



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

## OPINION – Song Zhongping

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### Despite Disclosure, US Still not Transparent in Nuclear Arsenals

The US State Department on 5 October 2021 disclosed the number of nuclear weapons in the US stockpile. The State Department said that the number of US nuclear weapons stood at 3,750 as of September 2020, including those in active status and in long-term storage. The number is down from 3,805 in 2019 and 3,785 in 2018.

Disclosing the number of nuclear weapons is a reversal of the Trump administration's policy. One of the important reasons why the Biden administration disclosed this sensitive information now is that the US is making efforts to restart arms controls talks with Russia. During the process of negotiations, Washington needs to disclose the number and make it seem transparent. The US is trying to leave the world an impression that it is reducing nuclear weapons. Another purpose of the US is to drag China into the negotiation of nuclear arms control with the US and Russia. By hyping China will "soon surpass Russia" as the US' "top nuclear threat," Washington has also tried to rope in Moscow to press China to join the negotiation.

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However, China has only a fraction of the number of nuclear warheads that the US has. It is not China that poses a so-called threat to the world, but the US nuclear weapons.

In fact, the number that Washington disclosed still lacks transparency. There is no worldwide verification mechanism to examine the exact number of nuclear weapons each country possesses. This means Washington can basically "disclose" whatever number it wants to. According to SIPRI,

as of January 2021, the US had a total inventory of approximately 5,550 nuclear warheads, while China's number was 350. This is a huge gap. In addition to the 3,750 nuclear weapons that the US State Department disclosed, the US also has about 1,750 retired warheads awaiting dismantlement. Therefore, precisely speaking, the number 3,750 was not so true. It is also unlikely that Washington will dramatically reduce its number of nuclear weapons in the future.

On the one hand, the US has announced that the number of its nuclear weapons has decreased in recent years. Yet on the other hand, it is proliferating nuclear technology to other countries. AUKUS, a trilateral security partnership between the US, the UK and Australia, is an example. The US will share its nuclear submarine technology with Australia, a country that has neither nuclear weapons nor any nuclear power stations. Upholding double standards, the US is precisely the initiator of global nuclear proliferation.

The US has another purpose: to replace old nuclear weapons with the new ones. To a great extent, the US' so-called declining number of nuclear weapons is because the country needs to eliminate old weapons, as the new ones are being developed. After its nuclear weapons are updated, the total inventory may not change too much. For example, the US Navy is now developing the Columbia-class submarine. This is an upcoming class of nuclear submarines scheduled to enter service in 2031. And the US Air Force is developing the Northrop Grumman B-21 Raider, which is able to deliver conventional and thermonuclear

weapons. All of these facts indicate that the US is strengthening its strategic nuclear force, and imposing serious threats to the whole world....

Source: <https://www.globaltimes.cn/page/202110/1235739.shtml>, 07 October 2021.

### OPINION – MZConsulting

#### Welcome Nuclear Newcomer Countries to the Nuclear Family

So far in 2021 two new countries have started producing nuclear energy for the first time. The

UAE has put the first unit of its 4-unit Barakah plant into service with the second one following close behind. In Belarus, it is the same story, as the first unit of the Ostrovetz station entered service and the second is going through its start up.

We know that the countries that have the lowest carbon emissions rely on either hydro or nuclear power (or both) as the backbone of their electricity systems. And these countries have achieved this low carbon footprint in reasonable time frames. So, a country like the UAE who has almost 100% fossil fuelled electricity will quickly decarbonize as the four-unit Barakah plant comes into service at which time nuclear will be 25% of their mix. Their further investments in renewables will help them meet their carbon targets.

Often when considering the future of nuclear power, the case of Germany comes up. Here we have a high-tech industrialized country who has decided to not only meet its climate goals without nuclear power but has put phasing it out as a higher priority than reducing emissions. This is often given as the example to demonstrate that nuclear has no future in a clean energy world.

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**So far in 2021 two new countries have started producing nuclear energy for the first time. The UAE has put the first unit of its 4-unit Barakah plant into service with the second one following close behind. In Belarus, it is the same story, as the first unit of the Ostrovetz station entered service and the second is going through its start up.**

Nothing could be more wrong. These decisions tend to be purely for ideological reasons. Germany who has invested heavily in renewables while at the same time phasing out nuclear power has struggled to meet its carbon objectives. Belgium announced it would build new gas plants to replace its nuclear fleet given its commitment to a nuclear phase out. Frankly, these countries have every right to meet their carbon targets as they see fit. But if they are so certain that renewables can do it alone, then they should just do it and remove nuclear when it is no longer needed. But this is not the case. Each of these countries has had to rely more on fossil fuel when nuclear is removed from their systems even as they invest heavily in new renewables.

Given the urgency of decarbonizing the world, the solution is clear. Countries that rely on fossil fuel for their energy should pursue both hydro and nuclear for their baseload needs and supplement with renewables to fully decarbonize their systems. Unfortunately, hydro is limited by geography but nuclear can be implemented almost anywhere. This means nuclear is an important option and countries planning to decarbonize are taking note.

According to the IAEA there are up to 30 countries looking into nuclear power for the first time. The World Nuclear Association (WNA) has just this month updated its biannual Nuclear Fuel Report. In this report the industry surveys companies around the globe to develop its scenarios. This year's update sees an expansion of the market with new countries embarking down the path of deploying nuclear power. In the reference scenario there are 9 new countries including Bangladesh, Egypt, Ghana, Indonesia, Kenya, Poland, Saudi Arabia, Turkey and Uzbekistan. Of these countries, Bangladesh, Egypt and Turkey have their first plants under construction. The Upper Scenario adds an additional 7 countries: Chile, Jordan, Kazakhstan, Nigeria, Philippines, Thailand and

Vietnam. And there are others who are starting to consider nuclear for their future.

All of these projections do not take into consideration the increased demand on energy systems as the goal becomes net zero carbon emissions. Once those pledged to meet net zero by 2050 start to develop their plans, and with the new nuclear options such as SMRs entering the market, we expect to see many more countries taking a hard look at implementing nuclear as part of their future energy systems.

So, for those countries that are truly committed to decarbonizing their energy systems and want to deploy nuclear as part of their solution – welcome to the nuclear family – you are on the path to abundant, reliable, and economic low carbon energy.

*Source: <https://mzconsultinginc.com/welcome-nuclear-newcomer-countries-to-the-nuclear-family/>, 30 September 2021.*

**OPINION – Ankit Panda**

**North Korea's New 'Hypersonic Missile': Not a Game Changer Just Yet**

North Korea has announced that it successfully tested a new "hypersonic missile" on 28 September 2021. The country's Academy of Defence Science said that a newly developed missile, dubbed the Hwasong-8, was flight-tested for the first time and carried a "hypersonic gliding warhead." State media described the missile as a "strategic weapon," which is a euphemistic way of implying that it is nuclear-capable.

While North Korea's claims of testing "hypersonic" missile technology will no doubt raise concerns in Northeast Asia about its continued qualitative progress with missile technologies, this latest test does not represent a game-changing development in the region. A theme in North Korea's missile development efforts since 2017 has been attempt

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to defeat missile defenses. A hypersonic glider presents one technological path to stressing existing U.S., South Korea, and Japanese missile defense capabilities. But instead of breathlessly panicking about this new capability, policymakers should understand that “hypersonic” missile technologies are not a monolithic class of superweapons, but vary in types, with each offering different advantages and trade-offs. In strict terms, all that’s conveyed by the word “hypersonic” is that the weapon in question travels at a speed of more than five times the speed of sound (Mach 5). All LRBMs, in this sense, are “hypersonic” — even missiles that North Korea first flight-tested in 1990s, for instance....

It’s not difficult to understand why North Korea might be interested in gliders. This technology is seeing significant interest across the world’s major missile powers and is perceived to be essential for defeating missile defenses. But while North Korea’s scientists and engineers may see this project as worthwhile, there are already ways in which Pyongyang’s missile arsenal can overwhelm and stress missile defenses. For instance, North Korea could rely on simply saturating missile defenses with large salvo launches in a conflict. This concept was tested in 2016 and 2017, when North Korea carried out simultaneous launches of multiple ballistic missiles. Additionally, newer North Korean quasi-ballistic missiles first tested in 2019 also exhibited flight characteristics similar to a hypersonic glider, spending much of their time in the earth’s atmosphere while maneuvering to their target.

Beyond the claims of the North Korean Academy of Defense Science and a single photograph

released by state media, there’s little data at the moment that would allow for detailed insight into the military utility of this new North Korean missile. But the bigger picture here is that North Korea remains a nuclear-armed state with an increasingly diverse and capable array of delivery systems.... Kim is slowly, but surely working his way through the expansive military modernization wish list he laid out in January 2021. Apart from new cruise missiles and hypersonic gliders, Kim also alluded to multiple warhead ICBMs and more responsive solid

propellant-based ICBM. With the newly tested hypersonic glider, Kim appears to have kept his word. Without diplomacy to dissuade further testing, we shouldn’t be surprised to see North Korea test more advanced weapons in the coming months. The missile-testing campaign of

the 8th Party Congress is in full swing.

Source: <https://www.19fortyfive.com/2021/09/north-koreas-new-hypersonic-missile-not-a-game-changer-just-yet/>, 29 September 2021.

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#### OPINION – SD Pradhan

### **Pak Nukes with Taliban: Deserves Serious Attention of the World Community**

While 22 US Senators have introduced a legislation titled ‘Afghanistan Counterterrorism, Oversight, and Accountability Act’ seeking sanctions on the Afghan Taliban and the foreign governments that support the outfit, referring to the Pak role, experts and the US generals with deep knowledge about Pakistan-Taliban nexus paint a more worrisome dimension of the possibility of the Taliban acquiring nuclear weapons from Pakistan - a nightmarish scenario.

This assessment comes as no surprise in view of close contacts of the ISI/Pak Army with the Taliban

since long. The Taliban not only received shelter but were given weapons in Pakistan. Al Qaeda leaders were also provided with safe houses and the necessary support. In addition, there are 12 Pak-based terrorist outfits. Recently, the Taliban received direct support to capture Kabul and Panjshir. ISI Chief was in Kabul to ensure that the Haqqani network gets the important positions in the interim government as also sidelining of Mullah Baradar. The Pak political leaders are gleefully projecting their role in the capture of Afghanistan by Taliban. Pakistan is manipulating the Taliban with a single purpose of having a strategic depth against India.

Bolton, who served as the national security advisor under then-President Donald Trump, has stated that the Taliban could obtain nuclear weapons from Pakistan pointing out that parts of the Pakistani government are directly responsible for Taliban's return to power. He aptly described Pakistan as 'the only government consisting simultaneously of arsonists and firefighters'. Another expert Marino, who specializes on South Asia has stated that Pakistan's nuclear buttons were 'already in a terrorist organization's hands'. She underscored the role of Pakistan in turning Afghanistan into an epicentre of terrorism. She strongly suggested that allowing nuclear weapons to continue in the hands of such a State could yield consequences that 'will be much worse than any war'.

The US top generals - Chairman of the Joint Chief General Milley and General McKenzie of US Central Command - had warned Biden that a rushed withdrawal from Afghanistan could increase risks to Pak nuclear weapons. They

however declined to discuss more on their concerns about Pakistan's nuclear weapons and the potential that they could fall into the hands of terrorists, in an open session. Earlier, former Director of CIA Haspel during her confirmation in 2018 had stated that the CIA was greatly concerned about the safety of Pak nuclear arsenal and was closely monitoring the nexus between the Pak based terrorists and the Pak

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nuclear scientists. An examination of the earlier reports of various terrorist groups having close nexus with ISI/Pak Army operating from Pakistan-Afghanistan region trying to obtain nuclear weapons with the help of Pak scientists suggests a distinct possibility of Taliban and other allied outfits obtaining Pak nukes.

Several Pak nuclear scientists were reported to had close links with Al Qaeda and LeT. Al Qaeda had links with well-known Pak nuclear scientists like Sultan Bashiruddin Mahmoud and Abdul Majid. George Tenet, a former CIA Director, in his book has mentioned that Sultan Mahmoud had met Osama bin Laden in August, 2001 and had provided the rough design of a bomb to the Al Qaeda in August 2001. David Albright a former UN inspector and a well-known expert had also concluded that Majid and Mahmoud had provided significant assistance to Al Qaeda....

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The possibility of ISIS/IS-K acquiring nuclear weapons from Pakistan also cannot be ruled out. In 2016, after the massacre in Brussels, it was learnt that the ISIS fanatics, who were behind the attack, were planning an attack on the Belgium nuclear power plants and had surveyed the areas. Afzal Ashraf, a former senior officer in the RAF and a counter-terrorism strategist for US Army in

Iraq, said Pakistan was “the most likely place” for ISIS to obtain a nuclear explosive.

What if internal Taliban take over nuclear assets?” The above scenario is not a part of fertile imagination. In the past, highly secured armed forces areas were attacked by the terrorists and radicalised soldiers. At

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least six facilities widely believed to be associated with Pakistan’ nuclear programme have so far been targeted by the terrorist groups. These include a suicide bomber attack on a bus carrying workers to Sargodha air base in Nov.2007, attack on a bus outside Kamara air base in Dec.2007, attack by Pakistani Taliban suicide bombers in Wah cantonment what experts believe to be Pakistan’s main nuclear weapons assembly depot in Aug, 2008, attack on Karachi Army Headquarters in 2009, assault on the naval base (PNS Mehran) in Karachi in 2011, and the attack on Minhas air force base in Kamara in August 2012....

The above certainly underline the threat of nuclear weapons falling into the hands of Taliban and its allies, which could be facilitated by the jihadi/rogue officers in the Pak Army and there is no dearth of such elements in the Pak Army. This aspect becomes scarier when we take into account the fact that Pakistan has developed tactical nuclear weapons and intends to deploy them along the Indo-Pak border. It would be easy to take over the control of such Pak nukes. Nukes in the hands of Taliban and its allies would be a threat to all countries including US, Russia, China, Central Asian countries and India. The situation has reached to such an alarming stage that the world community cannot afford to ignore it. Besides keeping a close watch on the Taliban and its terrorist allies, an effective pre-emptive

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strategy needs to be put in place by the world community involving innovative manoeuvres to take over control of the Pak nuclear arsenal, when the situation arises.

Source:[https://times of india.indiatimes.com/blogs/ChanakyaCode/pak-nukes-with-taliban-deserves-](https://timesofindia.indiatimes.com/blogs/ChanakyaCode/pak-nukes-with-taliban-deserves-serious-attention-of-the-world-community/)

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#### OPINION – John D. Maurer

### Build US Nuclear Capability to Incentivize Future Arms Control

As the Biden administration completes its NPR, it faces pressure to reduce the role of nuclear weapons in American national security policy. Some proponents of arms control argue that an NPR curtailing American nuclear modernization will reassure adversaries and signal American interest in negotiations. This emphasis on unilateral disarmament is misguided. If the Biden administration really hopes to reinvigorate nuclear arms control, its NPR should commit to modernizing the American arsenal as quickly as possible. The new NPR should explain how rapid American nuclear modernization will contribute to future arms control discussions by incentivizing Russian and Chinese leaders to negotiate. Only by rebuilding our own arsenal can we hope to achieve meaningful arms control in the future.

Since the end of the Cold War, US has enjoyed a holiday from nuclear competition. That holiday is over. Russia has spent the last decade developing newer and more lethal nuclear weapons. Soon, Russia may add new types of weapons, including

intercontinental torpedoes or nuclear-powered cruise missiles. More distressingly, China has abandoned its limited nuclear posture and procured its own nuclear triad, including hundreds of new intercontinental missiles that could carry thousands of new warheads. By comparison, American nuclear modernization remains at least a decade away.

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Most Americans would prefer to limit the role of nuclear weapons, but Russian and Chinese leaders do not agree. Their rapid nuclear modernization matches their revisionist ambitions to establish a new world system that is less open, less free, and less safe for anyone other than themselves. Nuclear modernization expands Russian and Chinese coercive power and challenges the credibility of American security guarantees around the world. The relative speed of Russian and Chinese nuclear expansion creates the impression that the United States is unfocused and unserious about sustaining its global security role. Modernized and expanded Russian and Chinese nuclear arsenals will hang ominously over future crises, constraining American options and further incentivizing sudden and dangerous aggressive actions....

The future of great power arms control depends not on American forbearance, but American strength. This should not be surprising. Naval arms limitation in the 1920s depended critically on the American naval building programs of the early twentieth century. Strategic nuclear arms control flourished not during the unilateral restraint of the 1960s, but the renewed American nuclear modernization of the 1970s and

1980s. Indeed, the gold standard for bringing a recalcitrant partner to the arms control table remains the NATO Dual Track decision of 1979, in which the United States and its European partners committed to deploying new intermediate-range nuclear missiles while simultaneously demanding sharp limits on such weapons from the Soviets. These successes are not difficult to explain: great

powers negotiate when they feel that doing so will limit *the other side*. Faced with unilateral disarmament, adversaries prefer to take the win without any concessions of their own. American strength may not always be sufficient for arms control success, but it is always necessary.

In drafting the new NPR, the Biden administration should keep in view this long and successful record of negotiating from strength. The new NPR should adopt a simple mantra: build nuclear capability to incentivize future arms control. Unilateral restraint will not help in a world where hostile revisionist powers seek to use nuclear weapons to rewrite the rules of the game. Under these conditions, downgrading the role of nuclear weapons in

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American policy would be seen by allies and adversaries alike as weakness, not goodwill. To counter revisionist coercion, reassure American allies, and create conditions for future limitations, the Biden administration's NPR should commit to nuclear modernization, and tie that modernization to specific arms control objectives for future negotiation.

*Source: <https://nationalinterest.org/feature/build-us-nuclear-capability-incentivize-future-arms-control-194972>, 08 October 2021.*



OPINION – William Nuttall

**How Nuclear Energy can Help Make all UK Electricity Green by 2035?**

PM Johnson is set to announce at the Conservative Party conference in Manchester that all of Britain's electricity will come from renewable sources by 2035. The government suspects that the British public – tired of petrol station queues and dreading winter gas bills – will like the idea of moving away from fossil fuels. But the nature of this energy crisis, stoked by a late summer lull in wind power generation, high wholesale gas prices and Britain's meagre prospects for storing energy, demands a careful response.

And what energy technology offers low-carbon credentials and a reliable base supply? The UK government's emphatic answer appears to be nuclear power. Only three years ago, UK ambitions for new nuclear power plants were in trouble. Major Japanese conglomerates Toshiba and Hitachi had pulled the plug on their separate nuclear projects in the country. But with renewed support from Boris Johnson's government, one of these now appears to be back on the table.

It was recently revealed that there are ongoing discussions between the government and American partners about US nuclear engineering firm Westinghouse building a new nuclear power plant on the island of Anglesea in north Wales. There is even talk of government support for Derby-based industrial giant Rolls-Royce to develop a series of smaller modular nuclear reactors. These are, in essence, scaled-down versions of traditional power plants that will generate 470 megawatts of electricity compared with the 1,000 megawatts from their

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larger equivalents. Importantly, with these new designs, true factory-based manufacture becomes possible. The factories produce modules for rapid assembly on-site. There are likely to be benefits for British businesses in the government's approach. But how would a new generation of nuclear plants help keep the lights on while cutting emissions from the energy sector?

**The Nuclear Option:** The reactors in nuclear power stations convert the heat generated by splitting atoms (a process known as nuclear fission) to electricity, and can usually run at maximum power for months, whatever the weather. This process doesn't emit greenhouse gases – although there are likely to be emissions during the construction of the plant itself. The vapour that rises from the iconic cooling towers of a nuclear power plant is water, not carbon dioxide. Large nuclear power stations have huge turbine generators spinning at high speed. These hold their speed in the face of small national fluctuations, providing stability to the grid. A constant base supply of nuclear power could continue to meet demand when renewable generation falters because the wind isn't blowing and the Sun isn't shining.

There are other ways nuclear energy can aid decarbonisation. Heat generated in nuclear reactors might be pumped into the central heating systems of homes and other buildings, replacing fossil gas boilers. Nuclear energy could even go towards producing hydrogen fuel – a form of stored energy with potential benefits in heating and transport. And because nuclear fuel like uranium is what's called energy-dense, even relatively small amounts can offer an ample supply. The UK also has its own fuel factory and plant for enriching uranium, allowing



greater national control over the entire process.

There remain concerns about the cost and safety of nuclear power. But these should now be placed in the context of climate change. Fossil fuels in power generation must end, and the stable and continuous operation of nuclear power plants is a useful complement to the varying output of renewable sources such as wind and solar. This appears to be the government's logic, favouring a boost to both nuclear and renewables investment. UK governments have pushed to rebuild British's nuclear capacity more than once in the last two decades. When Tony Blair was prime minister, he aimed for a series of very large nuclear power plants. The construction of the first of these, Hinkley Point C, is well underway. The pandemic and other problems have caused delays, but the first electricity generated from its two large reactors is expected in the summer of 2026...

**So far, instead of considered thought, we get shouting about floating Chernobyl's. Unfortunately, we have also seen the leaders of the major parties rushing to say there will be no nuclear power in Australia. Maybe this is only temporary. As with defence, so in energy production, reality intervenes. You can deny gravity as much as you like, but apples will still fall from trees.**

Nuclear technology is back in the government's sights, but this time it will involve more British money and technology. Talk of a green future has been joined with voices on the right clamouring for a new sense of national self-reliance, free from the vicissitudes of global fossil-fuel supply. Despite such realities, and the many difficulties encountered along the way, the UK nuclear renaissance remains internationalist in outlook. It is a strength that should be defended.

Source: <https://theconversation.com/how-nuclear-energy-can-help-make-all-uk-electricity-green-by-2035-169185>, 07 October 2021.

**OPINION – Alex Coram and Stephen Anthony**

**Australia Must Leverage Nuclear Subs for Civilian Energy Too**

Regional events have sharpened Australia's defence policies. The most obvious response of the Morrison government is committing us to an alliance with the US and the UK to share and buy

nuclear submarine technology. This has sorted out a messy procurement process that didn't seem to be delivering worthwhile results. PM Morrison deserves credit for trying to do this much.

Is the new arrangement in our best strategic interests? We don't know. Do we need submarines? We don't know. If we have submarines, should they be nuclear powered? Most likely. What we know is that the decision to choose nuclear-powered submarines has brought Australia face to face with one of the most important technologies of our time. Leaving aside strategic implications, this is a commendable move....

The main lesson is that the technologies required for major sectors of our economy, and for defence, should be determined by serious analysis of the outcomes we are trying to achieve. They should not be determined by popular opinion or ideology. It may take some time to learn this lesson. So far, instead of

considered thought, we get shouting about floating Chernobyl's. Unfortunately, we have also seen the leaders of the major parties rushing to say there will be no nuclear power in Australia. Maybe this is only temporary. As with defence, so in energy production, reality intervenes. You can deny gravity as much as you like, but apples will still fall from trees.

**Should we Follow a Third World Trajectory?** The decision to build nuclear submarines presents a number of alternatives and opportunities. One option is to follow a Third World trajectory. This means we remain technologically backward and import most of the defence expertise we need. This approach has historic precedents that didn't end well for us. Another is to have the confidence to expand our high-tech capacity. This would mean significant participation in the design, supply chains and building of new submarines. It would mean developing our engineers, manufacturers, scientists, skilled tradespeople, systems analysts and so on in the program from the outset. This is

what the Macroeconomics discussions with supply chain subcontractors supported. If we do this, why not think seriously about linkages between defence and economic growth by developing some civilian nuclear capacity? Why not extract full value from defence spending by linking it to other pressing policy issues?

We understand, of course, that the energy systems in submarines are not the same as civilian reactors. On the other hand, there are significant crossovers. There are also agglomeration effects from having the same technological capacity across the economy. And if we are going to be serious, why not start now? There is plenty of opportunity for involvement. We are entering a period of enormous innovation in nuclear energy. This is driven by governments and private firms such as Bill Gates' TerraPower, Rolls-Royce, GE-Hitachi and a large number of start-ups with technologies ranging from large to micro units.

It is sometimes said that we can't have nuclear energy in Australia because we don't have the capacity, or it would take too long. We can do better than this. As well as defence, we have a pressing issue in getting emissions as low as possible as quickly as possible. In the real world, all we know is that nuclear could provide most of our electricity. Attempting to rely on solar and wind hasn't worked well so far. Consider Germany, for example... In the absence of careful consideration, the risks of excluding nuclear from our energy mix are more than Russian-roulette high. Shouting from the rooftops about Chernobyl doesn't reduce them.

**Alternative Energy Systems:** Where is the detailed official analysis of alternative energy

systems – including basic economics of total systems costs, comparative costs, opportunity costs, options values along trajectories, discount rates, security functions, uncertainties and so on? If there is an argument against nuclear energy, it has to be made. It isn't good enough to just assert the same old tired lines about cost in some sort of economics-free zone. Or spent fuel. Or terrorism. Or whatever. Who knows what the opportunities might be if we choose the high-tech

option in defence and energy? Surely state governments that want to foster manufacturing and innovation need to foster relevant capabilities. Indeed, this is our idea of a big Australia policy and not some population Ponzi scheme... If we live in dynamic times which require new deterrents, it would seem that developing the technical capacity to match our military aspirations and working with other countries on energy issues can only help our security. Being low-tech and dogmatic might not be so helpful.

Source: <https://www.afr.com/policy/economy/australia-must-leverage-nuclear-subs-for-civilian-energy-too-20211010-p58ysj>, 11 October 2021.

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## NUCLEAR STRATEGY

### NORTH KOREA

#### North Korea Says it Fired 'Remarkable' New Anti-Aircraft Missile in Test

North Korea fired a newly developed anti-aircraft missile on 30 September 2021, the latest in a recent series of weapons tests that has come as denuclearisation talks with the US have deadlocked. It was North Korea's second known weapons test in a week after the launch of a

previously unseen hypersonic missile on 28 September 2021. It has also fired ballistic missiles and a cruise missile with potential nuclear capabilities in recent weeks.

The UNSC met behind closed doors on 1 October 2021 to discuss the latest tests and Washington said it was assessing the missile launches. The tests highlighted how North Korea has been steadily developing increasingly sophisticated weapons, raising the stakes for efforts to press it to give up its nuclear and missile programmes in return for U.S. sanctions relief. The Academy of Defence Science, a military weapons developer, said the test was aimed at confirming the practical functionality of the missile's launcher, radar, comprehensive battle command vehicle and combat performance. The missile has new key technologies such as twin rudder control and double impulse flight engine....

North Korea has said in recent weeks that its weapons tests are aimed at boosting its defence capabilities just as other countries do, accusing the US and South Korea of "double standards" and "hostile policy" toward it. On 29 September 2021, Kim said he has no reasons to attack South Korea and was willing to reopen severed inter-Korean hotlines. But it criticised Biden administration for using "more cunning ways and methods" in pursuing hostile policy while proposing dialogue...

Analysts say the North's carrot-and-stick approach is aimed at securing international recognition as a nuclear weapons state and driving a wedge between the United States and South Korea, with an eye on Moon's desire for a diplomatic legacy before his term ends in May. The Biden administration has said it has no hostile intent toward North Korea and has called on it to accept its offers of talks to break the impasse over denuclearisation negotiations....

Source: <https://www.reuters.com/world/asia-pacific/nkorea-says-it-conducted-anti-aircraft-missile-test-yesterday-kcna-2021-09-30/>, 01 October 2021.

## **PHILIPPINES**

### **Philippine Navy Receives Mistral 3 Surface-to-Air Missiles**

The Philippine Navy on 10 October 2021 took delivery of its first-ever Mistral 3 SAMs as part of the military's ongoing modernization program.

Delivered by French-based arms missile manufacturer MBDA, the new weapon system will be fitted to the country's BRP Jose Rizal (FF-150) and BRP Antonio Luna (FF-151) naval warships.... The deal costs 600 million Philippine pesos (\$12.3 million) and was procured

through a negotiated agreement with the MBDA.

**'Strengthening Warfare Capability':** The Mistral is a short-range air defense missile system that can be used on military vehicles, helicopters, and surface ships. Around 40 armed forces from various countries are reportedly using the system... Although the precise number of delivered Mistral missiles was not disclosed for security reasons, it was revealed that the navy is expecting another set of missile technology in 2022....

Source: <https://www.thedefensepost.com/2021/10/11/philippines-navy-mistral-missiles/>, 11 October 2021.

## **USA**

### **USAF F-35As Complete Design Certification for B61-12 Nuclear Weapons**

The USAF has completed the nuclear design certification process for use of the B61-12 air-launched tactical gravity nuclear bomb with the F-35A Lightning II conventional take-off and landing stealth multirole combat aircraft. During

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the first Full-Weapon System Demonstration of a Lightning II platform configured for a nuclear strike role, two F-35As from the 422nd Test and Evaluation Squadron – part of the USAF Air Combat Command's (ACC's) 53rd Test and Evaluation Group operating out of Nellis Air Force Base in Nevada – conducted two separate drops of high-fidelity, non-nuclear B61-12 Joint Test Assemblies at Sandia National Laboratories' Tonopah Test Range on 21 September.

"The [aircraft] released the inert weapons at varying altitudes and airspeeds, clearing the desired flight envelope in which the F-35A plans to operate," the F-35 Joint Program Office (JPO) said on 4 October. The last of 10 guided releases of B61-12 test assets on the F-35A, the event in September marked the first release of the most representative B61-12 test asset from an operationally representative F-35A, and moves the platform "one step closer to becoming the next air force aircraft, and first fifth-generation platform, to achieve compatibility with the refurbished B61-12 nuclear gravity bomb," the JPO said.

Source: <https://www.janes.com/defence-news/news-detail/usaf-f-35as-complete-design-certification-for-b61-12-nuclear-weapons>, 11 October 2021.

**BALLISTIC MISSILE DEFENCE**

**JAPAN**

**Japan Explores Defense Options for Emerging North Korean Threats**

Recent North Korean rocket tests have raised the possibility that Japan's current missile defenses may be rendered ineffective, forcing policymakers here to consider new options including a

**Recent North Korean rocket tests have raised the possibility that Japan's current missile defenses may be rendered ineffective, forcing policymakers here to consider new options including a constellation of small tracking satellites and the ability to attack the missile launch itself in enemy territory.**

constellation of small tracking satellites and the ability to attack the missile launch itself in enemy territory. North Korea test-fired a projectile toward the Sea of Japan on Sept. 28, later identifying it as the Hwasong-8 — a hypersonic missile whose speed and complex trajectory would make it almost impossible for a missile shield to shoot down. This came less than two weeks after a pair of

ballistic missile test launches by North Korea on Sept. 15. The Japanese government announced shortly after the firings that the missiles had likely fallen outside its exclusive economic zone. But Tokyo did an about-face nine hours later, reporting that they had in fact landed in the EEZ. The weapons were apparently capable of changing trajectories and extending their flight distance. They were no longer following simple parabolic paths, making them hard to track.

Japan's Self-Defense Forces currently predict missile trajectories based on radar readings of launch angle and speed. The weapons are then met with a two-tier defense system: the sea-based Aegis missile shield while outside the atmosphere, followed by Patriot Advanced Capability-3 missiles as they reenter.

**Japan's Self-Defense Forces currently predict missile trajectories based on radar readings of launch angle and speed. The weapons are then met with a two-tier defense system: the sea-based Aegis missile shield while outside the atmosphere, followed by Patriot Advanced Capability-3 missiles as they reenter.**

The system is designed for missiles traveling on a simple parabolic path, like a ball thrown in the air. But North Korea has been developing trajectory-shifting missiles in recent years that would make it much more difficult to intercept them in time or as accurately. A low-altitude flight can also hamper tracking efforts, rendering the missile invisible when flying beyond the horizon. The Aegis system also cannot shoot down missiles unless they leave the atmosphere...

"Japan's current missile defense system will not hold" against an onslaught of hypersonic,



trajectory-shifting missiles, an SDF official said. The first challenge is how to improve detection. Japan and the U.S. must deploy a constellation to minimize blind spots, said Tetsuo Kotani, professor of global studies at Meikai University. "We need to increase the number of sensors in order to improve our ability to detect missiles," he said. The more eyes that look down from space, the more they can see. The Ministry of Defense began weighing the possibility of such a satellite constellation this fiscal year. Top officials held their first meeting on the topic the day before North Korea's hypersonic missile launch.

Another challenge is intercepting the weapons—a task that will be easiest just after they take off. The capability to strike enemy bases—such as hitting missile-staging areas immediately after launch to stop projectiles while still in an opponent's territory—also emerged as a key topic during September's leadership election for the ruling Liberal Democratic Party.... There is some concern about whether such strikes comport with Japan's constitution, which allows only self-defense capabilities. But unlike preemptive attacks, the strikes now being debated here would occur only after it has been determined that Japan is being attacked.

Meanwhile, military technology continues its forward march. Japan will need to accelerate development at home rather depend so heavily on U.S. cooperation. Japan's defense spending is set to increase for a ninth straight year in fiscal 2021. But the country has hesitated on major increases so far, aiming to stay at around 1% of gross domestic product. Japanese spending has risen only about 10% over the last decade,

even as China's budget has more than doubled. The latest North Korean missile test came as Japan was transitioning between governments. As its new leader, Kishida now faces a key opportunity to weigh the rapid shift in Japan's security environment and consider overhauling its defense framework.

Source: <https://asia.nikkei.com/Spotlight/N-Korea-at-crossroads/Japan-explores-defense-options-for-emerging-North-Korean-threats>, 11 October 2021.

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## POLAND

**Poland Kicks Off Homegrown SHORAD System: Narew**

During the 29th International Defense Industry Exhibition (MSPO) the Polska Grupa Zbrojeniowa (PGZ) consortium signed what may be the most important contract in the history of the Polish defense industry — a framework agreement for the acquisition of a short-range air defense missile system under the code-name "Narew." Underlining the significance of the signing was the presence of President Duda and Minister of National Defense B³aszczak, who blessed the new agreement. Duda declared the contracts a sign of "further progress in the modernization of the Polish Armed Forces," calling it the "largest and most complex contract in the history of Polish Armed Forces — dozens of billions of zlotys and a total of almost 400 launchers." He also noted the potential economic impact on a variety of Polish firms who could take part in the Narew project in the coming years...

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The scope of the executory agreements involves the development and delivery of components and subsystems for 23 systems, including technology

and technical expertise acquisition, industrial capacity development, project management, and system integration. The adopted formula — with a framework agreement that serves as an umbrella for a number of smaller deals — aims to minimize the risk and allow optimization of program management, both for the military and industry.

The estimated value of the contract is 50-70 billion zlotys, roughly a \$12.5 to \$17.6 billion range. According to Poland's MND, signing contracts with suppliers of individual elements of the system should end in 2023. The goal is to integrate Narew capabilities with existing Polish radar systems as well as the Patriot systems already procured from the US. Overall, Narew will consist of newly-procured vehicles; engagement control stations; engagement operation centers; EO systems; mobile communication nodes; a multimode fire control radar called "Sajna," which serves as an early warning radar with passive coherent location and passive emitter tracking capabilities; as well as air defense missiles and launchers, which will be acquired from a foreign partner under the technology transfer....

According to the schedule, the first live firing of the Narew system elements is to take place in 2026. As designed, Narew will replace three aging capabilities with one new system: the Army's obsolete 2K12 Kub (SA-6 Gainful) mobile surface-to-air missile system and 9K33 Osa (SA-8 Gecko) mobile, low-altitude, short-range tactical surface-to-air missile system, along with the Air Force's Nawa SC (SA-3 Goa) surface-to-air missile system.

The basic task of the Narew system will be

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**The basic task of the Narew system will be protection of the Polish Armed Forces units and facilities and air bases, complementing the Wis<sup>3</sup>a (Patriot) medium range air defense and anti-ballistic missile system, to create a national, allied and coalition air defense system in all-weather, day and night conditions.**

protection of the Polish Armed Forces units and facilities and air bases, complementing the Wis<sup>3</sup>a (Patriot) medium range air defense and anti-ballistic missile system, to create a national, allied and coalition air defense system in all-weather, day and night conditions. The Narew system will be used primarily to engage multi-role aircraft, cruise missiles and UAVs operating on low altitudes....

Source: <https://breakingdefense.com/2021/10/poland-kicks-off-homegrown-shorad-system-narew/>, 08 October 2021.

## USA

### US Space Force Missile Warning System Ready for Launch

The USSF sixth and final Space Based Infrared System Geosynchronous Earth Orbit satellite (SBIRS GEO-6) is ready for launch

after completing production in early September. The Lockheed Martin satellite, built on the company's LM 2100 spacecraft, is expected to be launched in the first half of 2022 aboard a United Launch Alliance-developed Atlas V 421 rocket. According to the USSF, the LM 2100 spacecraft

provides "greater resiliency and cyber-hardening against growing threats, as well as improved spacecraft power, propulsion and electronics," than previous models.

### Space Based Missile Warning System:

The SBIRS is an infrared-based early warning satellite system that includes a combination

of satellites and payloads in Geosynchronous Earth Orbit and Highly Elliptical Orbit. Once launched, the satellite, equipped with "powerful scanning and staring infrared surveillance sensors," will join the Space Force's other missile warning satellites. The sensors will provide vast amounts of data to "detect missile launches, support ballistic missile defense, expand technical intelligence gathering

and bolster situational awareness on the battlefield.”

**SBIRS Successor:** The USSF, meanwhile, has already begun work on a successor to the SBIRS program, the Next-Generation Overhead Persistent Infrared (OPIR) missile warning satellite. According to the agency, the Next-Gen OPIR, which passed a critical design review in August, will utilize more capable sensors to detect enemy missiles through their heat signatures.

**Need for System Upgrade:** A senior materiel leader for Next-Gen OPIR at Space and Missile Systems, Col. Dan Walter, explained why the USSF now needs a missile warning system with more capable sensors: “There are shorter burn missiles, there’s advanced fuel, there’s a larger range of heat signatures.” “We are improving the capability above and beyond what SBIRS has right now to be able to detect a broader range of the missile arsenals that are out there”

Source: <https://www.thedefensepost.com/2021/10/06/us-space-force-missile-warning-ready/>, 06 October 2021.

## EMERGING TECHNOLOGIES AND DETERRENCE

### CHINA

#### China’s New Electromagnetic Missile can Cripple US, Indian Economy by ‘Knocking-Out’ Power, Communication Systems

China is developing a hypersonic missile armed with a non-nuclear warhead. Its warhead is designed to create an EMP to target an adversary’s electrical grids and disrupt its power supply, thereby causing massive economic losses. This project, being spearheaded by scientists at the China Academy of Launch Vehicle technology, could be a cause of worry for the US. According to the reports, this missile could cruise at six times the speed of

sound and cover around 3,000 kilometers in 25 minutes.

It is poignant to note that research into the electromagnetic effects of nuclear weapons on communication and electrical systems dates back to the 1950s. Global military powers like the US, Russia, China, and North Korea have since made strides in the research and development of EMP weapons systems and the addition to this new-age hypersonic technology race may give Beijing an edge over its arch-rival, the US.

**China is developing a hypersonic missile armed with a non-nuclear warhead. Its warhead is designed to create an EMP to target an adversary’s electrical grids and disrupt its power supply, thereby causing massive economic losses.**

**The chemical explosion would compress an electrically charged magnet known as a ‘flux compression generator’, which would convert the shock energy to short but extremely powerful bursts of microwaves.**

**How Does it Work?** EMP blasts were initially associated with nuclear warheads. The simple premise behind this was the emission of a significant amount of radiation. Subsequent developments such as the USAF High-Powered Microwave Advanced Missile Project (CHAMP) challenged this notion. CHAMP creates EMP explosions by leveraging a microwave generator. Chinese scientists seem to have expanded on this American concept by adding a chemical explosive warhead to generate an EMP blast. According to SCMP, the chemical explosion would compress an electrically charged magnet known as a ‘flux compression generator’, which would convert the shock energy to short but extremely powerful bursts of microwaves. The missile is expected to harness the intensity of the heat which is a by-product of the hypersonic speed. This is to be used to generate electricity which in turn powers the flux compression generation. This might lead the missile to generate significant electricity without the need for batteries.

These missiles would utilize super-capacitors that boast a power density 20 times more than batteries. Furthermore, these capacitors could be charged on the go by leveraging energy from

the heat-to-electricity generator. Chinese researchers claim that this approach could potentially offload a bulk of the energy within 10 seconds. This is suitable for instantaneous discharge to cause EMP damage. Chinese researchers said that the missile would be enveloped in a cloud which would safeguard it from the radar. Air molecules are ionized by the heat while the object travels through the air at hypervelocity. This results in a screen of plasma developing over the surface. The hypersonic missile is expected to convert the heat from the environment into electricity and use it to power multiple plasma generators located in various parts of the missile's body.

**Potential Damage:** According to EMP weapon expert, Peter Vincent Pry, these weapons can be fired only once. This kind of NNEMP warhead is a 'one-shot' weapon because it is explosive-driven, unlike the USAF CHAMP that uses a microwave generator for its NNEMP warhead that can generate many EMP bursts, or project a continuous EMP field on the ground as the missile cruises. Pry highlighted that NNEMP weapons technology has undergone changes in recent times owing to the advent of more potent generators. This can be carried out by lowering the size and weight profiles which may empower it to be delivered by UAV, hypersonic vehicles and cruise missiles.

The US electrical grid could be knocked out by a Chinese EMP weapon or even those launched by smaller nations like Tehran and Pyongyang. It can also damage the communication system as the EMP radiation can burn out electronic devices within a 2-km radius. However, there is another thought which believes that threats from EMP weapons are blown out of proportion. These weapons have evolved from their nuclear origins and have transitioned towards the non-nuclear realm. The advent of non-nuclear EMP weapons makes it more convenient when compared to

nuclear weapons, however, their lethality remains ambiguous....

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Amid the hypersonic race between Washington and Beijing, it is too early to predict who will have a clear edge. However, China's new EMP weapon could cause some temporary damage to

the US on the economic front using what is known as 'gray zone warfare' tactics....

Source: <https://eurasianimes.com/chinas-new-electromagnetic-missile-can-cripple-us-indian-econom/>, 10 October 2021.

## RUSSIA

### Russia Test-Fires New Hypersonic Missile from Submarine

A prospective Russian hypersonic missile has been successfully test-fired from a nuclear submarine for the first time on 4 October 2021. The Russian Defence Ministry said the Zircon missile was launched from the Severodvinsk submarine and hit a designated mock target in the Barents Sea. The launch marked Zircon's first launch from a submarine. It previously has been repeatedly test-fired from a navy frigate, most recently in July.

**Zircon missile was launched from the Severodvinsk submarine and hit a designated mock target in the Barents Sea. The launch marked Zircon's first launch from a submarine. It previously has been repeatedly test-fired from a navy frigate.**

Russian President Putin has said Zircon would be capable of flying at nine times the speed of sound and have a range of 1,000km (620 miles). Mr. Putin has emphasised that its deployment will significantly boost Russian military capability. Officials said Zircon's tests are to be completed later this year and it will be commissioned by the Russian navy in 2022. Zircon is intended to arm Russian cruisers, frigates and submarines. It is one of several hypersonic missiles under development in Russia. The Kremlin has made modernising the country's arsenals a top priority amid the tensions with the West that followed Russia's 2014 annexation of Ukraine's Crimean Peninsula.

Source: <https://www.thehindu.com/news/international/russia-test-fires-new-hypersonic->



missile-from-submarine/article36820524.ece, 04 October 2021.

NUCLEAR ENERGY

USA

DARPA'S Hypersonic Air-breathing Weapon Concept (HAWC) Achieves Successful Flight

DARPA, in partnership with the USAF, completed a free flight test of its Hypersonic Air-breathing Weapon Concept (HAWC). The missile, built by Raytheon Technologies, was released from an aircraft

seconds before its Northrop Grumman scramjet (supersonic combustion ramjet) engine kicked on. The engine compressed incoming air mixed with its hydrocarbon fuel and began igniting that fast-moving airflow mixture, propelling the cruiser at a speed greater than Mach 5.

The HAWC vehicle operates best in oxygen-rich atmosphere, where speed and manoeuvrability make it difficult to detect in a timely way. It could strike targets much more quickly than subsonic missiles and has significant kinetic energy even without high explosives.... Goals of the mission were: vehicle integration and release sequence, safe separation from the launch aircraft, booster ignition and boost, booster separation and engine ignition, and cruise. All primary test objectives were met. The achievement builds on pioneering scramjet projects, including work on the X-30 National Aero-Space Plane as well as unmanned flights of NASA's X-43 vehicles and the U.S. Air Force's X-51 Waverider... The HAWC flight test data will help validate affordable system designs and manufacturing approaches that will field air-breathing hypersonic missiles to our warfighters in the near future.

Source: <https://www.darpa.mil/news-events/2021-09-27>, 27 September 2021.

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SMRs are an "ideal fit" for the Australian energy market, the report finds, citing their enhanced safety, lower cost than large-scale nuclear reactors or equivalent energy production methods, configurability, and lower waste production than current reactors.

AUSTRALIA

SMRs 'Ideal Fit' for Australian Market, Report Finds

CEO Constable's remarks accompanied the MCA's launch of *Small Modular Reactors in the Australian Context*, a discussion paper authored by Australian nuclear expert Ben Heard which provides an overview of SMRs, their potential role in Australia and likely

operating costs. The 33-page document considers three of the "most advanced" SMR designs that are currently undergoing regulatory approval - NuScale's Power Module, GE-Hitachi's BWRX-300 and Terrestrial Energy's Integral Molten Salt Reactor - and their potential use in Australia. By 2030 and beyond, the levelised costs of electricity for those three SMR designs are estimated to be between AUD64 and AUD77 (USD46 and USD56) per MWh.

SMRs are an "ideal fit" for the Australian energy market, the report finds, citing their enhanced safety, lower cost than large-scale nuclear reactors or equivalent energy production methods, configurability, and lower waste production than current reactors. Furthermore, SMR modules have a similar capacity to many of the existing generator units that make up Australia's coal and gas-fired power plants so could easily replace ageing coal or gas-powered turbines without the need for additional grid investment, it says.

"Even with conservative assumptions that include higher than expected construction costs, SMRs could be Australia's lowest cost 24/7 zero emission power source that underpins reliable and secure electricity supplies," Constable said. "The MCA has long advocated that Australia needs to

consider zero emission nuclear energy, along with carbon capture use and storage, and renewable energy, as the country moves to decarbonise the economy. "Changes in the economic, trade, security, policy and technology environments in which Australia operates means that all options for low-carbon energy sources must be considered. SMRs offer part of the solution to addressing this necessary requirement."

With one third of the world's uranium reserves, Australia's "significant" uranium mining sector supplies about 10% of global demand, Constable said. This would be enough uranium to power "almost the entire output of the national electricity market" with low cost zero emission power, she added. "Despite this, outdated federal and state bans on nuclear power have seen Australia fall behind as the only G-20 country without access to nuclear energy or plans to develop it," she said. "Australia should take advantage of growing international interest in nuclear energy and look to expand its already significant uranium sector."

Although the Australian Nuclear Science and Technology Organisation (ANSTO) has operated nuclear reactors for research and isotope production since the 1950s and currently operates the OPAL reactor, the use of nuclear power in the country is currently prohibited by federal and state-level regulations. A parliamentary committee in 2019 recommended that the government should consider a partial lifting of the current moratorium on nuclear energy to allow the deployment of new and emerging technologies. It is embarking on the process to acquire nuclear submarines under the tripartite AUKUS partnership with the UK and the USA, although Prime Minister Scott Morrison at last month's AUKUS launch said Australia is not seeking to acquire nuclear weapons or establish a civil nuclear capability.

Source: <https://www.world-nuclear-news.org/Articles/SMRs-ideal-fit-for-Australian-market->

*report-finds, 06 October 2021.*

## **BANGLADESH**

### **Bangladesh Plans Another Nuclear Power Plant**

Bangladesh wants to build another nuclear power plant after its first one is completed, PM Hasina said on 10 October 2021 as work at the Rooppur plant reached a critical milestone. "If we are able to build another nuclear power plant, we will no longer face a power crisis," she said after inaugurating the installation of the reactor pressure vessel at Rooppur 1....

Addressing the event from her official Ganabhaban residence, Hasina said the

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installation made it "a day of joy and pride" for the Bangladeshi people. From now on, she said "we affirm our position in the nuclear world and contribute to the peaceful use of nuclear technology." Since nuclear power is low-carbon, Hasina continued, "it is therefore environmentally friendly

and helps to combat the adverse effects of climate change. In line with our plans for the development of the country, our power plant will help us achieve the Sustainable Development Goals by 2030 and contribute to a gradual transition to become an industrialised country by 2041...."

Source: <https://world-nuclear-news.org/Articles/Bangladesh-plans-another-nuclear-power-plant>, 11 October 2021.

## **GENERAL**

### **Four Takeaways from the 2021 World Nuclear Industry Status Report**

Although there are 23 fewer nuclear reactors in the world today than at the 2002 peak of 438, the past year saw a small uptick in the number of reactors operating worldwide and a corresponding increase in the global fleet's net operating capacity. That's one data point in the World

Nuclear Industry Status Report 2021, the latest in a series of annual industry reports compiled by an international team of independent experts led by Mycle Schneider, a consultant based in Paris. The 409-page report, released, is packed with information about global and country-specific trends, but several findings stand out, and they don't bode well for the nuclear energy industry.

First, although nuclear capacity is up, nuclear electricity production is down. As of mid-2021, there were 415 nuclear reactors operating in 33 countries, seven reactors more than a year earlier. Their total capacity was 1.9 percent higher than a year earlier. But in 2020, the worldwide nuclear fleet generated 3.9 percent less electricity than in the previous year. That was the first decrease in output since 2012, when many reactors remained shut down in the wake of the Fukushima nuclear disaster. Without China, where most of the new construction is happening, the decrease in production would look even bigger. In 2020, China for the first time produced more nuclear electricity than France, which relies heavily on nuclear energy. Only the United States produced more.

Nuclear energy's share of global electricity generation also continued its steady decline, dropping from a peak of 17.5 percent in 1996 to 10.1 percent in 2020. Although net nuclear capacity rose last year, the 0.4-gigawatt increase was minuscule in comparison with the gains made by renewable energy. "Nuclear is irrelevant in today's electricity capacity newbuild market," the industry report concludes.

Second, the report throws cold water on the prospects for small modular reactors. These reactors get a lot of media coverage and some public funding "but are so far unavailable commercially and will not be for another 10–15

years—if ever. Pilot projects in Argentina, China, and Russia have been disappointing," according to the authors.

Third, the report warned that nuclear power is less resilient than renewables to challenges such as the COVID-19 pandemic and climate change. While there is no indication that the COVID-19 pandemic compromised safety at nuclear power plants, the pandemic not only reduced nuclear electricity consumption but also affected some schedules for reactor commissioning and fuel loading.

And finally, the 2021 report for the first time devoted an entire chapter to how criminality is affecting the industry. "There is a real question about the exposure of the nuclear power sector to criminal activities including bribery and corruption, counterfeiting and other falsification, as well as infiltration by organized crime," the report says. The report cites three major corruption cases involving US nuclear energy companies in 2020. In one case involving the construction of two new reactors, the United States Attorney for South Carolina has charged two Westinghouse officials with multiple felonies....

*Source: <https://thebulletin.org/2021/10/four-takeaways-from-the-2021-world-nuclear-industry-status-report/>, 01 October 2021.*

**The report throws cold water on the prospects for small modular reactors. These reactors get a lot of media coverage and some public funding "but are so far unavailable commercially and will not be for another 10–15 years—if ever.**

**The Romanian government has adopted an integrated energy plan that calls for two new CANDU reactors at Cernavoda by 2031 and the refurbishment of an existing unit there in 2037. It would double the country's nuclear power supply in a decade....**

## **ROMANIA**

### **Romanian Energy Policy will See Nuclear Double**

The Romanian government has adopted an integrated energy plan that calls for two new CANDU reactors at Cernavoda by 2031 and the refurbishment of an existing unit there in 2037. It would double the country's nuclear power supply in a decade.... The plan is designed to address

the five main aspects of collective energy policy for countries in the EU: energy security, decarbonisation, energy efficiency, the internal energy market, and research, innovation and competitiveness. Drafts of the document have been commented on by professionals and civil society groups, as well as by the European Commission. The final version is now to be logged with the EU.

Nuclear energy already plays a major strategic role in Romanian power supply, with two CANDU reactors at the Cernavoda power plant supplying about 19% of electricity, and under this plan it would double in size. Construction of Cernavoda started in 1983 under the regime of former President Ceau'escu and the two units were completed in 1996 and 2007. Two more CANDUs were always planned for the site and it is Romania's firm policy to complete them.

The plan approved on 4 October 2021 foresees these new units - Cernavoda 3 and 4 - starting up in 2030 and 2031, respectively, with capacities of 675 MWe each. Romania has already signed a range of agreements towards this project with international partners, including the USA, France and Canada....

Refurbishment of Cernavoda 1 and 2 is also part of the plan. Unit 1 could undergo the procedure in around 2027-8 and unit 2 after 2037, granting each unit an extra 30 years of operation. This is "an effective solution" the plan said, given service life extension "is done at costs around 40% of new equivalent capacity." By doing this the country can "ensure the supply of electricity without greenhouse gas emissions, with minimal impact on the environment, at competitive costs, thus contributing sustainably to the decarbonisation of the energy sector and achieving Romania's energy and environment targets for 2030, in line

with the objectives assumed at European and even global level (Paris Agreement)". Beyond Romania's conventional nuclear capacity, the plan also includes ongoing support for research and development of advanced reactors, specifically its ALFRED lead-cooled fast reactor design. This is funded by the European Union through the Sustainable Nuclear Energy Technology Platform and the European Sustainable Nuclear Industrial Initiative....

Source: <https://www.world-nuclear-news.org/Articles/Romanian-energy-policy-will-see-nuclear-double>, 05 October 2021.

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## **SPAIN**

### **Spain Renews Licence for Ascó I and II**

Spain's Official State Gazette (BOE) on 7 October published an Order that grants the Ascó-Vandellós II Nuclear Association (ANAV) renewal of the authorisation for the operation of the Ascó I and Ascó II nuclear plants in Tarragona. Ascó I is authorised until 1 October 2030 when it will cease operation. Ascó II received a ten-year renewal to 1 October 2031. ANAV has managed the plants since they were transferred to it in October 2014. The nuclear power plant is owned by Endesa and Iberdrola. In 2020 it produced 35% of the electricity generated in Catalonia. Ascó I was commissioned in December 1984, while Ascó II in March 1986. The Nuclear Safety Council (CSN) issued a favourable report in July supporting the extension operation.

The Ascó plant is one of Spain's five operational nuclear plants and comprises two 1030MWe pressurised-water reactor units. Ascó I (100%-owned by Endesa) went into commercial operation in 1984 and Ascó II (Endesa 85%, Iberdrola 15%) in 1986. In July, an IAEA Safety Aspects of Long-

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Term Operation (Salto) team completed a review of long-term operational safety at the plant. The review was requested by ANAV. ANAV maintains a major investment programme at the Ascó nuclear power plant to ensure the optimal state of the facility, as well as the safe and reliable operation of the plant. In recent years significant improvements have been undertaken such as design modifications arising from post-Fukushima analyses, including the installation of a filtered containment ventilation system and passive decombinators of hydrogen inside the containment building, and the commissioning of an alternative emergency management centre (CAGE), as well as other measures incorporated with the aim of increasing robustness and responsiveness to events that could go beyond their design bases. ANAV has also continued with the renewal of components and the modernisation of systems as a firm commitment to the preparation for a long-term operation...

Source: <https://www.neimagazine.com/news/newsspain-renews-licence-for-asc-i-and-ii-9145984>, 11 October 2021.

## **UK**

### **UK Commits to Decarbonise Electricity System by 2035**

The UK government has announced plans to decarbonise the country's power system by 2035, instead of the previous target of 2050. The plan focuses on building a secure, home-grown energy sector - including nuclear energy - that reduces reliance on fossil fuels and exposure to volatile global wholesale energy prices. In December 2020, the UK government published its Energy White Paper, which identified nuclear power as a way to help the country achieve the four-fold increase

**In December 2020, the UK government published its Energy White Paper, which identified nuclear power as a way to help the country achieve the four-fold increase in clean electricity generation needed to achieve its net-zero target by 2050.**

**Nuclear power supplies about 16% of the UK's electricity, but its existing fleet of reactors are approaching the end of their operating lives. In 2016, the government agreed contracts for the first new nuclear power plant in a generation - Hinkley Point C - which will provide 7% of the country's current electricity needs...**

in clean electricity generation needed to achieve its net-zero target by 2050. The White Paper, *Powering our Net Zero Future*, developed PM Johnson's *Ten Point Plan for a Green Industrial Revolution* by setting out specific steps the government will take over the next decade to cut emissions from industry, transport and buildings by 230 million metric tonnes, while supporting hundreds of thousands of new green jobs...

"While gas generation continues to play a critical role in keeping the UK electricity system secure and stable, the development of clean energy technologies means it will be used less frequently in the future," a statement from the Department for Business, Energy and Industrial Strategy (BEIS)

said. "To ensure a clean electricity system is reliable, wind and solar power will need to be complemented by other clean technologies, such as nuclear and flexible technologies, that can supply electricity or reduce demand when the output from wind and solar generation is low"... Nuclear power supplies about 16% of the UK's electricity, but its existing fleet of reactors are approaching the end of their operating lives. In 2016, the government agreed contracts for the first new nuclear power plant in a generation - Hinkley Point C - which will provide 7% of the country's current electricity needs....

Source: <https://world-nuclear-news.org/Articles/UK-commits-to-decarbonise-electricity-system-by-20>, 08 October 2021.

### **UK Government Sets out Fusion Ambitions**

The UK government has on 1 October 2021 published a strategy setting out how it will leverage scientific, commercial and international leadership to enable the delivery of fusion energy.

It has also launched a consultation seeking views on the regulatory framework for ensuring the safe and effective rollout of fusion energy. As set out in PM Johnson's *Ten Point Plan for a Green Industrial Revolution*, released in November 2020, the government wants the UK to be the first country in the world to commercialise fusion energy technology. As part of this, the government aims to demonstrate the commercial viability of fusion by building a prototype fusion power plant, STEP (Spherical Tokamak for Energy Production). The UK hopes to deliver the world's first prototype fusion power plant by 2040. The site of the demonstration plant is expected to be announced in 2022.

The government has now published its *Fusion Strategy*, which sets out these ambitions in further detail. It said the strategy has two overarching goals: firstly, for the UK to demonstrate the commercial viability of fusion by building a prototype fusion power plant in the UK that puts energy on the grid; and secondly, for the UK to build a world-leading fusion industry which can export fusion technology around the world in subsequent decades. The strategy is focused on achieving these goals by working with the UK Atomic Energy Authority - the UK's research organisation responsible for the development of fusion energy - to secure UK leadership across three 'pillars': collaborating internationally; strengthening cutting-edge scientific research; and releasing private sector innovation to achieve its commercialisation...

**Regulating Fusion:** The UK government has also published a green paper setting out its proposals for the regulation of fusion energy. The proposals cover the regulation of: occupational and public health and safety; environmental protection;

planning consent; third party liabilities; security and safeguards for radioactive material....

The government said it believes that any regulatory framework for fusion energy facilities should serve to maintain safety and security in a way that is proportionate to the hazards involved. The consultation sets out its proposals for a regulatory framework for fusion energy which are

based on this principle....

To inform policy on the regulation of fusion energy in the UK, the government has launched a consultation to share knowledge and offer views on the proposals in the green paper. The consultation closes on 24 December. The

government will publish its response in early 2022, summarising the received responses and setting out the actions that will be taken. Science Minister Freeman said: "By putting in place the crucial foundations we're setting out today, we will ensure the UK is uniquely placed to capitalise on this

innovative and revolutionary energy source in the years ahead - helping to tackle climate change and reduce our dependence on unreliable fossil fuels at the same time." Oxford, England-based Tokamak Energy, developer of the ST-40 compact spherical tokamak, welcomed the publication of the *Fusion Strategy* and the green paper....

Source: <https://world-nuclear-news.org/Articles/UK-government-sets-out-fusion-ambitions, 01 October 2021>.

## USA

### US DOE Funds Hydrogen Production from Nuclear Power

A project to demonstrate the production of clean hydrogen energy from nuclear power at the Palo

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Verde nuclear power plant in Arizona is to receive USD20 million in federal funding as part of US DOE efforts to reduce the cost of clean hydrogen to USD1 per kilogram. The announcement comes as DOE marks Hydrogen and Fuel Cell Day. The Arizona project, which is led by PNW Hydrogen LLC, will progress DOE's H2@Scale multi-sector clean hydrogen initiative and help it to reach its Hydrogen Shot goal to reduce the cost of clean hydrogen by 80% to USD1 per kilogram within a decade, the department said. Hydrogen Shot is the first of the DOE's *Energy Earthshots* initiative, launched in June 2021.

"Developing and deploying clean hydrogen can be a crucial part of the path to achieving a net-zero carbon future and combatting climate change," Deputy Secretary of Energy Turk said. "Using nuclear power to create hydrogen energy is an illustration of DOE's commitment to funding a full range of innovative pathways to create affordable, clean hydrogen, to meet DOE's Hydrogen Shot goal, and to advance our transition to a carbon-free future."

PNW Hydrogen will be the primary recipient of the award, which is made up of USD12 million from the DOE Hydrogen and Fuel Cell Technologies Office (HFTO) and USD8 million from the Office of Nuclear Energy. The project will involve producing hydrogen at Palo Verde. Six tonnes of this will be stored and used to produce about 200 MWh of electricity during times of high demand, and may be also used to make chemicals and other fuels. This will provide insights into integrating nuclear energy with hydrogen production technologies and inform future clean hydrogen deployments at scale, DOE said....

Source: <https://world-nuclear-news.org/Articles/US-DOE-funds-hydrogen-production-from-nuclear-powe>, 08 October 2021.

## NUCLEAR COOPERATION

### FRANCE-POLAND

#### France Makes Nuclear Offer to Poland

France's EDF has made an offer to the Polish government to build as many as six EPR units. A project of that size would decarbonise 40% of the country's electricity and avoid up to 55 million tons of CO2 per year, EDF said. The "non-binding preliminary offer" represents a range of options for Poland. It details the engineering, procurement and construction that would be needed for four to six EPR units, at either two or three sites. The EPR units would produce 1650 MWe each.

EDF estimates that "about 25,000 local jobs" could be created at a construction site with two EPRs, as well as "tens of thousands" of indirect jobs.

"The offer aims at meeting the objectives of the Polish Nuclear Power Programme adopted by the Polish government in October 2020," said EDF, adding: "It aims at setting the principles for a Polish-

French strategic partnership framework in support of Poland's ambitious energy transition plan, aligned with the European carbon neutrality target."

Poland plans to build large nuclear reactors in the north of the country and has been developing environmental studies while engaging with communities near Ćarnowiec and Lubiatowo-Kopalino. The state-owned project company handling the work is called Polskie Elektrownie Jadrowe, having changed its name from PGE EJ 1 in June this year.

EDF said it has been "committed to partner the Polish nuclear power programme since its inception, with the full support of the French government." Both the countries are among the

**A project to demonstrate the production of clean hydrogen energy from nuclear power at the Palo Verde nuclear power plant in Arizona is to receive USD20 million in federal funding as part of US DOE efforts to reduce the cost of clean hydrogen to USD1 per kilogram.**

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10 EU nations of the Nuclear Alliance which has demanded nuclear power be included in the EU's Taxonomy list of sustainable investment options.

The US government is also keen to support Poland's nuclear power plans, with Westinghouse promoting its AP1000 design. Westinghouse recently upped its involvement in the country by opening a regional services centre in Krakow. In parallel, Poland has a thriving small reactor scene, with energy intensive industrial companies Synthos, Ciech, KGHM, Unimot and PKN Orlen working towards upgrading to new small reactors. Synthos' subsidiary Synthos Green Energy is collaborating with ZE Pak to potentially replace coal units at the Płnów power plant with nuclear units.

Source: <https://world-nuclear-news.org/Articles/France-makes-nuclear-offer-to-Poland>, 14 October 2021.

### **SOUTH KOREA–EGYPT**

#### **Korea, Egypt Talk Cooperation in Defense and Nuclear Projects**

National Assembly Speaker Park met with President Sisi of Egypt in Cairo on 10 October 2021, to discuss Egyptian cooperation in Korean defense and nuclear projects in the Middle Eastern country.... In particular, the National Assembly speaker highlighted the competence of the Korea Hydro & Nuclear Power (KHNP), which is showing active interest in the construction of turbines for the El Dabaa plant. "Korea has experience in safely operating 24 nuclear reactors and is well acknowledged around the world for its technology, as shown in the successful operation of the Barakah nuclear power plant in the United Arab Emirates," Park said. Park also emphasized Korea's shipbuilding capabilities to President Sisi, urging the Egyptian president to

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allow Korean companies to participate in the Suez Canal shipyard construction project, saying, "Korean shipbuilding technology leads the world." Samsung Heavy Industries is known to be considering a potential bid in the project....

Source: <https://koreajoongangdaily.joins.com/2021/10/11/national/diplomacy/Egypt-diplomacy-nuclear/20211011193427577.html>, 11 October 2021.

### **NUCLEAR PROLIFERATION**

#### **IRAN**

#### **Iran's Production of 20% Enriched Uranium Exceeds IAEA Reports**

Iran has produced more than 120 kilograms (265 pounds) of 20% enriched uranium, far more than what the U.N. nuclear watchdog reported in September. Head of Iran's nuclear department Eslami

said in an interview with state TV on 9 October 2021 that under the 2015 nuclear deal with world powers, the other signatories were to provide Iran with 20% enriched uranium needed for its research reactor. "But it was not delivered," he said. "If we did not produce it by ourselves this would have turned into one of our problems." Under the terms of the nuclear deal, Iran was prohibited from enriching uranium above 3.67% with the exception of its research reactor activities. Enriched uranium above 90% can be used in a nuclear weapon.

In September, the IAEA said Iran's stockpile of uranium enriched to up to 20% fissile purity was estimated at 84.3 kilograms (185 pounds) up from 62.8 kilograms (138 pounds) three months earlier. Scientists estimate that at least 170 kilograms (375 pounds) of enriched uranium is needed to make a bomb. The nuclear deal known as the JCPOA, promises Iran economic incentives in exchange for limits on its nuclear program, and is meant to prevent Tehran from developing a nuclear bomb. Tehran insists its



program is peaceful. The U.S. unilaterally pulled out of the deal in 2018 under then-President Donald Trump, but Britain, France, Germany, China and Russia have tried to preserve the accord. Tehran's strategy of deliberately violating the deal is seen as an attempt to put pressure on Europe to provide it with incentives to offset crippling American sanctions re-imposed after the U.S. pullout. President Joe Biden has said he is open to re-joining the pact. The last round of talks in Vienna ended in June without a clear result.

Source: <https://www.dailysabah.com/world/mid-east/irans-production-of-20-enriched-uranium-exceeds-iaea-reports>, 10 October 2021.

## NORTH KOREA

### Construction Activity Continues at Yongbyon's Uranium Enrichment Plant

Recent commercial satellite imagery indicates continued construction activity at North Korea's Uranium Enrichment Plant (UEP) at the Yongbyon Nuclear Scientific Research Center. Imagery from October 1 indicates that previously reported construction in an area just north of the plant's Cascade Hall #2 has recently been covered, concealing details of the building's layout and construction. Prior to this concealment, the floor space measured roughly 42 meters by 15 meters (including walls), with six circles each approximately three meters in diameter observed at the east end of the building. The purpose of the building is still unknown and may be harder to determine via imagery going forward. There are several possible functions for such an extension. One option, assuming that

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North Korea is producing low-enriched uranium at two enrichment halls, is that the extension could also be used to enrich low-enriched uranium to weapons grade (high-enriched uranium) as it becomes available from those two cascade halls.

Source: <https://www.38north.org/2021/10/construction-activity-continues-at-yongbyons-uranium-enrichment-plant/>, 06 October 2021.

## USA

### Nuclear Engineer and Wife Charged with Trying to Sell Secrets

US authorities have arrested and charged a nuclear engineer and his wife for trying to sell secret information about the design of nuclear submarines and passing it on to another country. Jonathan and Diana Toebbe were arrested in an operation during which over the course of a year, the couple allegedly sold sensitive information to an undercover FBI agent who had posed as a representative of a foreign power.

**US authorities have arrested and charged a nuclear engineer and his wife for trying to sell secret information about the design of nuclear submarines and passing it on to another country. Jonathan and Diana Toebbe were arrested in an operation during which over the course of a year, the couple allegedly sold sensitive information to an undercover FBI agent who had posed as a representative of a foreign power.**

### Joint Operation Thwarts Alleged Plot:

In a statement from the US Department of Justice, Attorney General Garland said: "The complaint charges a plot to transmit information relating to the design of our nuclear submarines to a foreign nation".... According to the

Justice Department statement, Toebbe is an employee of the Department of the Navy where he had served as a nuclear engineer on the Naval Nuclear Propulsion Program. He had top secret security clearance and had access to restricted information.

**Elaborate Plan Uncovered:** The Justice Department alleges that on April 1, 2020, Toebe sent a package to a foreign government with a sample of restricted information and detailed intention of forming a covert relationship to make purchases of more top-secret information.

Toebe was under the mistaken belief that the individual he was dealing with was a representative from a foreign government, when in fact the person was an undercover operative. In one transaction the Justice Department mentions, sensitive information was stored on a memory card and was concealed inside half a peanut butter sandwich which was left at a "dead drop" location — a method of handing over items or information by using a secret location — while his wife acted as lookout. Toebe received cryptocurrency payments amounting to \$30,000 (€25,919) for that particular instance. In another dead drop operation, a memory card was concealed in a chewing gum packet. Toebe received \$70,000 for that transaction. The Toebes are due to have their first court appearances in Martinsburg, West Virginia....

Source: <https://indianexpress.com/article/world/us-nuclear-engineer-and-wife-charged-with-trying-to-sell-secrets-7566451/>, 11 October 2021.

## **NUCLEAR NON-PROLIFERATION**

### **INDIA**

#### **Deeply Concerned Over Proliferation of WMD, their Delivery Systems: India at U.N.**

India has expressed deep concern over the proliferation of WMD and their delivery systems that could endanger peace and security, saying the possibility of terrorists acquiring such weapons necessitates the global community to work

together to address this grave danger. Ambassador Sharma, Permanent Representative of India to the

Conference on Disarmament (CD), Geneva, said India has been drawing the attention of the world towards these threats and the need to strengthen international cooperation to address them through its annual consensus UNGA resolution titled 'Measures to prevent terrorists from

acquiring weapons of mass destruction'.... He asserted that weapons in the hands of terrorists are the most threatening form of illicit small arms and light weapons....

Mr. Sharma also said that India's annual resolutions at the U.N. General Assembly, namely the 'Convention on the Prohibition of the Use of Nuclear Weapons' and 'Reducing Nuclear Danger' that enjoy the support of the majority of the Member States have consistently highlighted the

need for the CD to commence negotiations to reach agreement on an international convention prohibiting the use or threat of use of nuclear weapons and urgent steps to reduce the risks of unintentional and accidental use of nuclear

weapons, respectively.

He told the session that India is firmly committed to the goal of universal, non-discriminatory and verifiable nuclear disarmament. India's proposal for a step-by-step approach for the total elimination of nuclear weapons, contained in its Working Paper submitted to the Conference on Disarmament in 2007, calls on the Conference on Disarmament to negotiate a Comprehensive Nuclear Weapons Convention.... He said India is a responsible nuclear weapon State and is committed as per its nuclear doctrine, to maintain credible, minimum deterrence with the posture of no-first use and non-use against non-nuclear weapon States.

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He said that without diminishing the priority India attaches to disarmament, New Delhi has supported the immediate commencement of negotiations in the CD of FMCT on the basis of CD/1299 and the mandate contained in it. As per the CD/1299, the Conference on Disarmament decides to establish an ad hoc committee on a “ban on the production of fissile material for nuclear weapons or other nuclear explosive devices” .... India supports the full and effective implementation of the Chemical Weapons Convention and emphasises the strengthening of the OPCW to fulfill its important mandate.

Mr. Sharma also voiced India’s support for the institutional strengthening of the Biological Weapons Convention (BWC) including through the negotiation of a comprehensive and legally binding protocol, providing for an effective, universal and non-discriminatory verification mechanism for the BWC... Mr. Sharma added that India is cognizant of the need for enhanced international cooperation and for promotion of peaceful uses of science and technology through technology transfer, sharing of information and exchange of equipment and materials.

Source: <https://www.thehindu.com/news/international/deeply-concerned-over-proliferation-of-weapons-of-mass-destruction-their-delivery-systems-india-at-un/article36834037.ece>, 05 October 2021.

## **USA**

### **Transparency in the U.S. Nuclear Weapons Stockpile**

The US is releasing newly declassified information on the U.S. nuclear weapons stockpile to update the information previously released in September 2017. Increasing the transparency of states’

nuclear stockpiles is important to non-proliferation and disarmament efforts, including commitments under the NPT, and efforts to

address all types of nuclear weapons, including deployed and non-deployed, and strategic and non-strategic.

**Stockpile:** As of September 2020, the U.S. stockpile of nuclear warheads consisted of 3,750 warheads. This

number represents an approximate 88 percent reduction in the stockpile from its maximum (31,255) at the end of fiscal year 1967, and an approximate 83 percent reduction from its level (22,217) when the Berlin Wall fell in late 1989. The below figure shows the U.S. nuclear weapons stockpile from 1945 through September 30, 2020.

**Warhead Dismantlement:** From fiscal years 1994 through 2020, the US dismantled 11,683 nuclear warheads. Since September 30, 2017, the US has

dismantled 711 nuclear warheads. Approximately 2,000 additional nuclear warheads are currently retired and awaiting dismantlement.

**Non-Strategic nuclear weapons:** The number of U.S. non-strategic nuclear weapons has declined by more than 90 percent since

September 30, 1991.

Source: <https://www.state.gov/transparency-in-the-u-s-nuclear-weapons-stockpile/>, 05 October 2021.

## **NUCLEAR TERRORISM**

### **GENERAL**

#### **Aliens Took Control of Nuclear Weapons, can Start World War III: Ex-US Air Force Officer**

In a surprising claim, a senior US military officer has claimed that World War III can start due to aliens. Robert Salas, who has worked at a senior position in the US Air Force, noted that he had seen aliens tampering with nuclear missiles. He

**India is a responsible nuclear weapon State and is committed as per its nuclear doctrine, to maintain credible, minimum deterrence with the posture of no-first use and non-use against non-nuclear weapon States.**

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added that four former US Air Force chiefs will release documents in connection with this matter very soon.

Salas was a Weapon Controller in the US Air Force and he has also commanded Intercontinental Ballistic Missiles. Salas has also worked as an Air Force missile propulsion engineer in Titan-3 program, which is billed as the most modern and destructive nuclear missile program of the US. Salas also served as a reliability engineer for Martin-Marita Aerospace and Rockwell International on Space Shuttle design proposals from 1971 to 1973.

According to Salas, aliens from another planet had tampered with weapon systems at nuclear targets and disabled them. Salas revealed that aliens also started activating the missiles by starting the launch sequence and a total of ten intercontinental ballistic missiles were disabled.

It is to be noted that Salas was on-duty commander of an underground launch control facility located at Malmstrom Air Force Base on March 24, 1967. He said that on March 16, 1967, a similar incident took place at another missile launch control facility. Salas said that he would try to put pressure on the US Congress to investigate this matter.

Source: <https://www.dnaindia.com/viral/report-aliens-ufos-took-control-of-nuclear-weapons-can-start-world-war-iii-ex-us-air-force-officer-2915293>, 13 October 2021.

## **PAKISTAN**

### **Why Pakistan's Nukes could become an International Crisis**

On October 10, Pakistan lost the man responsible for the country's nuclear arsenal. AQ Khan, who died at the age of 85 was not only the pioneer of Pakistan's nuclear power but also the keeper of

the programme's many secrets. With his passing, his life's work could end up falling in the hands of terrorist groups within the country. A nightmare, not just for Pakistan, but also for the world.

Nuclear security concerns are nothing new for Pakistan, the country has been closely watched ever since its nuclear weaponry sprang into existence in 1998. In fact, constant scrutiny is not new for the South Asian nation either, with America setting up conditional assistance to the country. The condition?

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That "Pakistan must not possess a nuclear explosive device and that the proposed United States assistance program will reduce significantly the risk that Pakistan will possess a nuclear explosive device."

In some quarters, the scrutiny is justified, with Pakistan the only place where both terrorist groups and a nuclear program exist (and continue to, till date). A very recent American government report marked 12 groups as terrorist organisations. What's at stake? Approximately 165 nuclear warheads. With the Taliban back in power in Afghanistan, the concerns around Pakistan's weapons falling in the wrong hands are on top of global concerns again.

Source: <https://economictimes.indiatimes.com/news/defence/why-pakistans-nukes-could-become-an-international-crisis/articleshow/86917863.cms>, 10 October 2021.

## **NUCLEAR SAFETY**

### **GENERAL**

### **IAEA Developing Natural Hazard Alerting System**

The IAEA is developing a system that will alert the Agency of natural hazards - such as floods, earthquakes, volcanic eruptions and wildfires - that could potentially affect nuclear sites. The



External Events Notification System (EENS) would then trigger the IAEA's response and services offered. The system is being developed in collaboration with the University of Hawaii's Pacific Disaster Center (PDC) and Tenefit, an Internet application developer. PDC's technologies and methodologies originated to help protect the Hawaiian Islands and vulnerable communities throughout the Pacific from natural hazards and have expanded over time to cover the world.

EENS will be based on PDC's DisasterAWARE system, a multi-hazard monitoring and early warning platform. It will provide the IAEA access to hazard and impact information for timely reaction to events that could threaten the safety of nuclear facilities. The notification system will consist of two main modules: the Alert System and the External Event Damage Forecast. The DisasterAWARE system will feed the Alert System in real time and monitor the globe for hazards that could impact nuclear facilities. The forecast module, which will receive information from the Alert System, will produce a preliminary estimate of the impact on nuclear facilities and populated areas.

A report, based on the damage forecast, will be sent to the IAEA's Incident and Emergency Centre (IEC) within 30 minutes. The IEC is the global focal point for international emergency preparedness, communication and response to nuclear and radiological incidents and emergencies. The report will include a map and data sheet, describing characteristics of the hazard. In the case of a tsunami, for example, the report will include a propagation map, source of the tsunami and estimated arrival time to nuclear installation sites. In the first phase of the EENS development, the notification system will be configured for two priority hazards - earthquakes

and cyclones. The system will then be expanded to cover tornadoes, tsunamis, wildfires, floods and volcanic eruptions. The EENS is expected to be launched in 2022....

Source: <https://www.world-nuclear-news.org/Articles/IAEA-developing-natural-hazard-alerting-system>, 4 October 2021.

## **NUCLEAR WASTE MANAGEMENT**

### **GENERAL**

#### **Electrochemistry Reduces Waste Burden of Irradiated Nuclear Graphite**

**The IAEA is developing a system that will alert the Agency of natural hazards - such as floods, earthquakes, volcanic eruptions and wildfires - that could potentially affect nuclear sites. The External Events Notification System (EENS) would then trigger the IAEA's response and services offered.**

Researchers in the UK have devised a process that uses electricity to remove radioactive contaminants from irradiated nuclear graphite. The process could reduce the volume of waste from nuclear power plants that requires expensive and long-term storage. Graphite

is used to maintain the fission chain reaction in certain types of nuclear reactors. Over 300,000 tonnes of nuclear graphite waste are estimated to be awaiting storage or disposal worldwide. Due to a high density of legacy reactors, approximately a third of the world's irradiated graphite waste is within the UK.

**The DisasterAWARE system will feed the Alert System in real time and monitor the globe for hazards that could impact nuclear facilities. The forecast module, which will receive information from the Alert System, will produce a preliminary estimate of the impact on nuclear facilities and populated areas.**

'Most of the advanced nuclear reactor technologies being proposed for future low carbon energy production will also use nuclear graphite, so this waste burden is likely to increase for future generations unless novel solutions are examined to treat, reduce and recycle this waste form,' explains Abbie

Jones from the University of Manchester. 'Technologies that can minimise this burden will not only massively reduce costs of managing legacy wastes but also improve the sustainability of future nuclear reactors and help achieve net zero targets.'

The UK's current strategy, as outlined by the Nuclear Decommissioning Authority, is to store the waste graphite temporarily to allow short-lived isotopes to decay prior to final disposal. However, storing nuclear graphite waste is expensive, space-inefficient and runs the risk of contamination.

**The UK's current strategy, as outlined by the Nuclear Decommissioning Authority, is to store the waste graphite temporarily to allow short-lived isotopes to decay prior to final disposal. However, storing nuclear graphite waste is expensive, space-inefficient and runs the risk of contamination.**

In response to these issues, Jones and colleagues set out to determine whether electrolysis in high-temperature molten salt media could be applied to decontaminate nuclear graphite. Team member Clint Sharrad says they chose to use molten salt due to its wide electrochemical window, allowing them to access electric potentials that could better force nuclear graphite contaminant removal. As a proof of concept, the team performed tests using graphite samples from different reactor sites across the UK. After electrolysis, they assessed what corrosion and fission products the graphite released into the molten salt media. The group then adjusted the process parameters to optimise radioisotope transfer into the salt phase.

**The main recommendation from the RK&M project, which ended in 2018, was that the preservation of information and knowledge should apply a so-called systemic strategy. This, the final report said, will involve using different methods, media and content, across different time scales with several actors and places...**

Post-treatment, the team evaluated the graphite and found a significant reduction in the radioactive content. The decrease in activity was large enough that the resulting graphite could be reclassified from intermediate-level waste to low-level waste. Ken Czerwinski, a radiochemist at the University of Nevada, Las Vegas in the US, says the 'key contribution of this work is the potential to concentrate radioactive waste and limit the amount of material destined for high-level radioactive waste disposal.' Jones suggests that applying this method at an industrial scale 'could save the UK over £1 billion' of costs related to managing legacy nuclear graphite by 'avoiding

interim storage requirements and minimising waste volumes requiring managed disposal'.

Despite achieving high decontamination levels, the researchers also observed minimal graphite degradation. This suggests future reactors could reuse the graphite. Sharrad says this would result in 'not only reducing the waste burden but also enhance the sustainability of nuclear reactor systems by providing a whole lifecycle approach for a main reactor core component.' Next, the team plans to conduct follow-up research looking at a wider variety of graphite samples and explore whether treated nuclear graphite performs as effectively as virgin graphite in a reactor system. This will allow them to determine whether reusing nuclear graphite may be a feasible option in the future.

Source: <https://www.chemistryworld.com/news/electrochemistry-reduces-waste-burden-of-irradiated-nuclear-graphite/4014537.article>, 07 October 2021.

## **SWEDEN**

### **Swedish Regulator Studies Securing Repository Knowledge**

The Swedish Radiation Safety Authority (SSM) has published a report on ways to inform future generations where radioactive waste has been disposed of and how it should be handled. The report was commissioned by the government to examine different methods for how information and knowledge about the final repository for used nuclear fuel can be secured over a long period of time.

In 2011, the OECD Nuclear Energy Agency initiated the Preservation of Records, Knowledge and Memory Across Generations (RK&M) project.

The purpose of that project was partly to develop the theoretical basis, and partly to develop concrete proposals, for information and knowledge preservation further into the future. The main recommendation from the RK&M project, which ended in 2018, was that the preservation of information and knowledge should apply a so-called systemic strategy. This, the final report said, will involve using different methods, media and content, across different time scales with several actors and places.... In addition to the completed RK&M project, SSM notes there are several other international working groups that have worked or are working on issues that concern the preservation of information and knowledge. In its report, SSM reviews the methods that can be used so that future generations do not inadvertently affect the final repository resulting in harm to people and the environment.

**No Unique Solution:** According to SSM, the RK&M project's description of methodology and various methods for information and knowledge preservation should form the basis for the development of a strategy for the geological final repositories in Sweden for used nuclear fuel and other radioactive waste. It noted there is no regulatory requirement that such a strategy must be developed in order to be able to make decisions on admissibility under Sweden's Environmental Code and permits under the Nuclear Activities Act. However, it said such a strategy should be developed during the step-by-step process that follows a decision on a permit in accordance with the Nuclear Activities Act. "Important factors in the application of a strategy in Sweden are that it is started at an early stage and that it involves several different actors in the area with clear responsibilities," it said...

"It is about preserving information for future generations so that they have the opportunity to, for example, take back the deposited nuclear waste in a radiation-safe way, should it become

relevant," said Annika Bratt, co-author of the report. "It is an extensive task that extends over long periods of time. At the same time, the work needs to start now. "The question of what the right solution is arouses great interest among the public, noted Carl-Henrik Pettersson, co-author of the report. "However, there is no unique solution for how information and knowledge preservation should take place, but it is about implementing different methods that complement each other in different ways and thus provide good opportunities for information and knowledge to be passed on

into the future." Going forward, SSM sees that the issue is also relevant for other activities with long-lived hazardous waste, and sees a need for broad cooperation with other authorities. It says it is also important that the municipalities concerned are given good

opportunities to participate in the continued work....

Source: <https://www.world-nuclear-news.org/Articles/Swedish-regulator-studies-securing-repository-know>, 05 October 2021.

## UK

### Two Cumbria Sites Earmarked for Nuclear Waste Disposal

Plans to dispose of Britain's nuclear waste stockpile underneath the Irish Sea off the Cumbrian coast have been unveiled. The Copeland Geological Disposal Facility working group has earmarked two areas of west Cumbria for geological exploration. However, it said there were no plans to use former or future coal mines for the purpose. There are almost 80,000 tonnes of nuclear waste at Sellafield. A Geological Disposal Facility (GDF) consists of a series of vaults and tunnels deep underground, or under the sea, where the material would be buried....

**'Very Early Part':** Mark Cullinan, chair of the Copeland GDF working group, said: "Over the past 11 months we have talked to local people and

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looked at the data available. "The group feels confident that we have selected two search areas worthy of further consideration as an initial starting point going forward. "We are still in the very early part of the GDF journey and it's up to the local authorities and Radioactive Waste Management to decide whether we progress further." Copeland Council previously showed interest in having an underground GDF but Cumbria County Council refused permission in 2013. The GDF would store the UK's higher activity

radioactive waste, the most radioactive variety, underneath several hundred metres of solid rock. The government first invited local authorities to volunteer to host the store in 2006 but said they could not proceed if local people opposed plans. Copeland and Allerdale Borough Councils and Cumbria County Council expressed an interest in housing a facility in 2012.

*Source: <https://www.bbc.com/news/uk-england-cumbria-58737736>, 29 September 2021.*



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).

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