7bn in funding for a new large-scale nuclear power plant, likely Sizewell C, to be built by EDF as a successor to its Hinkley Point C project.

Brussels-based nuclear industry association Foratom thinks the Netherlands is sending a positive signal to other member states with its decision to include nuclear power in its electricity mix. "Until now, the Netherlands had not planned on developing new nuclear but rather extending the life of its existing nuclear power plant," says Jessica Johnson from Foratom. Johnson adds: "From our perspective, it is sending a positive message at EU level because it shows that a member state that was not planning on new nuclear initially has come back to its decision to be able to achieve its climate goals. We hope to see more member states following suit soon."

... That stance is not currently clear. In December 2021, the Dutch House of Representatives passed a motion that gas should not be labelled 'green'. However, in summer, the House of Representatives also voted for a motion to

include nuclear energy in the EU Taxonomy. "They find themselves in a conundrum," says Johnson. "If they want nuclear included in the Taxonomy, they have to accept gas to be so [too]." Within the Netherlands, the plans for two new nuclear plants are also stirring debate. "There are few topics that split society as much as nuclear energy," says de Coninck. "It seems you have to be either for or against it." De Coninck thinks the step towards more nuclear was not unexpected given the political situation of the country.

"I suspect it is a politically motivated compromise for the strict and ambitious emission goals," she says. "Two of the big parties in the coalition are pro-nuclear. The argument is that we need a backup for all the variable energy from wind and solar, and they say that nuclear would be the most suitable and CO2-free candidate, although various studies indicate there are other, cheaper options. Most future electricity will be generated by renewables. So the question is how often the nuclear plants would operate. Who wants to invest in a nuclear power plant that is only operational 25% of the time?"

**Two of the big parties in the coalition are pro-nuclear. The argument is that we need a backup for all the variable energy from wind and solar, and they say that nuclear would be the most suitable and CO2-free candidate, although various studies indicate there are other, cheaper options. Most future electricity will be generated by renewables. So the question is how often the nuclear plants would operate.**

In their election programmes for 2021, the liberal pro-business People's Party for Freedom and Democracy and centre-right Christian Democratic Appeal expressed a desire to invest in nuclear energy. The other two parties that now form part of the coalition, the left-of-centre liberal Democrats 66 and the conservative Christian

Union, were not against new nuclear plants if they are "sustainable and reliable".

Kloosterman argues that the Dutch choice for nuclear makes sense considering the urgency of net-zero goals. "While the two new nuclear power plants won't be able to contribute to the 2030 targets, they can contribute to those in 2050. To reach net zero in 2050 we must consider every option. It seems logical to me to give serious consideration to nuclear as part of the mix."

Kloosterman thinks it unlikely that any new nuclear technologies such as thorium-based generation will be ready in time for the two new plants. "If you want to make sure the plants contribute to 2050 goals, light-water reactors are the only option."

**Cost and Skills Challenges:** One of the biggest obstacles to building the plants will be cost, says de Coninck. She thinks the initial €5bn will likely not be enough. In Finland, the Olkiluoto 3 reactor is more than ten years behind schedule and many times over budget. France has the same issue with Flamanville 3. The completion of Hinkley Point C in the UK will cost £500m more than planned and is delayed to June 2026. Since the last nuclear power plant in the Netherlands was built more than 50 years ago, there is also a lack of knowledge and expertise in the country, argues de Coninck. "Building two entirely new nuclear plants, while not having done that in half a century, is quite a task."

Kloosterman disagrees. He says the knowledge is there, but the capacity is not. "If we want to start building nuclear power plants, we have to start training new people as soon as possible." Education on all levels would need upscaling. Some studies, expertise and research positions that have disappeared over the years would need to be brought back. "At TU Delft, we used to have a chair in nuclear reactor technology," says Kloosterman. "That professor retired around a decade ago but was never replaced. With the renewed interest in the construction of nuclear power plants, it is

necessary to start increasing the capacity in education on a national level."

This is also why Kloosterman thinks it is important to extend the lifespan of the only plant in the country. "It is important to keep that kind of experience in the Netherlands, the people who understand the operation of a power plant. That

is why I think it is a wise decision to keep Borssele operational, so you can keep that experience until the new power plants are built."

For now, the Dutch government's plans for the new nuclear plants are still in their early stages. For that reason, de Coninck warns the country should not rely too much on nuclear. "Building a power plant takes a lot of time and resources," she says. "What

if something, like public opinion, changes in the next ten or 20 years? If you opt out then, you are stuck with an unreliable electricity grid or you miss your climate targets. If the government initiates the building of new nuclear plants, they need to make sure it happens."

A report on public opinion on climate change and the energy transition from Statistics Netherlands in 2020 showed that the Dutch are divided on nuclear energy: around 25% think the Netherlands

should invest more in nuclear, 18% think less and 25% think the use of nuclear should stop altogether.

The actual realisation of new Dutch nuclear plants also depends on whether there are energy businesses interested in building and operating them. These

private sector players have yet to step forward. To convince them, the government needs to make sure there are clear agreements on the completion of the projects, says Kloosterman. "Businesses need

**France has the same issue with Flamanville 3. The completion of Hinkley Point C in the UK will cost £500m more than planned and is delayed to June 2026. Since the last nuclear power plant in the Netherlands was built more than 50 years ago, there is also a lack of knowledge and expertise in the country, argues de Coninck. "Building two entirely new nuclear plants, while not having done that in half a century, is quite a task."**

**A report on public opinion on climate change and the energy transition from Statistics Netherlands in 2020 showed that the Dutch are divided on nuclear energy: around 25% think the Netherlands should invest more in nuclear, 18% think less and 25% think the use of nuclear should stop altogether.**

that guarantee before investing in such a big project," he says. "The government could play a critical role in minimising risks by establishing that once this process is started it will be completed, and that the plant could sell the produced electricity for a cost-effective price."

Source: <https://www.energymonitor.ai/sectors/power/the-netherlands-opens-the-door-to-new-nuclear-with-e5bn>, 27 January 2022.

## **NUCLEAR STRATEGY**

### **USA**

#### **US Launches Nuclear Weapons' Use War Games Amid Soaring Tensions with Russia Over Ukraine**

Amid ongoing tensions over the Russia-Ukraine conflict and US President Joe Biden administration mulling Washington's response to the crisis, the United States Strategic Command (Stratcom) launched Global Lightning drills. While US Strategic Command controls the US nuclear armament and other measures related to their use, the Global Lightning drills are designed to test the branch's readiness to engage in nuclear warfare.

According to the Sputnik report, the war games conducted by US Strategic Command have been long-planned and are routine for the force. However, their timing is hardly the best as the latest five-day drills come at a time when the United States is repeatedly alleging the Russian invasion into Ukraine and is thinking about Washington's response if a scenario like that emerges. It is pertinent to note that the last Global Lightning drills took place in April 2021 and involved the US using nuclear weapons as deterrence in a hypothetical standoff with Russia, stated Sputnik.

However, as per the report, this year the Global Lightning forces focus on a response to potential nuclear conflict with China. The drill itself does not include nuclear weapons or nukes or any kind of

launches or bombings. But, notably, the US Strategic Command checks nuclear command and control circuits while also incorporating innovations into previous tactics, and decision-making in accordance with a nuclear war plan. The nuclear war plan was reportedly last updated in 2019. The brief information on the same was obtained only recently through a Freedom of Information Request, stated the report.

Meanwhile, the tensions between the United States, NATO and Russia have soared in recent days owing to the developments taking place near Ukraine. While the US and NATO have upheld the right of nations to join any alliance, Russia has asked the organisation to bar the

former Soviet Union nation from being a member of NATO. Moscow is seeking to halt NATO's eastward expansion into Europe. Amid the crisis, Russia was accused of ramping up its military presence near Ukraine, which according to the West, is the Kremlin's preparation to launch an invasion into the

neighbouring country.

**Russia Appears Ready to Discuss US' Reply on Security Proposals:** Meanwhile, US Under Secretary of State for Political Affairs Victoria Nuland told CBS that Washington "heard some signs that Russians are interested in engaging" with America's response to Moscow's security proposals for European security assurances. Nuland's remarks came days after US Ambassador to Russia John Sullivan handed to Russian Deputy Foreign Minister Alexander Grushko Washington's formal reply to Russia's recommendations on security assurances.

Source: Aanchal Nigam, <https://www.republicworld.com/world-news/us-news/us-launches-nuclear-weapons-use-war-games-amid-soaring-tensions-with-russia-over-ukraine-articleshow.html>, 31 January 2022.

**The drill itself does not include nuclear weapons or nukes or any kind of launches or bombings. But, notably, the US Strategic Command checks nuclear command and control circuits while also incorporating innovations into previous tactics, and decision-making in accordance with a nuclear war plan.**

**BALLISTIC MISSILE DEFENCE**

**ISRAEL**

**Israel Successfully Tests Arrow 3 Anti-Ballistic Missile System**

Israel conducted a successful test of its Arrow 3 anti-ballistic missile system outside the Earth's atmosphere, the Defense Ministry said. The trial tested a number of "breakthrough" capabilities for the missile defense system, which can be used immediately by the Israeli Air Force, the Defense Ministry's Missile Defense Organization head Moshe Patel told reporters.

"We have made a breakthrough in every part of the system, in the detection arrays, in the launches, even in the interceptors themselves, so that they match the threats that are expected in the region. There were highly, highly significant technological breakthroughs here that were assessed and can be used by the air force in its operational systems immediately" Patel said.

Boaz Levy, the president and CEO of the Israel Aerospace Industries, which manufactures the Arrow 3, said the breakthroughs were principally in the area of "algorithms," the ways in which the systems detect incoming threats and calculate launch trajectories for interceptors. I won't elaborate, but it gives the system more capabilities in dealing with threats," Levy told reporters.

The live-fire test was held over central Israel in the early hours of Tuesday morning, with two Arrow 3 interceptors being fired at the same target. "The operational radar arrays of the Arrow

system detected the target and sent the data to the fire management system, which analyzed the data and fully plotted the interception. Once the plans were completed, two Arrow 3 interceptors were fired at the target, and they completed their mission successfully," the Defense Ministry said in a statement.

Levy said the launching of two interceptors was intentional and planned in advance, not the result of one failing to shoot down the incoming simulated target. He said the two interceptors had "two different missions" in the exercise, having been given two different flight paths to shoot down the same target. "They were carried out exactly as we planned them" Levy added.

Patel added that this more closely matches what would happen in an actual barrage and is the first time that two interceptors were launched simultaneously. He refused to comment on the precise altitude at which the interceptors shot

down the target, but said it was "deep in space." The Arrow 3 is currently Israel's most advanced long-range missile defense system, meant to intercept ballistic missiles while they are still outside of the Earth's atmosphere, taking out projectiles and their nuclear, biological, chemical or conventional warheads closer to their launch sites. It was developed in a joint project between the Defense Ministry's Missile Defense Organization and the American Missile Defense Agency. Work is underway on the development of a yet more advanced system, the Arrow 4.

The head of the Defense Ministry's Weapons Development and Technology Infrastructure

**We have made a breakthrough in every part of the system, in the detection arrays, in the launches, even in the interceptors themselves, so that they match the threats that are expected in the region. There were highly, highly significant technological breakthroughs here that were assessed and can be used by the air force in its operational systems immediately.**

**Levy said the launching of two interceptors was intentional and planned in advance, not the result of one failing to shoot down the incoming simulated target. He said the two interceptors had "two different missions" in the exercise, having been given two different flight paths to shoot down the same target. "They were carried out exactly as we planned them.**



Administration, Danny Gold, described the test as “a breakthrough that represents a technological leap forward in the capabilities of the defense establishment to renew and to match the emerging threats regionally and on the future battlefield.” [The] test followed a number of recent ballistic missile tests by Iran in recent weeks. In an apparent threat to Iran, Defense Minister Benny Gantz said the Arrow test ensured Israel’s ability to take action freely. “We are preserving Israel’s ability to defend itself against developing threats in the region and allowing Israel offensive freedom of operation against its enemies, from an understanding that the best defense allows for the most effective attack,” he said.

[The] test was apparently delayed multiple times, likely due to inclement weather, with the testing area off the coast of central Israel being closed to commercial flights twice over the past week. Patel refused to comment on the reason behind these postponements, saying only that certain safety criteria had not been met. The Arrow 3 was first tested successfully in February 2018, after months of delays and technical problems. It is considered one of the most powerful weapons of its kind in the world and has been in development since 2008. Complemented by a number of other missile defense systems designed to protect Israel from short-, medium- and long-range attacks, the Arrow 3 represents the highest level of Israel’s multi-tiered missile defense network.

Source: <https://www.timesofisrael.com/israel-carries-out-test-of-arrow-anti-ballistic-missile-system/>, 18 January 2022.

**The Arrow 3 was first tested successfully in February 2018, after months of delays and technical problems. It is considered one of the most powerful weapons of its kind in the world and has been in development since 2008.**

**A multibillion-dollar missile defense system owned by the United Arab Emirates and developed by the U.S. military intercepted a ballistic missile during a deadly attack by Houthi militants in Abu Dhabi, marking the system’s first known use in a military operation, Defense News has learned.**

**UAE**

**THAAD, in First Operational Use, Destroys Midrange Ballistic Missile in Houthi Attack**

A multibillion-dollar missile defense system owned by the United Arab Emirates and developed by the U.S. military intercepted a ballistic missile during a deadly attack by Houthi militants in Abu Dhabi, marking the system’s first known use in a military operation, Defense News has learned.

The THAAD System, made by Lockheed Martin, took out the midrange ballistic missile used to attack an Emirati oil facility near Al-Dhafra Air Base, according to two sources granted anonymity because they are not authorized to speak about the UAE’s activities. The Emirati base hosts U.S. and French forces. The attack, which used cruise missiles, ballistic missiles and drones, killed three civilians and wounded six others, UAE’s ambassador to the United States, Yousef Al Otaiba, said earlier.

“Several attacks, a combination of cruise missiles, ballistic missiles and drones, targeted civilian sites in the UAE. Several were intercepted, a few of them [weren’t], and three innocent civilians unfortunately lost their lives,” Al Otaiba said at a virtual event sponsored by the Jewish Institute for National Security of America.

The Emirati Embassy in Washington did not immediately respond to a request for comment. The UAE was a key member of the Saudi-led coalition that entered Yemen’s civil war in 2015, after the Houthis had overrun Yemen’s capital of Sanaa the previous year and ousted the country’s president from power. Although the UAE has largely withdrawn forces from the conflict, it remains heavily involved in the war and supports local militias on the ground in Yemen.

U.S. Central Command confirmed “a potential inbound threat” had forced U.S. service members at Al-Dhafra into their bunkers, in a “heightened alert posture” for about 30 minutes Sunday night. Airmen were directed to keep their protective gear close for 24 hours afterwards. “Everything was professional and disciplined. The ‘all clear’ was called at 9:27 p.m. local time,” said Capt. Bill Urban, a spokesman for the command. “There was no mission impact.” Lockheed Martin declined to comment.

**The U.S. has deployed THAAD throughout the world, including to Guam, Israel, South Korea and Japan. In 2017, Saudi Arabia agreed to buy THAAD in a deal thought to be worth up to \$15 billion. The UAE was the first foreign customer for the system and trained its first units in 2015 and 2016.**

THAAD, which is designed to counter short-, medium- and long-range ballistic missiles, was initially developed in the 1990s. It struggled in early testing, but has had a consistent reliability track record in flight tests since Lockheed Martin in 2000 won the development contract to turn THAAD into a mobile tactical army fire unit.

By 2019, the Missile Defense Agency had demonstrated the capability for the THAAD system to remotely fire an interceptor following 16 consecutive successful intercept tests. The U.S. has deployed THAAD throughout the world,

**Congressional aides said lawmakers have generally been open to Abu Dhabi’s requests for weapons to defend against Houthi attacks, but Emirati officials are likely to face questions over the country’s growing ties to China and accusations its forces have intervened in Libya’s ongoing war.**

including to Guam, Israel, South Korea and Japan. In 2017, Saudi Arabia agreed to buy THAAD in a deal thought to be worth up to \$15 billion. The UAE was the first foreign customer for the system and trained its first units in 2015 and 2016.

The Army operates seven THAAD batteries, but has long had a requirement to field nine total. The MDA has lacked the funding to build the final two, but U.S. lawmakers added funding in the fiscal 2021 budget to build an eighth THAAD battery. The Houthis have used drones and missiles to attack Saudi Arabia and oil targets in the Persian Gulf over the course of Yemen’s war, now in its eighth year. [The] attack was the UAE’s first acknowledgement of being hit by the Houthis.

Several civilians have died in Saudi Arabia from cross-border Houthi attacks.

... Abu Dhabi asked the U.S. for help bolstering its defenses against missiles and drones and halting weapons from being transported to the Houthis, according to a statement the UAE’s Embassy in Washington posted to Twitter. In a call between Abu Dhabi Crown Prince Mohamed bin Zayed Al Nahyan and U.S. Defense Secretary Lloyd Austin, Austin “underscored his

unwavering support for the security and defense of UAE territory against all threats.” The Pentagon has since declined to provide specifics about the UAE’s request.

Abu Dhabi was also consulting with congressional gatekeepers on U.S. arms sales. The embassy said Al Otaiba met with House Foreign Affairs Committee Chairman Gregory Meeks, D-N.Y. Ahead of Senate Foreign Relations Committee Chairman Robert Menendez’s meeting with Al Otaiba, Menendez said, “We’ll see what their request is. I certainly recognize some of the challenges they’re having.”

Congressional aides said lawmakers have generally been open to Abu Dhabi’s requests for weapons to defend against Houthi attacks, but Emirati officials are likely to face questions over the country’s growing ties to China and accusations its forces have intervened in Libya’s ongoing war.

U.S. officials would also have to consider the suitability and production schedules for the equipment Abu Dhabi is requesting, according to a Senate aide granted anonymity to talk about diplomatically sensitive arms sale talks. If the UAE is seeking Patriot missiles, there’s reportedly an interceptor shortage fueled by Houthi drone and

rocket attacks against Saudi Arabia. "The Saudis are using up their Patriots at a good clip, and these things, you don't just pick them up at Walmart," the aide said. "The Emiratis could be asking for things very appropriately, but before anything comes from it and arrives in country, it could be years."

Gulf Arab states, as well as the U.S., U.N. experts and others, have previously accused Iran of supplying arms to the Houthis, a charge Tehran denies. Bilal Saab, a former Pentagon official now at the Middle East Institute, said the Houthis' use of missiles suggests Iranian involvement, even after diplomatic talks in December between Iranian and Emirati officials in Tehran. ...President Joe Biden said his administration, following the strikes, is considering restoring the Houthis to the U.S. list of international terrorist organizations. ...

Source: <https://www.defensenews.com/land/2022/01/21/thead-in-first-operational-use-destroys-midrange-ballistic-missile-in-houthi-attack/?mkt>, 22 January 2022.

**Bilal Saab, a former Pentagon official now at the Middle East Institute, said the Houthis' use of missiles suggests Iranian involvement, even after diplomatic talks in December between Iranian and Emirati officials in Tehran.**

**Dutton also announced a "highly successful defense flight trial" late last year, part of a classified program aimed to "counter hypersonic threats," but provided no further detail. A release says the \$14 million center can accommodate more than 60 staff.**

defense flight trial" late last year, part of a classified program aimed to "counter hypersonic threats," but provided no further detail. A release says the \$14 million center can accommodate more than 60 staff. The University of Queensland there is a leading force in Australian hypersonics research.

what's called the Southern Cross Integrated Flight Research Experiment (SCIFiRE) — part of a broader push by Australia to build a range of precision strike weapons in the face of China and Russia's aggressive development of hypersonic and other

long-range weapons. The defense contractor Thales Australia welcomed the Brisbane expansion. "We look forward to the expansion of the defence ecosystem at Eagle Farm, where Thales currently has around 150 highly skilled and experienced staff supporting ADF programs," Chris Jenkins, CEO of Thales Australia, said in a statement. Thales works with Southern Launch, Airspeed, Mincham and Mackay Defence to provide tooling and precision engineering, specialized insulation, composite cases and design and launch services.

A hypersonic cruise missile under development by the US and Australia uses an air-breathing scramjet engine and is meant to be carried by Australia's F-18s and F-35As, as well as the P-8A surveillance aircraft. Boeing, Lockheed Martin and Raytheon have separate contracts to work on this. While the amount of money Australia spent on the center is tiny by American standards, much of the money on hypersonics may well be out of sight as part of the AUKUS agreement, for which hypersonics are a key component. While the nuclear-powered submarines have attracted much of the attention, sources here and in the US say classified research and development is a substantial part of AUKUS work.

**EMERGING TECHNOLOGIES AND DETERRENCE**

**AUSTRALIA**

**Aussies Unveil New Hypersonics Center, Signal Distance from Ukraine Crisis**

Australia's defense minister cut the ribbon at the country's new hypersonics center, marking another step forward for the country's offensive and defensive hypersonic capabilities. "The technology that is developed here will help us to better defend against the malign use of this technology. And to give us the ability to strike against any potential adversaries from a distance and deter aggression against Australia's national interests," Defense Minister Peter Dutton said in Brisbane, where the center was built.

Dutton also announced a "highly successful

NUCLEAR ENERGY

GERMANY

**Germany's Habeck Denounces Plan to Label Nuclear Energy 'Green' in Brussels**

German Economic Affairs and Climate Action Minister Robert Habeck called for his government to block EU-level attempts to classify nuclear energy as "green." "I hope that the Commission will follow our recommendations and remarks that nuclear power is not a sustainable form of energy," Habeck said after talks with European Commission President Ursula von der Leyen.

The European Union is set to classify a number of energy sources as sustainable or not sustainable in the coming weeks. Habeck said his "personal opinion" was that "Germany should vote no" on the proposal, should it remain in the plans "in the form that it is currently included."

In his first visit to Brussels as a Cabinet minister, Habeck said that, instead of promoting atomic power, "we need special technologies that are 'made in the EU,' for example, hydrogen fuel."

Habeck is the deputy chancellor and co-leader of the Greens; his ministerial position received an altered title as part of the coalition deal, with the Economy and Energy Ministry renamed the Economic Affairs and Climate Action Ministry. He announced at the beginning of January that his office was looking into the possibility of clean hydrogen-based energy to lower the country's emissions.

Although Germany represents only about 1% of the world's population, it accounts for over 2% of its carbon emissions. It is in the process of phasing out nuclear power production entirely, with the final plants set to switch off at the end of the year.

The fact that Queensland is an important battleground in the federal elections to be held before the third week of May may have influenced Dutton's decision to highlight the new facility. As one of the most senior members in the government, he has many tools to promote his party's chances, and in Australia defense jobs are highly prized. Of geopolitical strategic concerns, Dutton said, "Today we face I think the most significant change in our strategic environment since the Second World War," including from hypersonic technology. The test flight, he said, is important not just for offensive capabilities, but for research in how to bolster Australia's defenses. "We'll not stand by and watch our country lose its competitive and our capability edge," he said.

**For Ukraine Crisis, Dutton Doesn't Expect Australian Involvement:**

Dutton addressed the situation in Ukraine making it clear that Australia does not expect to send troops should Russia invade. With the US, Britain and other countries evacuating non-essential personnel from Ukraine in the face of the massive Russian troop buildup, and the increase in the amount of military assistance from NATO countries Australia has kept a very close eye on the region. Instead, he said in a separate interview with Sky News, "We've got a lot going on in the Indo-Pacific at the moment. Australia's responsibility is within our region. We haven't received a request for any assistance and we wouldn't expect to receive one." However, Australia might help Russia's neighbor combat Putin's cyber attacks if they ask for assistance. He noted that "Ukraine is under a significant cyber-attack from Russia at the moment" but no Australian commitments have been made yet.

Source: <https://breakingdefense.com/2022/01/aussies-unveil-new-hypersonics-center-signal-distance-from-ukraine-crisis/?mkt>, 25 January 2022.

**Today we face I think the most significant change in our strategic environment since the Second World War," including from hypersonic technology. The test flight, he said, is important not just for offensive capabilities, but for research in how to bolster Australia's defenses.**

**The European Union is set to classify a number of energy sources as sustainable or not sustainable in the coming weeks. Habeck said his "personal opinion" was that "Germany should vote no" on the proposal, should it remain in the plans "in the form that it is currently included.**



Source: <https://www.taiwannews.com.tw/en/news/4421913>, 25 January 2022.

**NUCLEAR COOPERATION**

**HUNGARY–RUSSIA**

**Hungary's Orban to Discuss Nuclear Power Project with Putin**

Hungarian Prime Minister Viktor Orban plans to meet with President Vladimir Putin on Feb. 1 to discuss the progress of a Russian-backed project to expand a Hungarian nuclear power plant, Hungary's foreign minister said. Speaking on the sidelines of a UNSC meeting in New York, Foreign Minister Peter Szijjarto told Russian state news agency Tass that Hungary wants the project to "enter into the establishment phase" in the first half of this year.

**The 12 billion-euro (\$13.6 billion) expansion of the Paks nuclear plant in central Hungary involves the construction of two new nuclear reactors. The work is be carried out by the Russian state nuclear energy corporation Rosatom and financed with a 10-billion euro (\$11.3 billion) loan from a Russian state bank.**

The 12 billion-euro (\$13.6 billion) expansion of the Paks nuclear plant in central Hungary involves the construction of two new nuclear reactors. The work is be carried out by the Russian state nuclear energy corporation Rosatom and financed with a 10-billion euro (\$11.3 billion) loan from a Russian state bank. "We would like to see the two new reactors operational by the end of this decade," Szijjarto said. Orban and Putin agreed on the project in 2014, but it has gone through numerous delays and permitting issues.

Orban's nationalist government, which has pursued close ties with Russia under Putin, says the expansion of Hungary's only nuclear facility is necessary to make the country more self-sufficient in its energy production. Critics of the project say it places Hungary under further financial and political dependence on Russia and poses environmental and safety risks. The Hungarian foreign minister said that increasing the volume of Russian gas supplies under a 15-year contract Russia signed with Hungary last year also would be on the

agenda when Orban meets with Putin.

The contract, which calls for 4.5 billion cubic meters of Russian gas to be delivered annually to Hungary via Serbia and Austria, angered Ukraine, Hungary's eastern neighbor. The Ukrainian government argued the agreement damaged Ukraine's national interests by bypassing the country and causing a loss of lucrative transit payments. Szijjarto said the Feb. 1 talks between

Putin and Orban would also cover Hungary becoming a manufacturer of Russia's Sputnik V COVID-19 vaccine, which Hungary has administered to nearly 1 million people. "By autumn, we would like to be a manufacturing place for Sputnik because we see that there's a big market for the vaccines in the future,"

the foreign minister said.

Source: <https://abcnews.go.com/International/wireStory/hungarys-orban-discuss-nuclear-power-project-putin-82370683>, 20 January 2022.

**INDIA–RUSSIA**

**Russia Starts Manufacturing Reactor for Kudankulam Nuclear Power Plant**

Russia's state atomic energy corporation has started manufacturing the nuclear reactor and steam generators for the sixth unit of Tamil Nadu's Kudankulam nuclear power plant. Rosatom is currently

**Rosatom is currently building the 6,000-MW project at Kudankulam, which will have six VVER-1000 nuclear reactors, and is in talks with India to construct six more reactors at a new site that is yet to be identified.**

building the 6,000-MW project at Kudankulam, which will have six VVER-1000 nuclear reactors, and is in talks with India to construct six more reactors at a new site that is yet to be identified. The reactor and steam generator shells for the sixth unit have passed an incoming inspection and are currently in the "initial operations of the manufacturing cycle", Rosatom said.

As part of a framework agreement signed by the Indian government and Rosatom in 2017 for the fifth and sixth power units at Kudankulam, JSC

AEM-Technologies – a part of the machine-building division of Rosatom – will manufacture and supply two nuclear reactors, two sets of steam generators, reactor coolant pump set bodies, the main circulation piping, emergency core cooling system tanks, passive core flooding system tanks and two pressurisers. The total weight of the items is almost 6,000 tonnes. “The reactor is an item of first safety class. It is a vertical cylindrical body with an elliptical bottom. The core and internals are located inside the vessel,” Rosatom said.

The steam generators are heat exchangers and part of a steam generating unit. Each steam generator has a diameter of more than four metres, its length is about 14 metres, and the weight is 340 tonnes. The first power unit of the Kudankulam plant has been steadily operating at the design capacity level of 1,000 MW since February 2016. The second was included in India’s national electricity grid in August 2016. ...

*Source: <https://www.hindustantimes.com/india-news/russia-starts-manufacturing-reactor-for-kudankulam-nuclear-power-plant-101642458342733.html>, 18 January 2022.*

## **IRAN–RUSSIA**

### **Iran, Russia Set to Boost Strategic Nuclear Cooperation**

As President Ebrahim Ræisi is visiting Russia, a senior Iranian atomic official says Tehran and Moscow are in talks over the construction of new units at the Bushehr nuclear power plant as part of their efforts to promote bilateral strategic cooperation in the fields of energy and nuclear technology. In an interview with Press TV, Behrouz Kamalvandi, spokesman of the Atomic Energy Organization of Iran (AEOI) said nuclear cooperation was “one of the most strategic issues” on the agenda of the meeting between Ræisi and Putin.

“The issue of nuclear industry can be divided into two sections of energy-related and non-energy-related activities. In both fields, the relation between the two countries is excellent. We are being supplied by ... different types of radioisotopes which are used for medical purposes, industry, agriculture and other areas” he said. He pointed out that the joint project to build additional units at the Bushehr plant were in line with Iran’s plan to generate at least 10,000 megawatts of electricity using nuclear energy. The

process was continuing apace despite delayed payments to the Russians, he added. “As you know Iran has a program of bringing the capacity of electricity in nuclear field to at least 10,000 megawatts....

The Russians can contribute a very good part at this program. It has been discussed by the two presidents and we are expecting to exchange delegations in the very near

future in order to implement the new projects,” Kamalvandi said. The official further said that one of Iran’s planned nuclear projects with Russia values at about \$5 billion. Russia says continues cooperation with Iran at Bushehr power plant despite US bans. Russia affirms its resolve to keep up cooperation with Iran at the Bushehr nuclear power plant, defying illegal US sanctions against the Islamic Republic. “As you know, a power plant with the capacity of 1,000 megawatts is working. The technology has been transferred to the Iranian expertise. It is operated by the Iranian engineers. We are already constructing two new units with the capacity of 1,000 megawatts, each of them.” Kamalvandi also noted that despite payment difficulties between Iran and Russia, the construction work at Bushehr power plant “is ongoing. It has not stopped.”

*Source: <https://www.presstv.ir/Detail/2022/01/20/675137/Iran-Kamalvandi-nuclear-energy>, 20 January 2022.*

**Behrouz Kamalvandi, spokesman of the Atomic Energy Organization of Iran (AEOI) said nuclear cooperation was “one of the most strategic issues” on the agenda of the meeting between Ræisi and Putin. “The issue of nuclear industry can be divided into two sections of energy-related and non-energy-related activities. In both fields, the relation between the two countries is excellent. We are being supplied by ... different types of radioisotopes which are used for medical purposes, industry, agriculture and other areas.**

**URANIUM PRODUCTION**

**BELGIUM**

**Belgian Regulator Says Reactors could Operate beyond 2025**

Belgium's Doel 4 and Tihange 3 could continue operating beyond 2025 provided certain safety upgrades are carried out, Belgium's Federal Agency for Nuclear Control (FANC) has said. However, it said the government must make a prompt decision on their long-term operation and develop a global approach with all the actors involved. On 23 December, Belgium's coalition government said it had agreed to close its existing nuclear power plants by 2025. Under the plan, Doel 3 and Tihange 2 will be shut down in 2022 and 2023, respectively. The newer Doel 4 and Tihange 3 will be shut down by 2025.

However, it requested FANC consider the extended operation of the two newer reactors if a report by grid operator Elia, due on 18 March, shows the security of energy supply will be jeopardised after 2025 without nuclear energy. FANC has now submitted its analysis of a possible extension of the operating period of Doel 4 and Tihange 3 to the federal government. The report analyzes and lists the decisions to be taken and the actions to be implemented in the short and medium-term to be able to operate the reactors longer than expected, in the event that this extension proves necessary to guarantee energy supply beyond 2025. The continued operation of the units is referred to as "Plan B". The regulator said the long-term operation (LTO) of the reactors is possible from the nuclear safety point of view, albeit with necessary regulatory modifications and improvements to the safety of the installations. It noted that all nuclear reactors currently comply with the safety

**Belgium's coalition government said it had agreed to close its existing nuclear power plants by 2025. Under the plan, Doel 3 and Tihange 2 will be shut down in 2022 and 2023, respectively. The newer Doel 4 and Tihange 3 will be shut down by 2025.**

**For Plan B to be activated, it is crucial that the government makes a clear decision before the end of the first quarter of 2022. It will then be up to the operator of the nuclear power plants to carry out their analysis and determine whether they are willing to make the necessary investments.**

requirements defined in the Royal Decree of 30 November 2011.

These regulations were reinforced in 2020 by additional safety requirements which will apply from 2025. It said the newer reactors at Doel 4 and Tihange 3 are already generally compliant with these new requirements, even if certain improvements must be made in terms of their safety. ANC said a distinction should be made between the "essential requirements" with which the facilities must comply in

order to fully meet the new additional requirements - and which must be implemented before any possible extension of their service life in 2025 - and the "opportunities for modification" that can be carried out after 2025 without compromising safety. It is up to operator Engie Electrabel to submit a so-called 'LTO file' with the accompanying action plan to the FANC, the regulator noted. Such a plan describes how the operator wants to improve the safety design, how it deals with the obsolescence of its installations and which human factors it will take into account in the future.

"Since this has not yet happened for Doel 4 and Tihange 3 and the remaining preparation period is now limited, FANC proposes to speed up the procedure and to consult with Engie Electrabel within six months of the government decision and to determine what work must

be done by when," FANC said. Any extension of the operation of the units will also require an environmental impact study to be conducted. FANC said the procedure to be adopted should be the same as that currently followed in the context of the extension of the service life of Doel units 1 and 2. FANC said an extension should cover a period of at least 10 years in order to be able to work out a thorough action plan for improving nuclear safety. "For Plan B to be activated, it is

crucial that the government makes a clear decision before the end of the first quarter of 2022. It will then be up to the operator of the nuclear power plants to carry out their analysis and determine whether they are willing to make the necessary investments. "A coordinated approach with all relevant stakeholders will be needed to ensure that everything runs smoothly by 2025, according to FANC.

**Belgium's nuclear plants account for almost half of the country's electricity production. It has still not been established how Belgium will make up the shortfall from closing its reactors.**

It is essential, it said, that all relevant stakeholders support the extension plan. By 18 March - the date on which the government is called upon to make a decision - "considerable preparatory work must be carried out and not only in the field of nuclear safety. Consequently, FANC asks the government to validate this global approach with all the actors concerned by the end of January at the latest and to explicitly mandate the various actors so that they develop the actions and the schedule for the date of 18 March. "It added: "If the government confirms the total phase-out of nuclear power in March 2022, the extension of Doel 4 and Tihange 3 will then have to be considered as definitively irreversible. "Belgium's nuclear plants account for almost half of the country's electricity production. It has still not been established how Belgium will make up the shortfall from closing its reactors. Elia has previously said that at least 3.6 gwe of new thermal capacity would be needed by the end of 2025.

Source: <https://world-nuclear-news.org/Articles/Belgian-regulator-says-reactors-could-operate-beyo>, 18 January 2022.

## **GENERAL**

### **Global Uranium (Production, Demand and Balance) Market Report 2022**

The global uranium production is forecasted to reach 63.16ktu in 2025, experiencing growth at a CAGR of 5% during the period spanning from 2021

to 2025. Growth in the global uranium market was supported by factors such as rising nuclear power capacities, increasing urban population, increasing use of uranium in radiation and increasing use of uranium in the military. However, the market growth would be challenged by a decline in nuclear electricity generation, shutting down of mine operations and geopolitical issues.

The market is anticipated to experience certain trends like uranium used in radioisotope thermoelectric generators and rising uranium demand from China and developing nations. A gradual decrease in secondary supply, a combination of uranium demand recovery and uranium stockpiling by producers and funds, would lead to the global uranium market remaining in deficit in 2021. In 2020, the dominant share of the market was held by Kazakhstan. Kazakhstan has been an important source of uranium for more than 50 years. The region would continue to dominate the world's production of uranium during the forecast period, as the state-owned entity that mines and explores for uranium and also produces atomic power in the former Soviet republic.

**A gradual decrease in secondary supply, a combination of uranium demand recovery and uranium stockpiling by producers and funds, would lead to the global uranium market remaining in deficit in 2021. In 2020, the dominant share of the market was held by Kazakhstan. Kazakhstan has been an important source of uranium for more than 50 years.**

Source: Excerpted. Research and Markets. <https://www.globenewswire.com/news-release/2022/01/18/2368298/28124/en/Global-Uranium-Production-Demand-and-Balance-Market-Report-2022-with-Profiles-of-Kazatomprom-Orano-Uranium-One-China->

[General-Nuclear-Power-Corp-BHP-China-National-Nuclear-Corp.html](https://www.globenewswire.com/news-release/2022/01/18/2368298/28124/en/Global-Uranium-Production-Demand-and-Balance-Market-Report-2022-with-Profiles-of-Kazatomprom-Orano-Uranium-One-China-), 18 January 2022.

## **SOUTH AFRICA**

### **Koeberg Offline for Replacement of Steam Generators**

Unit 2 of South Africa's Koeberg nuclear power plant has been taken offline for refuelling and the



replacement of its three steam generators and reactor pressure vessel head. The work is part of plans to extend its operation for 20 years, and scheduled to take five months. Plant owner and operator Eskom said that it followed 450 days of uninterrupted operation. The refuelling is the 25th since the 920 mwe unit was commissioned. Unit 1 is scheduled to be taken offline later in the year, with its three steam generators also being replaced, but not its reactor pressure vessel head, which was replaced several years ago.

"This is going to be a long, but needed, outage - the first of its kind for Koeberg. Our staff are prepared and committed to make history by ensuring the success of this project," said Riedewaan Bakardien, Eskom's Chief Nuclear Officer. "Nuclear safety is the paramount factor. We will progress the outage work diligently, making sure nuclear safety and safety of plant, personnel and public is top of mind." The company described the replacement of the steam generators as a "precautionary safety measure". Eskom added that the replacement work was an important element of the safety submission being prepared for South Africa's National Nuclear Regulator (NNR) in support of its application to extend operations by 20 years, beyond 2024.

The twin pressurised water reactors (PWR) at Koeberg were built by Framatome, with unit 1 beginning commercial operation in 1984 and unit 2 the following year. They generate about 5% of the country's electricity. The current unit 2 steam generators have been in use since it began operations in 1985. On removal they will be stored on site, packaged and dismantled for final disposal at the national nuclear waste repository. In 2014, Eskom signed a ZAR4.4 billion (USD285 million) contract with Areva - now Orano - to design, manufacture and install the replacement steam generators, which each weigh about 380

**Unit 2 of South Africa's Koeberg nuclear power plant has been taken offline for refuelling and the replacement of its three steam generators and reactor pressure vessel head. The work is part of plans to extend its operation for 20 years, and scheduled to take five months.**

**In 2014, Eskom signed a ZAR4.4 billion (USD285 million) contract with Areva - now Orano - to design, manufacture and install the replacement steam generators, which each weigh about 380 tonnes and are 20 metres long.**

tonnes and are 20 metres long. They have been made in China under subcontract by Shanghai Electric Power Equipment Company. Eskom said the outages at the Koeberg plant, which is near Cape Town, were planned to take place at times of the year which minimise the impact on overall electricity supply, but said the length of the outages meant "the electricity supply system may be under additional strain during the coming year".

*Source: <https://world-nuclear-news.org/Articles/Koeberg-offline-for-replacement-of-steam-generator>, 17 January 2022.*

## **NUCLEAR PROLIFERATION**

### **NORTH KOREA**

#### **North Korea Fires Pair of Projectiles Presumed to be Cruise Missiles in 5th Test this Year**

North Korea fired a pair of projectiles believed to be cruise missiles, a South Korean official told ABC News. An official with the South Korean Ministry of National Defense said the projectiles were detected by South Korean and U.S. intelligence agencies, which are analyzing the launch. Further details were not immediately available.

North Korea has test-fired missiles at least five times this year. North Korean state media boasted the successful launches of hypersonic missiles on Jan. 5 and Jan. 11, followed by a short-range ballistic missile from a train car on Jan. 14 and another short-range ballistic missile from the Sunan airport in the capital, Pyongyang, on Jan. 17.

The latest launch came just five days after North Korea implied it would withdraw from a self-imposed moratorium on testing nuclear weapons and long-range ballistic missiles, blaming the U.S. for the failed trust between the two countries.

"The hostile policy and military threat by the U.S. have reached a danger line that cannot be overlooked anymore despite our sincere efforts for maintaining the general tide for relaxation of tension in the Korean peninsula since the DPRK-U.S. summit in Singapore," North Korea's official Korean Central News Agency reported ....

Source: <https://abcnews.go.com/International/north-korea-fires-pair-projectiles-presumed-cruise-missiles/story?id=82457321>, 25 January 2022.

### North Korea Fires Two Missiles as U.S. Condemns Flurry of Tests

Nuclear-armed North Korea fired what appeared to be two short-range ballistic missiles, drawing condemnation from the United States for what would be the sixth round of missile tests this month. The series of tests is among the most missiles ever launched by North Korea in a month, analysts said, as it begins 2022 with a dizzying display of new and operational weapons. South Korea's Joint Chiefs of Staff said it had detected the launch of what it presumed were two ballistic missiles at about 8 a.m. (2300 GMT) from near Hamhung, on the east coast of North Korea. They travelled for about 190 km to an altitude of 20 km, JCS added.

North Korea said this month it would bolster its defences against the United States and consider resuming "all temporally-suspended activities", an apparent reference to a self-imposed moratorium on tests of nuclear weapons and long-range missiles. The launch came after North Korea fired two cruise missiles into the sea off its east coast

**The series of tests is among the most missiles ever launched by North Korea in a month, analysts said, as it begins 2022 with a dizzying display of new and operational weapons. South Korea's Joint Chiefs of Staff said it had detected the launch of what it presumed were two ballistic missiles at about 8 a.m. (2300 GMT) from near Hamhung, on the east coast of North Korea. They travelled for about 190 km to an altitude of 20 km, JCS added.**

on Tuesday, adding to the tension over its tests. Earlier in the month, North Korea tested tactical guided missiles, two "hypersonic missiles" capable of high speed and manoeuvring after lift-off, and a railway-borne missile system.

"The (Kim Jong Un) regime is developing an impressive diversity of offensive weapons despite limited resources and serious economic challenges," said Leif-Eric Easley, an international affairs

professor at Ewha University in Seoul. Certain tests aim to develop new capabilities, especially for evading missile defences, while other launches are intended to demonstrate the readiness and versatility of missile forces that North Korea has already deployed, he said. "Some observers have suggested that the Kim regime's frequent launches are a cry for attention, but Pyongyang is running hard in what it perceives as an arms race with Seoul," Easley said.

**In a speech to the U.N.-sponsored Conference on Disarmament, North Korea's Ambassador to the United Nations in Geneva, Han Tae Song, accused the United States of staging hundreds of "joint war drills" while shipping high-tech offensive military equipment into South Korea and nuclear strategic weapons into the region.**

In a speech to the U.N.-sponsored Conference on Disarmament, North Korea's Ambassador to the United Nations in Geneva, Han Tae Song, accused the United States of staging hundreds of "joint war drills" while shipping high-tech offensive military equipment into South Korea

and nuclear strategic weapons into the region. "(This) is seriously threatening the security of our state," Han said.

**'Remarkable':** A U.S. State Department spokesperson condemned the launches as a violation of multiple U.N. Security Council resolutions and a threat to North Korea's neighbours and the international community. The United States remains committed to a diplomatic approach and calls on North Korea to engage in

dialogue, the spokesperson said. As with other recent tests, the U.S. military's Indo-Pacific Command said that the launch was destabilising but did not pose an immediate threat to U.S. territory or personnel, or to its allies.

South Korean and U.S. nuclear envoys had a phone call during which they shared "deep concerns" over the latest test and agreed to continue cooperation to prevent further escalation, Seoul's foreign ministry said. North Korea's recent "remarkable development" in nuclear and missile technology could not be overlooked, Japan's Chief Cabinet Secretary Hirokazu Matsuno told a briefing.

South Korea's National Security Council convened an emergency meeting, at which it said the launches were "very regrettable" and went against calls for peace and stability in the region, the presidential Blue House said in a statement.

At a media briefing in Beijing, foreign ministry spokesman Zhao Lijian said China urged all parties to "speak and act with caution, stick to the right direction of dialogue and consultation, and jointly promote the political resolution of the Korean Peninsula issue." U.S. President Joe Biden's administration sanctioned several North Korean and Russian individuals and entities this month on accusations they were helping North Korea's weapons programmes, but China and Russia delayed a U.S. bid to impose U.N. sanctions on five North Koreans. [read more](#)

... U.S. Deputy Assistant Secretary of State for Japan and Korea Mark Lambert said that Washington had "no reservations" about talking with North Korea and was willing to meet anywhere and talk about anything. "We have to have a serious discussion about the

denuclearisation of North Korea, and if North Korea is willing to do that, all sorts of promising things can happen," he said during an online seminar hosted by the Washington-based Center for Strategic and International Studies.

**South Korea's National Security Council convened an emergency meeting, at which it said the launches were "very regrettable" and went against calls for peace and stability in the region, the presidential Blue House said in a statement.**

policy. "The recent test-firing of new types of weapons was part of activities for carrying out a medium- and long-term plan for development of national science," the North Korean U.N. envoy Han said in a speech on Tuesday. "It does not pose any threat or damage to the security of neighbouring countries and the region."

North Korea has defended its missile tests as a sovereign right of self-defence and said U.S. sanctions proved that even as the United States proposes talks, it maintained a "hostile" policy. North Korea has not launched long-range ICBMs or tested nuclear weapons since 2017 but began testing a slew of shorter-range missiles after denuclearisation talks stalled following a failed summit with the United States in 2019.

**Accusing the United States of hostility and threats, North Korea said it will consider restarting "all temporally-suspended activities" it had paused during its diplomacy with the Trump administration, in an apparent threat to resume testing of nuclear explosives and long-range missiles**

Source: <https://www.reuters.com/world/china/nkorea-fires-projectile-into-sea-off-east-coast-skorea-says-2022-01-26/?mkt>, 27 January 2022.

### **North Korea Slams US, Hints at Resuming Nuclear, ICBM Tests**

Accusing the United States of hostility and threats, North Korea said it will consider restarting "all temporally-suspended activities" it had paused during its diplomacy with the Trump administration, in an apparent threat to resume testing of nuclear explosives and long-range missiles. North Korea's official Korean Central News Agency said leader Kim Jong Un presided over a Politburo meeting of the ruling Workers' Party where officials set policy goals for "immediately bolstering" military capabilities to

counter the Americans' "hostile moves."

Officials gave instructions to "reconsider in an overall scale the trust-building measures that we took on our own initiative ... and to promptly examine the issue of restarting all temporally-suspended activities," the KCNA said. Experts say Kim is reviving an old playbook of brinkmanship to extract concessions from Washington and neighbors as he grapples with a decaying economy crippled by the pandemic, mismanagement and U.S.-led sanctions over his nuclear ambitions.

The North has been ramping up its weapons demonstrations recently, including four rounds of missile launches just this month, in an apparent effort to pressure Washington over a prolonged freeze in nuclear diplomacy. The North's Foreign Ministry had already warned of stronger action after the Biden administration imposed fresh sanctions over its continued missile tests. The U.N. Security Council scheduled a closed-door meeting to discuss North Korea and non-proliferation matters. South Korea said its military was closely monitoring the North as it urged its rival to return to dialogue.

China, North Korea's main ally, repeated its denouncement of U.S. sanctions through a Foreign Ministry briefing, calling them a source of tension on the Korean Peninsula. China has avoided criticizing the North over its recent missile launches and endorsed a return to multinational disarmament talks hosted by Beijing that have stalled since 2008. Kim announced a unilateral suspension of his nuclear and intercontinental ballistic missile tests in 2018, as he initiated talks with then-President Donald Trump in an attempt to leverage his nukes for badly needed economic benefits.

Their summits followed a provocative run in North Korean nuclear and intercontinental range ballistic

missile testing in 2017 that demonstrated Kim's pursuit of an arsenal that can target the American homeland. He also exchanged threats of nuclear annihilation with Trump. But negotiations have stalled since their second summit in 2019, when the Americans rejected North Korea's demand for major sanctions relief in exchange for a partial surrender of its nuclear capabilities.

At the end of that year, Kim returned to familiar threats and said the North was no longer obligated to maintain its suspension on nuclear and ICBM

tests, which Trump touted as a major achievement. However, the pandemic thwarted many of Kim's economic goals as the North imposed a lockdown and halted most of its trade with China.

North Korea appeared this month to have resumed railroad freight traffic with China that had been suspended for two years. It conducted its sixth and last

test of a nuclear explosive device in September 2017. and its last launch of an ICBM was in November that year. Some experts say that the North could dramatically raise the ante in weapons demonstrations after the end of February's Winter Olympics in Beijing. They say Pyongyang's leadership likely feels it could use a dramatic provocation to move the needle with the Biden administration, which has offered open-ended talks but showed no willingness to ease sanctions unless Kim takes real steps to abandon his nuclear and missile program.

Saying that U.S. hostility has reached a "danger line" that can no longer be overlooked, the North Korean Politburo members called for practical measures to "more reliably and effectively increase our physical strength for defending dignity, sovereign rights and interests of our state," the KCNA said.

They criticized United States of continuing its military exercises with South Korea and arming

**Some experts say that the North could dramatically raise the ante in weapons demonstrations after the end of February's Winter Olympics in Beijing. They say Pyongyang's leadership likely feels it could use a dramatic provocation to move the needle with the Biden administration, which has offered open-ended talks but showed no willingness to ease sanctions unless Kim takes real steps to abandon his nuclear and missile program.**



its ally with advanced weaponry and claimed — apparently falsely — that Washington is continuing to send strategic assets to the region to pressure the North. The United States since 2018 has dramatically scaled down its combined exercises with South Korea, which have mostly been reduced to computer simulations, to make room for diplomacy with North Korea and over COVID-19 concerns.

... Kim Jong Un in recent years had showcased some new weapons he may wish to test, including what appeared to be North Korea's largest ICBM that was rolled out during a military parade in October 2020. He also issued an ambitious wish list of sophisticated weaponry early last year while setting a five-year plan to develop military forces, which included hypersonic missiles, solid-fuel ICBMs, spy satellites and submarine-launched nuclear missiles.

If the North does stage another nuclear test, it may use it to claim it acquired an ability to build a nuclear warhead small enough to fit on a purported hypersonic missile it tested twice so far this year, experts say. .... The U.S. Treasury Department imposed sanctions on five North Koreans over their roles in obtaining equipment and technology for the country's missile programs.

The State Department ordered sanctions against another North Korean, a Russian man and a Russian company for their broader support of North Korea's weapons of mass destruction activities. The Biden administration also said it would pursue additional U.N. sanctions over the North's tests.

Source: <https://www.sheltonherald.com/news/article/North-Korea-hints-at-resuming-nuclear->

*ICBM-tests-16788877.php, 20 January 2022.*

**NUCLEAR NON-PROLIFERATION**

**GENERAL**

**If the North does stage another nuclear test, it may use it to claim it acquired an ability to build a nuclear warhead small enough to fit on a purported hypersonic missile it tested twice so far this year, experts say. .... The U.S. Treasury Department imposed sanctions on five North Koreans over their roles in obtaining equipment and technology for the country's missile programs.**

**Gustavo Zlauvinen, who will head the upcoming review conference of the Treaty on the Non-Proliferation of Nuclear Weapons, known as the NPT, is eyeing the move based on requests from some member states for an early gathering.**

**Spring Talks in Europe Eyed for U.N. Nuclear Non-Proliferation Pact**

The president-designate of a U.N. conference on nuclear nonproliferation is exploring the possibility of holding the gathering in Europe in the spring, moving up the timeline from his earlier proposal of convening the session in August, diplomatic sources

said Tuesday. Gustavo Zlauvinen, who will head the upcoming review conference of the Treaty on the Non-Proliferation of Nuclear Weapons, known as the NPT, is eyeing the move based on requests from some member states for an early gathering.

The NPT, joined by about 190 countries, is the world's most widely ratified nuclear arms control agreement. Its review conferences involving both nuclear and non-nuclear states, as well as atomic-bombing survivors and civic groups, had been held every five years since 1975, with the last gathering in 2015. The subsequent meeting has been delayed repeatedly from the spring of 2020 as originally planned due to the coronavirus pandemic.

According to the sources, Zlauvinen is considering countries such as Austria, the Netherlands and Switzerland as candidates to host the event, following the first meeting of signatories to a U.N. treaty banning nuclear weapons slated for March in Vienna. Zlauvinen indicated he wants to arrange a possible conference schedule and meeting venue with European countries during a consultation with NPT member states on Tuesday.

But the schedule remains fluid, as some NPT member states prefer to gather in New York where each country has a U.N. delegation, the sources added. Non-nuclear states prefer deep discussions with nuclear states at in-person gatherings. The NPT requires the five permanent members of the U.N. Security Council — Britain, China, France, Russia and the United States — to commit to nuclear disarmament. Among four other nuclear-weapon states, India, Israel and Pakistan have not joined the pact, while North Korea pulled out of the treaty in 2003. The Treaty on the Prohibition of Nuclear Weapons, which bans the development, possession, testing and use of such arms, took effect in January of last year. None of the nuclear-weapon states have joined the nuclear ban treaty, and Japan, the only country to have suffered nuclear bombings, has refrained from signing the pact due to its security reliance on U.S. nuclear forces.

**None of the nuclear-weapon states have joined the nuclear ban treaty, and Japan, the only country to have suffered nuclear bombings, has refrained from signing the pact due to its security reliance on U.S. nuclear forces.**

**We are strongly committed to the complete, verifiable, and irreversible dismantlement of all of North Korea's nuclear weapons, other weapons of mass destruction and ballistic missiles of all ranges, as well as related programs and facilities, in accordance with relevant UN Security Council resolutions (UNSCRs).**

*Source: <https://english.kyodonews.net/news/2022/01/8e3fa760e3b3-spring-talks-in-europe-eyed-for-un-nuclear-non-proliferation-pact.html?mkt>, 27 January 2022.*

## **NORTH KOREA**

### **US, Japan Reaffirm Commitment to Complete Denuclearization of Korean Peninsula**

The US and Japan reaffirmed their commitment to the complete denuclearization of the Korean Peninsula on January 21, urging North Korea to quickly return to the NPT. The countries also urged all UN member countries to fully implement UNSC sanctions on North Korea in a joint statement, “We are strongly committed to the complete, verifiable, and irreversible dismantlement of all of North Korea’s nuclear weapons, other weapons of mass destruction and ballistic missiles of all

ranges, as well as related programs and facilities, in accordance with relevant UN Security Council resolutions (UNSCRs)” the countries said in a joint statement.

The US-Japan joint statement comes after North Korea hinted at the resumption of its nuclear and long-range ballistic missile testing. Pyongyang said that it will consider resuming “temporarily-suspended activities” that it said were suspended as part of efforts to build trust with the US. The North has maintained a self-imposed moratorium on nuclear and long-range missile testing since November 2017. However, the country has staged more than 10 rounds of short-range missile launches since Joe Biden took office a year earlier, including four missile tests since the start of this year.

The UN Security Council was set to discuss additional sanctions on North Korea proposed by the US for its latest missile tests, but reports said the move has been delayed by China, one of the five veto-power wielding permanent members of the Security Council. The reports also said the delay can last up to six months and that it can also be extended by another three months, which could permanently remove the US proposal for additional sanctions from the UN Security Council.

The US and Japan reiterated the importance of the international nuclear non-proliferation regime, from which North Korea withdrew in 2003. “Japan and the United States wholly reaffirm their commitment to the NPT, which has been the cornerstone of nuclear non-proliferation and disarmament for 51 years since coming into force,” the countries said, adding the 1945 atomic bombings of Hiroshima and Nagasaki serve as “stark reminders that the 76-year record of non-

use of nuclear weapons must be maintained.” The joint statement also comes one day before Biden and Japanese Prime Minister Fumio Kishida will hold a virtual summit, the first of its kind since Kishida took office in October. North Korea remains unresponsive to US overtures since Biden took office. It has also stayed away from denuclearization talks with the US since late 2019.

Source: <http://www.koreaherald.com/view.php?ud=20220121000101>, 21 Jan 2022.

## **NUCLEAR SAFETY**

### **GENERAL**

#### **IAEA Supports Advancing Radiation Safety Regulatory Infrastructure in Caribbean**

Across the Caribbean, the IAEA has supported the establishment of appropriate laws, regulations and regulatory bodies, and promoted the application of to the IAEA's Safety Standards. Cooperation between the IAEA and member countries of the Caribbean Community (CARICOM) have made the use of radiation technologies in the region safer, by advancing radiation safety regulatory infrastructure in the region.

Through its technical cooperation (TC) programme, the IAEA has provided continuous support to CARICOM countries to ensure that the use of nuclear and radiation technologies does not compromise the safety of people and the environment. There are 12 Caribbean countries who are members of both the IAEA and CARICOM.

Across the Caribbean, the IAEA has supported the establishment of appropriate laws, regulations and regulatory bodies, and promoted the

application of to the IAEA's Safety Standards. With further implementation of the Regional Strategic Framework (RSF) for the Caribbean region, policy-makers, regulators and operators have realized notable improvements and achievements. Advancing the legal and regulatory framework for radiation safety Since 2016, IAEA-CARICOM countries have participated in four TC projects, taking advantage of the Agency's assistance

in drafting legislation and regulations to support the control of radiation sources. Six countries in the region have participated in the IAEA's annual two-week intensive training course on nuclear law—the IAEA Nuclear Law Institute—which is focuses on drafting nuclear legislation.

In January 2017, experts from seven countries in the Caribbean region attended the IAEA School for Drafting Regulations on Radiation Safety and prepared a first draft of their national regulations for the control of radiation sources. Additionally, five IAEA-CARICOM countries drafted their national nuclear law through participation in the IAEA Legislative Assistance Programme. Jamaica passed the Nuclear Safety and Radiation Protection Act in August 2015, and following participation in these activities, the country

approved regulations in August 2019. Jamaica became the first CARICOM country to establish an independent and fully-operational regulatory body, the Hazardous Substances Regulatory Authority (HSRA), in 2020. In October 2020, Belize enacted its Radiation Safety and Security Act,

which established a new national regulatory body, the Radiation Safety and Security Office. “With the passing of the Radiation Safety and Security Act, Belize is now empowered with a robust legal instrument to ensure the safe, secure and

**Through its technical cooperation (TC) programme, the IAEA has provided continuous support to CARICOM countries to ensure that the use of nuclear and radiation technologies does not compromise the safety of people and the environment. There are 12 Caribbean countries who are members of both the IAEA.**

**Jamaica passed the Nuclear Safety and Radiation Protection Act in August 2015, and following participation in these activities, the country approved regulations in August 2019. Jamaica became the first CARICOM country to establish an independent and fully-operational regulatory body, the Hazardous Substances Regulatory Authority (HSRA), in 2020.**

peaceful use of nuclear applications for development," remarked Martin Alegria, Chief Environmental Officer at the Department of the Environment of Belize.

Three additional countries—Antigua and Barbuda, the Bahamas and Barbados—have drafted national laws, and Trinidad and Tobago is currently drafting its proposed national nuclear law. Operationalization of regulatory bodies. Within the past five years, 11 of the 12 IAEA-CARICOM countries have either established a national regulatory body or designated an interim national regulatory body to ensure the regulatory oversight of nuclear technology. By coordinating the delivery of training and equipment with the IAEA, countries in the Caribbean have empowered their national institutions responsible for the control of radiation sources. Radiation safety experts are essential for the operation of a national regulatory body.

Since 2016, a total of 57 regulators from CARICOM countries have received practical training in radiation safety through various IAEA projects. Training events have included courses that establish and demonstrate best practices in regulatory functions, such as notification, authorization, inspection and enforcement. IAEA-supported capacity building activities further clarified methods for the identification, characterization and control of radiation sources, which are necessary to ensure an accurate, updated national inventory. National radiation safety infrastructure also relies on the availability of equipment to support essential regulatory functions...The Coaching

Programme will deliver capacity building support to the remaining Member States in the region, and its scope will be expanded to include individual coaching on the safety of disused radioactive sources.

Source: <https://www.devdiscourse.com/article/technology/1891600-iaea-supports-advancing-radiation-safety-regulatory-infrastructure-in-caribbean>, 21 January 2022.

## NUCLEAR WASTE MANAGEMENT

### JAPAN

**Since 2016, a total of 57 regulators from CARICOM countries have received practical training in radiation safety through various IAEA projects. Training events have included courses that establish and demonstrate best practices in regulatory functions, such as notification, authorization, inspection and enforcement. IAEA-supported capacity building activities further clarified methods for the identification, characterization and control of radiation sources, which are necessary to ensure an accurate, updated national inventory.**

### Treated Water from Fukushima Nuclear Power Plant Safe to be Discharged into Sea: Expert

Fukushima Daiichi nuclear power station has to inevitably discharge water to the sea which is treated by Advanced Liquid Processing System. Professor Dadashi Narabayashi is an expert of nuclear engineering who gave insights into the treatment and disposal of water. Professor said underground water in the reactor buildings absorbed various nuclear materials after touching fuel debris. Those nuclear materials are removed by chemical treatment until safe level except tritium. Treatment is undertaken by use of membrane, medicine and finally by treating it with the facility's ALPS. After this process, the water is called ALPS treated water.

**In the area of Fukushima power station, there are more than 1000 tanks in which 1.25 million cubic metres of water are stored. After treatment of water nuclear materials are removed except tritium. After treatment, the concentration of tritium is assumed to one eye drop putting into a pool.**

In the area of Fukushima power station, there are more than 1000 tanks in which 1.25 million cubic metres of water are stored. After treatment of water nuclear materials are removed except



tritium. After treatment, the concentration of tritium is assumed to be one eye drop put into a pool. Narabayashi introduces one interesting episode about proof of safety. It was undertaken by students from Taiwan where the import of Fukushima food is banned. Narabayashi said Taiwan still prohibits the import of marine and food products from Fukushima due to their fear of radiation. Students studying Atomic Energy once came to Fukushima to investigate the safety. They checked flounder which were caught on the coast 10 kilometres from Fukushima Daiichi nuclear power station. After the accident, concentrated contaminated water flowed in from the damaged Fukushima power station. After measuring them with a highly sensitive detection machine, it indicated safety.

At regular locations, picking up sea water measuring the concentration of tritium and picking up fish and seaweed to measure concentration should be undertaken simultaneously when discharging diluted treated water. As a promise, if abnormal values have been detected in sea area monitoring, the discharging should be stopped to check. The future of Fukushima power station is a matter of global concern. Therefore, decommissioning should be carefully done after referring to the opinions of experts and carefully considering all other similar cases around the world.

*Source: <https://www.aninews.in/news/world/asia/treated-water-from-fukushima-nuclear-power-plant-safe-to-be-discharged-into-sea-expert20220120144559/>, 20 January 2022.*



Centre for Air Power Studies

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

Centre for Air Power Studies

P-284

Arjan Path, Subroto Park,

New Delhi - 110010

Tel.: +91 - 11 - 25699131/32

Fax: +91 - 11 - 25682533

Email: capsnetdroff@gmail.com

Website: [www.capsindia.org](http://www.capsindia.org)

**Edited by: Director General, CAPS**

**Editorial Team:** Dr. Sitakanta Mishra, Dr. Poonam Mann, Nasima Khatoun, Dr. Silky Kaur, Abhishek Saxena, Anubhav S. Goswami, Nichole Ballawar, Prachi Lokhande

**Composed by: CAPS**

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