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OPINION – Richard N. Haass

### The Coming Nuclear Crises

Until just a few years ago, it looked as if the problem posed by nuclear weapons had been successfully managed, if not solved. American and Russian nuclear stockpiles had been reduced substantially from their Cold War highs, and arms-control agreements were in place that limited both intermediate- and long-range systems. But all of that could now come undone.

Progress over the last generation wasn't limited to the US and Russia. Libya was persuaded to abandon its nuclear ambitions, Israel thwarted Iraqi and Syrian nuclear development, and South Africa relinquished its small nuclear arsenal. Iran signed the Joint Comprehensive Plan of Action, which constrained its ability to acquire many of the essential prerequisites of nuclear weapons. Most recently, the UNSC imposed tough sanctions aimed at persuading North Korea to give up its still modest and comparatively primitive nuclear-weapons program, clearing the way for high-level talks between North Korean and US officials.

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And, of course, no nuclear weapon has been used in combat for three-quarters of a century, since the US dropped two nuclear bombs on Japan to hasten the end of World War II.

This past summer, however, the US withdrew from the 1987 Intermediate-Range Nuclear Forces

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Treaty after it concluded Russia had violated the INF's terms. The treaty limiting longer-range US and Russian nuclear weapons will expire in 2021 unless it is extended, and it's not clear that it

will be: both countries are committing substantial resources to modernise their arsenals.

Moreover, by exiting the JCPOA the US has heightened the risks stemming from Iran. The accord, concluded in 2015, was imperfect. In particular,

many of its most significant constraints would last only 10 to 15 years, and the agreement didn't limit Iran's ballistic-missile development. But it did place a ceiling on Iranian nuclear activity and allowed for international inspections. By all accounts, Iran was honouring its provisions.

Now, however, Iran has begun a slow but steady process of getting out from under many of the agreement's limits. It may be doing this to persuade the US and Europe to ease economic sanctions. It may also be calculating that these steps could dramatically reduce the time it would need to produce nuclear weapons without being attacked. But it's at least as likely that Iran's actions will lead the US, or more probably Israel, to undertake a preventive strike designed to destroy a significant part of its program.

Such a strike could lead several other regional powers, including Turkey, Saudi Arabia and Egypt, to develop or acquire nuclear weapons of their own. Turkey, increasingly estranged from many of its allies, has suggested that it may choose to develop nuclear weapons regardless of what Iran does.

**North Korea is Far Ahead of Iran:** It already has several dozen nuclear weapons and missiles, has tested missiles that can reach the US, and is developing submarine-launched nuclear weapons. The notion that North Korea will agree to give up its weapons and 'denuclearise' is fanciful. Its leader, Kim Jong-un, believes that only nuclear weapons can ensure his regime's survival, a belief understandably strengthened by the experience of Ukraine, which accepted security guarantees in exchange for giving up the nuclear weapons it inherited from the Soviet Union, only to be invaded by Russia 25 years later.

One risk is that North Korea will over the next few years come to possess a significant arsenal that will pose a meaningful threat to the US. Another is that North Korea's neighbours, including South

Korea and Japan, will determine that they, too, need nuclear weapons given the North Korean threat and their diminished confidence in the reliability of the US and its guarantees to protect them with its nuclear forces.

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The danger in both regions is that a race to acquire nuclear weapons could trigger a preventive war. Even if such a war were avoided, the presence of multiple nuclear arsenals would increase the temptation for one or more countries to strike first in a crisis. 'Use them or lose them' has the potential to become a recipe for instability and conflict when capabilities aren't sufficiently robust to absorb an attack and still be able to mete out the sort of devastating retaliation essential for effective deterrence.

As if all this were not enough, India and Pakistan, two countries with a long history of bilateral conflict, are both nuclear powers. Nuclear deterrence cannot be assumed. It is all too easy to imagine a Pakistani-supported terrorist attack leading to Indian retaliation, which in turn could prompt Pakistan to threaten using nuclear weapons, because its conventional military forces cannot compete with those of India. There is also the possibility that the command and control of weapons will break down and one or more devices will find their way into the hands of terrorists.

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It is close to 60 years since a young presidential candidate named John F. Kennedy predicted that as many as 20 countries could achieve nuclear-weapons capability by the end of 1964. Fortunately, Kennedy was proved wrong, and the number of countries with nuclear weapons is still nine. The 1968 Nuclear Non-Proliferation Treaty has proved to be quite robust, in part because it is buttressed

by efforts to prevent the export of critical technologies and by arms control, sanctions and the strength of alliances, which reduces the need for countries to become self-reliant.

But with nuclear technology increasingly available, arms control unravelling amid renewed great-power rivalry, weakened alliances as the US pulls back from the world, and fading memories of Hiroshima and Nagasaki, we are entering a new and dangerous period. Nuclear competition or even use of nuclear weapons could again become the greatest threat to global stability. Less certain is whether today's leaders are up to meeting this emerging challenge.

*Source: Richard N. Haass is president of the Council on Foreign Relations, <http://www.aspistrategist.org.au>, 19 November 2019.*

**OPINION – Alexander Campbell, Vickram Singh**

**Lessons from the Cyberattack on India's Largest Nuclear Power Plant**

Indian officials acknowledged on October 30th that a cyberattack occurred at the country's Kudankulam nuclear power plant. An Indian private cybersecurity researcher had tweeted about the breach three days earlier, prompting Indian authorities to initially deny that it had occurred before admitting that the intrusion had been discovered in early September and that efforts were underway to respond to it.

According to *Washington Post*, Kudankulam is India's biggest nuclear power plant, "equipped with two Russian-designed and supplied VVER pressurized water reactors with a capacity of 1,000 megawatts each. Both reactor units feed India's southern power grid. The plant is adding four more reactor units of the same capacity, making the Kudankulam Nuclear Power Plant one of the largest collaborations between India and Russia."

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**While reactor operations at Kudankulam were reportedly unaffected, this incident should serve as yet another wake-up call that the nuclear power industry needs to take cybersecurity more seriously. There are worrying indications that it currently does not.**

While reactor operations at Kudankulam were reportedly unaffected, this incident should serve as yet another wake-up call that the nuclear power industry needs to take cybersecurity more seriously. There are worrying indications that it currently does not: A 2015 report by the British think tank Chatham House found pervasive shortcomings in the nuclear power industry's approach to cybersecurity, from regulation to training to user behavior. In general, nuclear power plant

operators have failed to broaden their cultures of safety and security to include an awareness of cyberthreats. (And by cultures of safety and security, those in the field—such as the Fissile Materials Working Group—refer to a broad, all-embracing approach towards nuclear security, that takes into account the human factor and encompasses programs on personnel reliability and training, illicit trafficking interception, customs and border security, export control, and IT security, to name just a few items. The Hague Communiqué of 2014 listed nuclear security culture as the first of its three pillars of nuclear security, the other two being physical protection and materials accounting.

This laxness might be understandable if the incident were the first of its kind. Instead, there have been over 20 known cyber incidents at nuclear facilities since 1990. This number includes relatively minor items such as accidents from software bugs and inadequately tested updates along with deliberate intrusions, but it demonstrates that the nuclear sector is not somehow immune to cyber-related threats. Furthermore, as the digitalization of nuclear reactor instrumentation and control systems increases, so does the potential for malicious and accidental cyber incidents alike to cause harm.

This record should also disprove the old myth, unfortunately repeated in Kudankulam officials' remarks, that so-called air-gapping effectively secures operational networks at plants. Air-gapping refers to separating the plant's internet-connected business networks from the operational networks that control plant processes; doing so is intended to prevent malware from more easily infected business networks from affecting industrial control systems. The intrusion at Kudankulam so far seems limited to the plant's business networks, but air gaps have failed at the Davis-Besse nuclear power plant in Ohio in 2003 and even classified US military systems in 2008. The same report from Chatham House found ample sector-wide evidence of employee behavior that would circumvent air gaps, like charging personal phones via reactor control room USB slots and installing remote access tools for contractors.

The consequences of a cyber-based intrusion at a nuclear power plant could range from loss of confidential employee or business information to potentially causing a reactor shutdown or physical damage. The industry must realize that cyberattacks can be the main event, rather than simply a means to enable more traditionally imagined threats like physical intrusions. And regardless of the consequences of a given incident, public statements...that refuse to even admit the possibility of cyberattack will undermine public trust—an existential resource for many nuclear power programs.

Despite speculation about potential North Korean responsibility or escalation with Pakistan, revealing the culprits and motives associated with the Kudankulam attack matters less for the nuclear power industry than fixing the systemic lapses that enabled it in the first place.

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The good news is that solutions abound: The Nuclear Regulatory Commission has issued guidance for US operators on improving workforce development and performance assessment for cybersecurity at nuclear power plants. And the National Nuclear Security Administration includes cybersecurity in their security assessments at US and international facilities, along with technical exchanges and training programs. It also developed a course on cybersecurity for nuclear power plant operators in partnership with the International Atomic Energy Agency—which has published its own technical guides on computer security, and recently held its first cybersecurity course for nuclear power plant operators.

Countries need not depend solely on international organizations or other governments for this expertise. Public-private partnerships like the WINS and WANO also share information about best practices and can serve as a knowledge conduit for states where nuclear power implicates national security concerns.

The challenge now is integrating this knowledge into the workforce and maintaining it over time. But the institutionalization of cybersecurity does

not present an insurmountable barrier. One item to note, however, is that the problem's scale and complexity is only likely to grow as more states join the nuclear power club. And even with years of experience, no country is immune from succumbing to cyberattack: the incident occurred in a country whose nuclear power program dates back to the 1950s, and previous cyberattacks have struck nuclear facilities in countries with similarly long-established nuclear power programs, including Japan, France, and the US. That they have still

fallen victim to breaches bodes ill for prospective newcomers like Jordan, whose national Computer Emergency Response Team is only two years old. One can expect that nuclear newcomers with less indigenous cybersecurity expertise will need more help from international partners, and will face a steeper uphill climb towards maintaining that workforce.

If there is a silver lining to the recent cyberattack, it is that India now has an opportunity to become a leader in nuclear cybersecurity. India has established the GCNEP as a forum for bilateral and multilateral cooperation in nuclear security that could be widened to include cybersecurity.

The problem of cybersecurity is not new to the nuclear power industry, and it does not require solutions radically different from those already in place in fields such as finance and commercial aviation. The nuclear industry's history of safety and security culture, and the body of research on sector-specific cybersecurity recommendations, together can offer a path toward a nuclear power industry that better defends itself against cyber threats. The avenues for fostering cooperation and sharing best practices have been established, as has the need for workforce development.

But the incident was an example of a well-established nuclear power program responding to a breach with denial, obfuscation, and shopworn talk of so-called "air-gaps" demonstrates how dangerously little progress the industry has made to date.

Source: <http://www.thebulletin.org>, 14 November 2019.

**OPINION – SD Pradhan**

**Cyber-attack on Kudankulum Nuclear Power Plant Underlines the Need for Cyber Deterrent Strategy**

The cyber-attack on the Kudankulum Nuclear Power Plant in October 2019, raises certain important questions about the security of our critical infrastructure and more importantly the adequacy of our response. Cyberattack on nuclear power plants was perturbing given the potentially catastrophic consequences of such an attack.

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However, the press release issued after the attack reflected that the government considers that 'its system is infallible and no penetration into the nuclear power control plant is possible'. The reflected overwhelming confidence, complacency, and

ignorance about the emerging dimensions of cyber threats.

There are two issues that deserve thorough scrutiny. First is the need to determine the intent of the attack on the administrative unit. This could be aimed at manipulating the access control system so that the entry of unauthorised persons could be managed in the facility either to steal nuclear material or place monitoring devices near the operational network to collect data (each time a computer key

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is used, it emits electromagnetic radiation which can be monitored by a device kept within 200 meters) or to damage the facility or to disable the reactor cooling systems resulting in a Fukushima-like disaster. The threat emerging from humans and human-computer interface is the gravest security threat in the present age that must be kept in view.

The second issue is whether the separation of the administrative units dealing with management aspects and the operational unit acting as the nerve centre of the plant for power generation provides a dependent secured system. The administrative unit is usually internet connected with firewalls for its protection from the cyber-attacks. The operating network system controls machines and equipment through a complex algorithm to manage power generation is not connected with the internet and remains to stand alone.

It is routine to keep the two systems separated. In cyber terminology, it is called that the operating network is "air-gapped" from the administrative network. This means that no path exists between the two networks. When air-gap is deployed, the computers in the operating unit are not connected with the internet of the administrative unit.

However, usually, the two systems are separated through 'the software-defined air-gap' with a firewall. The firewall has a system for preventing any external connections being established with the isolated computer network. The reason for having a firewalled based air gap system is to allow for a controlled software update of the network. This exposes the operational network to a host of vulnerabilities. Our past attacks have established that no air gap system is impossible to surpass. Air-gaps may be effective against unsophisticated cyber-attacks but not against the targeted attacks by professional attackers. The NTI report on cyber threats to nuclear facilities in 2016 stated that targeted attacks go beyond the network connections and generally leverage "witting and unwitting humans, or a long and difficult-to-defend supply chain to deliver the attack".

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**It would be wrong to presume that the attack on Kudankulum Power Plant's administrative unit was an isolated attempt. It could be a part of overall plan to penetrate into the plant by managing the entry of unauthorised persons for later attack on a wide scale causing sufficient harm.**

For a successful cyber-attack, the hackers are expected to have the knowledge of the entire system-equipment used, their models and make and software versions as also ways to disable their safety mechanisms. These require substantial time and several efforts. When a state decides to obtain data or decides to destroy the data of the target country, it deploys its agents to get someone to connect an external device either to obtain or to destroy data. The combined efforts of human agents and hackers can wreak havoc.

The 'stuxnet' malware used in 2010 in the Iranian nuclear plant was focussed to hit the centrifuges.

This meant that the hackers had all the information about the power plant. The attackers must have watched the systems through the cyber intelligence gathering process or could have got the information from

someone inside the plant before targeting the centrifuges in Natanz uranium enrichment plant, which was separated by the air-gap system. The attack was initiated by a malware that was present in USBs.

The Ukraine attack in 2016 was also a case similar to Stuxnet. Attackers disabled power distribution stations in Ukraine, causing a widespread blackout. The attack started several months before the blackout actually occurred. The hackers had acquired detailed information about the system. In Ukraine, it is known that the cyber

attackers had targeted several employees of the companies and embedded Microsoft Word documents with malware to gain access to the administrative network.

It would be wrong to presume that the attack on Kudankulum Power Plant's administrative unit was an isolated attempt. It could be a part of overall plan to penetrate into the plant by managing the entry of unauthorised persons for later attack on

a wide scale causing sufficient harm. An analysis of the malware shows that it was a modified version of Dtrack that was used for attacking Indian financial institution earlier. It is a Remote Access Trojan, which means that it is a malware that looks like a legitimate file but it actually allows a remote user to command a machine.

It is widely believed that it was developed by the North Korean Lazarus group. The North Korea in the past had targeted institutions linked with Indian Space Research Organisation. It is possible that the attack on Kudankulam Nuclear Power Plant was carried out at the behest of China or Pakistan- both of them have reasons for attacking India's biggest power plant with two Russian designed water reactors that feeds India's south power grid. Four more reactors are to be added soon. Hence for India's rivals, this becomes an important target.

India needs to upgrade its system to protect critical infrastructure. It must admit that the 'air gap' system is not infallible and do away with the sense of complacency. A combination of hostile agents and hackers could penetrate any system. The statement of NPCIL after the attack reflected ignorance about the threat from this combination. Immediately in all such places the counter-intelligence system should be upgraded to monitor the activities of all personnel working there. Our security policy for dealing with cyber-attacks hardly places importance to the emerging threats from the combination of the two.

The more important aspect is to have a strategy to deter adversaries from undertaking such attacks. Attacks on the critical infrastructure should be treated as a war against the nation. While attribution remains a problem, the continued attacks of similar types point fingers towards the culprits sponsored by a hostile state. The countries like US, UK, Russia and China despite accepting that attribution remains a problem, feel that a declared strategy to punish the hackers and their supporters can deter the known adversaries. They have created Cyber Commands and have adopted 'active cyber defence strategy'.

It is heartening to note that India has announced the formation of a tri-service for cyber warfare. India is going to face more destructive attacks than disruptive attacks seen now. The Artificial Intelligence procedures can manipulate networks and devices in unthinkable ways. They engage very large elements at the very same time, and correct the nature of the attack by self-learning depending on the method of the defence it faces. The need for a declaratory strategy to address the new challenges can hardly be overemphasised. In face of emerging threats a comprehensive cyber deterrence strategy to deter key state and non-state actors from conducting cyber-attacks against Indian interests is the need of the hour. In a positive move, India may soon have a single authority or agency responsible for the entire spectrum of defensive cyber operations in the country for better

command and control. It would help in ensuring an integrated approach towards cyber-attacks and would be able to develop abilities to identify the hackers with the help of different agencies dealing

with this aspect and would formulate the much needed cyber strategy to deter the hostile nations and their groups to launch attacks on Indian critical infrastructure.

*Source: SD Pradhan has served as chairman of India's Joint Intelligence Committee. He has also been the deputy national security adviser. The Times of India, 29 November 2019.*

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**OPINION – Ritu Sharma**

**Kudankulam Nuclear Plant's Critical Digital Assets not Susceptible to Cyber-Attack: Experts**

Revelations of cyber intrusions in the network of Kudankulam Nuclear Power Plant by a North Korean hacker group had sent the Indian populace in a frenzy. However, the experts associated with the power project have ruled out the possibility of cyber-attack on a nuclear power plant as the operating system of the plant are not connected to any internet.

As the news broke on twitter, the skeptics of the nuclear power have been raising questions about

it safety and have caused mass concern. The statement by the NPCIL accepting that a malware has been detected in NPCIL system has been interpreted out of context.

The breach was reported on September 4 and investigations revealed that the infected computer belonged to a user who was connected "in the Internet connected network used for administrative purposes". The point that the system was isolated from critical internal network was conveniently buried.

"The systems involved in operating the plant are completely independent and are never connected to any other system or the internet. So the possibility of cyber-attack on the systems involved in operating the plant does not exist," RK Sinha, former secretary of the DAE under whom Kudankulam Nuclear Power Plant's first unit was connected to the grid, told Nuclear Asia.

Nuclear power facilities use digital and analog systems to monitor, operate, control and protect their plants. Digital assets critical to plant systems for performing safety and security functions are isolated from the external networks, including the Internet. This separation provides protection from many cyber threats.

Further elaborating on it he said: "To give a simple example, an automatic domestic washing machine too incorporates a control software that makes the machine respond to various sensors as well as user choices –

but it can never be hit by cyber-attack since it does not provide any access to any external network, or internet." Hence the reports that the hackers had gained controller-level access to the nuclear power station seems exaggeration.

The DTrack malware that infected one computer connected to the administrative system of the Nuclear Power Plant was trailed back to a North

Korean hacker group Lazarus. Reports have attributed the hacking to North Korea's interest in the Thorium-fuelled Nuclear Power, something that India has been pursuing for long. The cyber-intrusion does warrant concern but not paranoia.

India's safety protocol of isolating critical operational

equipment of the Kudankulam Nuclear Power Plant are similar to those followed at key defence establishments. The Indian Armed Forces as well operate on internal network system that is not connected to any external networks; and even use of Compact Discs and pen drives on the internal network.

Laying any doubts about the cyber security of a nuclear power plant to rest, the Managing Director of Zyfra Pavel Rastopshin said that the automated control systems of nuclear power plants are not connected to internet. Zyfra is a Finnish-Russian company that develops industrial digitalisation technologies. "Such systems transmit relevant information 'outwards' (including to a crisis center) over special, protected communication channels.

Conventional networks, for instance, for accounting workflows, are connected to the Internet. But these networks also exist separately and are not physically connected with automated control systems," Rastopshin said.

Allaying the fear that many people had following the

attack, Rastopshin added: "Nobody can connect to such systems and start illegally managing the nuclear power plant, for instance, by giving commands to extract control rods: the safety system, which is responsible for this, works on

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unvarying algorithms. Access is forbidden for external carriers." India has already reported to IAEA about the safety measures.

"Specific guidance has been developed to assist States with the development and implementation of information and computer security programmes as part of their nuclear security regimes. It includes technical guidance on Security of Nuclear Information, Computer Security at Nuclear Facilities and Computer Security Incident Response Planning at Nuclear Facilities."

As per the Nuclear Regulatory Commission (NRC) of the US, "A cyber-attack cannot prevent critical systems in a nuclear energy facility from performing their safety functions. Nuclear power plants are designed to shut down safely if necessary, even if there is a breach of cyber security. They are also designed to automatically disconnect from the power grid if there is a disturbance caused by a cyber-attack." NRC further elaborates measures taken for the cyber security of Nuclear Power Plant, "Critical digital assets" that perform safety, security, and emergency preparedness functions at nuclear power plants are not connected to the Internet. When devices like thumb drives, CDs, or laptops are used to interface with plant equipment, strictly monitored measures are in place.

There is no denying the fact that cyber threat has increased owing to large scale digitalisation taking place in nuclear facilities. Hence, cyber risk to nuclear facilities requires constant evaluation and response, especially as the industry increases its reliance on digital systems.

Recognising the dynamic nature of cyber security field, the International Security Department at Chatham House convened an 18 month study to explore the potential impact

of digitisation on and implications for the civil nuclear sector. The report titled "Cyber Security at Civil Nuclear Facilities: Understanding the Risks" and released in September 2015 enumerated many challenges facing the civil nuclear facilities. It attributes the opaqueness in communicating any breach of cyber security breach at nuclear facilities as the main hindrance in assessing the extent of problem. Also, limited collaboration between nuclear-industry with other sectors that have been making giant strides in

cyber security as a glaring lacunae in the improvement. Calling for an international cyber security regime, the report recommended to address these problems.

India could also take cue from the recent cyber intrusion to fire wall its cyber security measures at

civil nuclear installations and bring them up to speed to present day threats.

Source: <http://www.nuclearasia.com>, 21 November 2019.

**OPINION – Conn Hallinan**

**Nuclear Lies and Broken Promises**

When Turkish President Recep Tayyip Erdogan told an economic meeting in the city of Sivas on Sept. 4 that Turkey was considering building nuclear weapons, he was responding to a broken promise.

When Israeli Prime Minister Benjamin Netanyahu accused the government of Iran of lying about its nuclear program, he was concealing one of the greatest subterfuges in the history of nuclear weapons. And the vast majority of Americans haven't a clue about either.

Early in the morning of Sept 22, 1979, a US satellite recorded a double flash near the Prince Edward Islands in the South

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Atlantic. The satellite, a Vela 5B, carries a device called a "bhngmeter" whose purpose is to detect nuclear explosions. Sent into orbit following the signing of the PTBT in 1963, its job was to monitor any violations of the agreement. ...

Nuclear explosions have a unique footprint. When the weapon detonates, it sends out an initial pulse of light, but as the fireball expands, it cools down for a few milliseconds, then spikes again. "Nothing in nature produces such a double-humped light flash," says Victor Gilinsky. "The spacing of the hump gives an indication of the amount of energy, or yield, released by the explosion." Gilinsky was a member of the US Nuclear Regulatory Commission and a former Rand Corporation physicist.

There was little question who had conducted the test. The Prince Edward islands were owned by South Africa and US intelligence knew the apartheid government was conducting research into nuclear weapons but had yet to produce one. But Israel had nukes and both countries had close military ties. In short, it was almost certainly an Israeli weapon, though Israel denied it.

In the weeks that followed, clear evidence for a nuclear test emerged from hydrophones near Ascension Island and a jump in radioactive iodine-131 in Australian sheep. Only nuclear explosions produce iodine-131. But the test came at a bad time for US President Jimmy Carter, who was gearing up his re-election campaign, a cornerstone of which was a peace agreement between Israel and Egypt.

If the Israelis were seen to have violated the Partial Test Ban, as well as the 1977 Glenn

Amendment to the Arms Export Control Act, the US would have been required to cut off all arms sales to Israel and apply heavy sanctions. Carter was nervous about what such a finding would have on the election, since a major part of Carter's platform was arms control and non-proliferation.

So Carter threw together a panel of experts whose job was not to examine the incident but to cover it up. The Ruina Panel cooked up a tortured explanation involving mini-meteors that the media accepted and, as

a result, so did the American public.

But nuclear physicists knew the panel was blowing smoke and that the evidence was unarguable. The device was set off on a barge between Prince Edward Island and Marion Island (the former should not be confused with Canada's Prince Edward Island) with a yield of from 3 to 4 kilotons. A secret CIA panel concurred but put the yield at 1.5 to 2 kilotons. For comparison, the Hiroshima bomb was 15 kilotons.

It was also clear why the Israelis took the risk. Israel had a number of Hiroshima-style fission bombs but was working on producing a thermonuclear weapon—a hydrogen bomb.

Fission bombs are easy to use, but fusion weapons are tricky and require a test. That the Vela picked it up was pure chance, since the satellite had been retired. But its bhngmeters were still working.

From Carter on, every US president has covered up the Israeli violation of the

1963 Partial Test Ban Treaty, as well as the 1968 Nuclear Non-Proliferation Treaty (NPT). So when Netanyahu says Iran is lying about its nuclear program, much of the rest of the world, including the US nuclear establishment, rolls their eyes.

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As for Turkish President Erdogan, he is perfectly correct that the nuclear powers have broken the promise they made back in 1968 when they signed the NPT. Article VI of that agreement calls for an end to the nuclear arms race and the abolition of nuclear weapons. Indeed, in many ways, Article VI is the heart of the NPT. Non-nuclear armed countries signed the agreement, only to find themselves locked into a system of “nuclear apartheid,” where they agreed not to acquire such weapons of mass destruction, while China, Russia, Great Britain, France, and the US get to keep theirs.

The “Big Five” not only kept their weapons, but they are also all in the process of upgrading and expanding them. The US is also shedding other agreements, like the Anti-Ballistic Missile Treaty and the Intermediate-Range Nuclear Force Agreement. Washington is also getting ready to abandon the START treaty that limits the US and Russia to a set number of warheads and long-range strategic launchers.

What is amazing is that only four other countries have abandoned the NPT: Israel, North Korea, Pakistan, and India (only the latter three have been sanctioned by the US). But that situation cannot hold forever, especially since part of Article VI calls for general disarmament, a pledge that has been honored in the breach. The US currently has the largest defense budget in its history and spends about 47 percent of what the entire rest of the world spends on their militaries.

While the US doesn't seem able to win wars with that huge military—Afghanistan and Iraq were

disasters—it can inflict a stunning amount of damage that few countries are willing to absorb. Even when Washington doesn't resort to its military, its sanctions can decimate a country's economy and impoverish its citizens. North Korea and Iran are cases in point.

**The “Big Five” not only kept their weapons, but they are also all in the process of upgrading and expanding them. The US is also shedding other agreements, like the Anti-Ballistic Missile Treaty and the Intermediate-Range Nuclear Force Agreement. Washington is also getting ready to abandon the START treaty that limits the US and Russia to a set number of warheads and long-range strategic launchers.**

would anyone sign on or stay in the Treaty? Turkish President Erdogan may be bluffing. He loves bombast and effectively uses it to keep his foes off balance. The threat may be a strategy for getting the US to back off on its support for Israel and Greece in their joint efforts to develop energy sources in the eastern Mediterranean Sea.

**While the US doesn't seem able to win wars with that huge military—Afghanistan and Iraq were disasters—it can inflict a stunning amount of damage that few countries are willing to absorb. Even when Washington doesn't resort to its military, its sanctions can decimate a country's economy and impoverish its citizens. North Korea and Iran are cases in point.**

If the US was willing to cover up the 1979 Israeli test while sanctioning other countries that acquire nuclear weapons, why would anyone think that this is nothing more than hypocrisy on the subject of proliferation? And if the NPT is simply a device to ensure that other countries cannot defend themselves from other nations' conventional and/or nuclear forces, why

But Turkey also has security concerns. In his speech, Erdogan pointed out “There is Israel just beside us. Do they have [nuclear weapons]? They do.” He went on to say that if Turkey did not respond to Israeli “bullying,” in the region, “We will face the prospect of losing our strategic superiority in the region.”

Iran may be lying—although there is no evidence that Teheran is making a serious run at producing a nuclear weapon—but if they are, they are in good company with the Americans and the Israelis. Sooner or later someone is going to set off one of those nukes. The likeliest candidates are India and

Pakistan, although use by the US and China in the South China Sea is not out of the question. Neither is a dustup between NATO and Russia in the Baltic.

It is easy to blame the current resident of the White House for world tensions, except that the major nuclear powers have been ignoring their commitments on nuclear weapons and disarmament for over 50 years. The path back to sanity is thorny but not impossible:

One: re-join the Anti-ballistic Missile Treaty, thus making Russia's medium-range missiles unnecessary, and reduce tensions between the US and China by withdrawing ABM systems from Japan and South Korea. Two: Re-instate the INF Agreement and find a way to bring China, India, and Pakistan into it. That will require a general reduction of US military forces in Asia coupled with an agreement with China to back off on its claims over most of the South China Sea. ...

Three: continue adherence to the START Treaty but halt the modernization of the Big Five's nuclear weapons arsenals and begin to implement Article VI of the NPT in regards to both nuclear and conventional forces. Pie in the sky? Well, it beats a mushroom cloud.

Source: <http://www.intpolicydigest.org>, 24 November 2019.

**INTERVIEW – KN Vyas**

**DAE Working on Small Modular Reactors**

DAE is working on design of Small Modular Reactors, however, any commercialisation of technology will take place only when the

construction of existing nuclear technology has been completed. Secretary DAE and Chairman of Atomic Energy Commission KN Vyas spoke to

Nuclear Asia on various topics along with the hurdles in way of finalising the deal for Jaitapur nuclear power plant and strides made by the Indian nuclear research in various fields like health and agriculture.

**Nuclear Asia (NA):** Indian Government's plan to build 10 indigenous PHWRs has been very ambitious. Is the plan going as per schedule? What has been the lessons learned with respect to undertaking such a project within the country?

**KN Vyas (KNV):** Subsequent to COP-21, in order to meet India's Intended Nationally Determined Contribution (INDC), renewable energy (in the form of solar or wind) alone may not be adequate.

This may be due to the fact that higher proportion of relatively intermittent power supply sources may necessitate an additional reliable but de-carbonised power source. Subsequently, Government approved 10 indigenous PHWRs.

NPCIL has initiated Pre-project activities for new plants as well as initiated advance procurement of long delivery equipment. NPCIL plans to construct and commission the reactors in a fleet mode progressively by 2031.

For efficient implementation of the projects NPCIL, based on past experience, will make efforts: to order large work packages and long delivery equipment in a timely manner; to ensure satisfactory reply to the queries by regulator, as part of licensing, are provided in time; to make available at site engineering details, incorporating guidelines from regulators and construction feedback.

**Re-instate the INF Agreement and find a way to bring China, India, and Pakistan into it. That will require a general reduction of US military forces in Asia coupled with an agreement with China to back off on its claims over most of the South China Sea.**

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**NA:** Indo-French deal for the construction of Jaitapur Nuclear Power Plant has been in limbo for a long time now. The negotiation with the French major EDF has been going on for a considerable time. What are the irritants and what has been suggested to overcome them?

**KNV:** It may be brought to the notice that Indo-French negotiations for Jaitapur have been carried out with three agencies viz. AREVA, FRAMATOME and EDF. As a final stage, Industrial Way Forward Agreement was signed between NPCIL and EDF in March 2018. Subsequently, in December 2018 EDF has submitted a Techno Commercial Offer, for which negotiations are being carried out, which involved scope of work by each of the agencies, discussion on CLND and establishing overall technical feasibility. Subsequent to satisfactory conclusion of the discussions, overall project proposal will get initiated.

**NA:** The target of nuclear energy generation has been scaled down to 20 GW by the end of the decade. What is holding back India's capacity? Is it lack of infrastructure or inability of the nuclear industry to rise up to the occasion? Do you think the negative perception around nuclear energy is the reason behind it? How would you assuage apprehension of general public around it? Also, how do you think India would cope with the challenge of climate change without adequate nuclear energy capacity?

**KNV:** The present installed nuclear power capacity is 6780 MW. There are nine reactors with a capacity of 6700 MW under construction and twelve more with a capacity of 9000 MW have been accorded financial sanction by the Government. On their progressive completion, the nuclear power capacity is expected to progressively increase to 22480 MW by the year 2031.

There have been several challenges being encountered in the capacity addition programme. These include delays in land acquisition & related R&R, obtaining statutory clearances and difficulties faced by Indian industries in timely manufacturing and delivery of equipment / components. In respect of projects to be set up with foreign cooperation, the techno-commercial discussions to arrive at project proposals have been long drawn as they involve complex techno-commercial, legal and regulatory issues.

Additionally, DAE faces various challenges in implementing NPP projects, some of which are: changes needed to be incorporated based on reviews carried out by regulator subsequent to accident at Fukushima; scare caused by Fukushima

accident and public, at large, going in overdrive and failing to understand the differences between Fukushima and Indian scenario in terms of the types of reactors, environmental conditions, etc; high expectations of project affected people in terms of compensation from new site being identified by NPCIL; high capital investment of any nuclear power project.

DAE believes that for meeting the challenge of global warming, renewables alone will not be able to meet the required de-carbonisation. Internationally, advanced countries may also not be able to meet the goals set by them. In India, if we intend to increase our living standard, have increased level of industrialization and pursue the projects of national importance like lift irrigation or river linking, nuclear energy is a very reliable de-carbonised source of energy.

**NA:** Collaboration with Russia and Bangladesh for the Rooppur Nuclear Power Plant has proved to be fruitful for Indian Nuclear energy industry. Are there more such plans to collaborate with foreign partners in third countries?

**The present installed nuclear power capacity is 6780 MW. There are nine reactors with a capacity of 6700 MW under construction and twelve more with a capacity of 9000 MW have been accorded financial sanction by the Government. On their progressive completion, the nuclear power capacity is expected to progressively increase to 22480 MW by the year 2031.**

**KNV:** In the opinion of DAE, tripartite agreement between Bangladesh, Russia and India for cooperation is helping all the three parties. As of now, no specific plans for collaboration with other countries are under consideration.

**NA:** The 500 MWe PFBR has been missing its deadline to go critical. Has there been some hiccups with the project? Is the reactor expected to go critical anytime soon? Also, is the delay proving to be a dampener for India's plan to achieve its three stage nuclear power programme?

**KNV:** PFBR is missing the deadline. The team at PFBR is putting in tremendous efforts for first-of-a-kind equipment, systems and plant for setting-to-work. As the systems are first-of-a-kind, regulator is also cautious in giving step by step clearances.

To some extent, having sodium cooled systems complicates the matter as minor corrections also require a very elaborate procedure for sodium draining, residual sodium clean up, before the system or equipment can be opened to atmosphere for any corrections. The complete process takes a very long time, so that sodium related safety is ensured.

**NA:** People have been questioning the rationale behind the Thorium based fuel cycle that the cost involved in developing it is way too much than its advantages. What is your answer to that?

**KNV:** DAE believes that thorium based fuel cycle is a solution for long term energy security not only for India, but also for many countries in the world and hence efforts need to be spent for having continued R&D for Thorium fuel cycle. The delay or the cost associated is not the reason to stop the work, which has a significant promise. The costs involved towards R&D are not significant at this stage. The R&D gives a

significant confidence to Indian scientists for the Thorium fuel cycle which is recognized internationally for contribution in the related area.

**NA:** What are the new feats achieved by Indian nuclear agencies in applying nuclear technology in the field of health and agriculture?

**KNV:** DAE has institutes involved in R&D at Mumbai, Kalpakkam, Indore and Kolkata. As a part of societal applications, following major new activities have been completed: a process has been developed for extraction of Ruthenium-106 from spent nuclear fuel. The pure Ruthenium-106 has been coated to make an ophthalmic patch to be used for eye cancer. Subsequent to regulatory approval, the patches are given to hospitals for patient trials. This will result in a significant reduction in cost for treatment.

On the similar lines, medical grade Yttrium-90 from high level radioactive waste has been separated and radiopharmaceuticals have been prepared for treatment, which are undergoing trials. Carrier-free Copper-64 has been made at APSARA-U reactor, which was made operational last year. Copper-64 trials for PET imaging have been successfully carried out. Three new crop varieties viz. rice, flaxseeds and mustard have been released to farmers for their use. Medical diagnostic instruments have been developed for detection of oral cancer as well as tuberculosis. Trials by doctors have found the instruments to be useful. Medical cyclotron at Kolkata has been used for preparation of first set of radio-pharmaceuticals batches for regulatory approval. It is hoped that successful completion of all the trials would augment the radiopharmaceutical supply in the eastern region.

**NA:** Countries like Russia and China have turned their focus on SMRs and Floating Nuclear Power Plants to generate power to cut down capital cost

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and to provide power away from large grid systems. How does India look at such innovations and what are the innovations in the peaceful nuclear technology sector that India is working on?

**KNV:** DAE has design teams working on SMRs. However, before any serious consideration, DAE need to complete the task taken up for construction of already planned reactors first. Carrying out the design of new reactor systems and refinement in the already performed design is an ongoing process, which is always under focus to improve the designer's capability. SMRs also need some technology development to fill-up gap areas. Process of technology development also needs to be completed before task related to SMRs can be taken up in a more serious manner.

Source: <http://www.nuclearasia.com>, 21 November 2019.

## **NUCLEAR STRATEGY**

### **RUSSIA**

#### **Kremlin's Nuclear Strategy could Easily Get Out of Hand**

Would the US fight a nuclear war to save Estonia? The question would probably strike most Americans as absurd. Certainly, almost no one was thinking about such a prospect when NATO expanded to include the Baltic states back in 2004.

Yet a series of reports by the nonpartisan RAND Corporation shows that the possibility of nuclear escalation in a conflict between the North Atlantic Treaty Organization and Russia over the Baltic region is higher than one might imagine. The best

**Yet a series of reports by the nonpartisan RAND Corporation shows that the possibility of nuclear escalation in a conflict between the North Atlantic Treaty Organization and Russia over the Baltic region is higher than one might imagine. The best way of averting it? Invest more in the alliance's conventional defense.**

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There was a time when it seemed quite normal to risk nuclear war over the sanctity of European frontiers. During the Cold War, NATO was outnumbered by Warsaw Pact forces, and it would have had great difficulty stopping a Soviet attack with conventional weapons. From the moment it was formed,

NATO relied on the threat of nuclear escalation — whether rapid and spasmodic, or gradual and controlled — to maintain deterrence. American thinkers developed elaborate models and theories of deterrence. US and NATO forces regularly carried out exercises simulating the resort to nuclear weapons to make this strategy credible.

After the Cold War ended, the US and its allies had the luxury of thinking less about nuclear deterrence and war-fighting. Tensions with Russia receded and nuclear strategy came to seem like a relic of a bygone era. Yet today, with Russia rising again as a military threat, the grim logic of nuclear statecraft is returning.

**NATO doesn't have the capability to prevent Russian forces from quickly overrunning Estonia, Latvia and Lithuania. Russian invaders would be at the gates of the Baltic capitals in two to three days; existing NATO forces in the region would be destroyed or swept aside. NATO could respond by mobilizing for a longer war to liberate the Baltic countries, but this would require a bloody, dangerous military campaign.**

The spike in tensions between Russia and the West over the past half-decade has revealed a basic problem: NATO doesn't have the capability to prevent Russian forces from quickly overrunning Estonia, Latvia and Lithuania. Russian invaders would be at the

gates of the Baltic capitals in two to three days; existing NATO forces in the region would be destroyed or swept aside. NATO could respond by mobilizing for a longer war to liberate the

Baltic countries, but this would require a bloody, dangerous military campaign. Critically, that campaign would require striking targets — such as air defense systems — located within Russia itself, as well as suppressing Russian artillery, short-range missiles and other capabilities within the Kaliningrad enclave, which is situated behind NATO's front lines.

Moreover, this sort of NATO counteroffensive is precisely the situation Russian nuclear doctrine seems meant to avert. Russian officials understand that their country would lose a long war against NATO. They are particularly alarmed at the possibility of NATO using its unmatched military capabilities to conduct conventional strikes within Russian borders. So the Kremlin has signaled that it might carry out limited nuclear strikes — perhaps a “demonstration strike” somewhere in the Atlantic, or against NATO forces in the theater — to force the alliance to make peace on Moscow's terms. This concept is known as “escalate to de-escalate,” and there is a growing body of evidence that the Russians are serious about it.

A NATO-Russia war could thus go nuclear if Russia “escalates” to preserve the gains it has won early in the conflict. It could also go nuclear in a second, if somewhat less likely, way: If the US and NATO initiate their own limited nuclear strikes against Russian forces to prevent Moscow from overrunning the Baltic allies in the first place. And even the limited use of nuclear weapons raises the question of further escalation: Would crossing the nuclear threshold lead, through deliberate choice or miscalculation, to a general nuclear war involving intercontinental

ballistic missiles, strategic bombers and apocalyptic destruction?

So what to do? One option would be for the West to pull back — to conclude that any game that involves risking nuclear war over the Baltic states is not worth the candle. The logic here is superficially compelling.

After all, the US could survive and thrive in a world where Russia dominated Estonia, Latvia and Lithuania, just as it survived and thrived during the Cold War, when those countries were part of the Soviet Union. The problem is that failing to defend the Baltic states would devalue the Article 5 guarantee on

which NATO rests: the principle that an attack on one is an attack on all. And given that one could raise similar questions about so many US commitments — would declining to meet a Chinese attack on the Philippines really endanger America's existence? — this failure could undermine the broader alliance system that has delivered peace and stability for so many decades.

A second option, emphasized by the Pentagon's 2018 Nuclear Posture Review, would be to devise new limited nuclear options as a way of strengthening deterrence and dissuading Russia from pursuing a strategy of escalate to de-escalate. For example, the US

might develop low-yield nuclear weapons that could be used, in a relatively limited fashion, against a Russian invasion force or the units supporting it.

This approach is probably worthwhile, because it would help fill in missing steps on the escalatory ladder between conventional conflict and general nuclear war. The knowledge that the US has its

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own “tactical” nuclear options might inject greater caution into the calculations of Russian planners. It is possible, RAND analysts note, that limited nuclear strikes early in a Baltic conflict could convince the Kremlin that the risks of proceeding are unacceptable.

The dangers here are, well, obvious and drastic. There is always some possibility — although informed analysts debate how much of a possibility — that Russia might mistake a limited strike against military targets in the Baltics for part of a larger or more dangerous nuclear strike against Russia itself.

And if the plan is to use limited nuclear strikes against Russian military assets involved in an invasion of the Baltic states, the implication is that NATO would be using nuclear weapons on the territory of its own members.

A third, and best, option is to strengthen the weak conventional posture that threatens to bring nuclear options into play. The root of NATO’s nuclear dilemma in the Baltics is that the forces it currently has stationed there cannot put up a credible defense. Yet as earlier studies have noted, the US and its allies could make a Russian campaign far harder and costlier — with a much-diminished chance of rapid success — by deploying an enhanced NATO force of seven to eight brigade combat teams, some 30,000 troops.

That force would include three or four armored brigade combat teams (as opposed to the one NATO periodically deploys to Eastern Europe now), along with enhanced mobile air defenses and other critical capabilities.

Russia couldn’t claim credibly that such troops posed any real offensive

threat to its territory. But the force would be large and robust enough that Russian troops couldn’t destroy it in a flash or bypass it at the outset of a conflict. It would therefore obviate many of the nuclear escalation dynamics by making far less

likely a situation in which NATO must escalate to avoid a crippling defeat in the Baltics, or one in which Russia can escalate to protect its early victories there.

Developing this stronger conventional deterrent in the Baltics would not be cheap: Estimates run from \$8 billion to \$14 billion in initial costs, plus \$3 billion

to \$5 billion in annual operating expenses. Yet neither would it be prohibitive for the richest alliance in the world. The best way of reducing the danger of a nuclear war in the Baltics is to ensure that NATO won’t immediately lose a conventional one.

*Source: <http://www.aawsat.com>, 15 November 2019.*

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## **BALLISTIC MISSILE DEFENCE**

### **INDIA**

#### **India Test Fires Two Prithvi-II Short-Range Nuclear-Capable Ballistic Missiles**

The tactical surface-to-surface short-range ballistic missiles were test fired at night on November 20. India’s SFC test launched two short-range nuclear capable ballistic missiles at night as part of its annual training cycle to test the combat readiness of the Indian Army’s missile forces.

Two Prithvi-II tactical surface-to-surface short-

range ballistic missiles were test fired from the ITR on Dr. Abdul Kalam Island in the Bay of Bengal off the coast of Odisha at nighttime on November 20.

The missile launches took place between 7 p.m. and 7:15 p.m., according to government sources cited in local media reports. “[T]he missile trajectory was tracked by radars, electro-optical tracking systems and telemetry stations by the DRDO along the coast of Odisha,” an official was quoted as saying by Times Now. “Both tests met all parameters,” the official added. The missile reportedly splashed down in the Bay of Bengal. The night-time user trial was overseen by the SFC and the Defense Ministry’s DRDO. The missile was randomly selected from the production stock.

*Source: The Diplomat, 22 November 2019.*

**NUCLEAR ENERGY**

**CHINA**

**China’s Experimental Nuclear Fusion Reactor to Go Live in 2020**

The race is on among the world’s nations to create an ‘artificial sun’, and now China is staking its claim as the one to beat with a next-generation nuclear fusion reactor. According to Xinhua News, the HL-2M tokamak reactor is set to be operational as soon as next year, as installation work “has gone smoothly” since the delivery of its coil system in June.

According to Duan Xuru, head of the Southwestern Institute of Physics under the China National Nuclear Corporation, the new nuclear fusion reactor is expected to generate plasma at temperatures of more than 200m degrees Celsius. He added that the new reactor will provide key technical support for the country’s participation

in the ITER based in the south of France. As reported by New Atlas, the facility has recently finished construction of the 73 metre-tall building that will house the largest tokamak reactor on Earth.

*Source: Colm Gorey, <https://www.siliconrepublic.com>, 29 November 2019.*

**HUNGARY**

**Hungary Makes EU Bid to Soften Nuclear Licensing Rules to Ease**

Hungary has submitted draft legislation to the European Commission to amend the country’s nuclear safety protocols to custom-fit a 12 billion euro Russian-led nuclear plant expansion project that it wants to speed up.... The draft legislation was detailed to Reuters by the Hungarian Atomic Energy

Agency (HAEA), and corroborated by several sources with knowledge of the matter who wanted to remain unidentified.

The EU review was confirmed by an EU official requesting anonymity, as well as several Hungarian government sources. Eight sources, including high-ranking government officials, confirmed the plan. Hungary wants to expand its 2-gigawatt Paks nuclear power plant with two Russian-made VVER reactors, each with a capacity of 1.2 gigawatts.

The project, awarded in 2014 without a tender to nuclear giant Rosatom, an arm of the Russian government, is often cited as a sign of exceptionally warm ties between Hungarian premier Viktor Orban and Russian President Vladimir Putin, a connection that has unnerved Western allies. However, Rosatom struggled to meet EU and Hungarian safety criteria, delaying the project by several years, and the Russian and Hungarian governments now want to accelerate it.

**The HL-2M tokamak reactor is set to be operational as soon as next year, as installation work “has gone smoothly” since the delivery of its coil system in June. According to Duan Xuru, head of the Southwestern Institute of Physics under the China National Nuclear Corporation, the new nuclear fusion reactor is expected to generate plasma at temperatures of more than 200m degrees Celsius.**

Under the proposed new rules, license applications to build the reactor hole and surrounding insulating slurry wall could be considered before the entire project receives the green light - a break with prior protocol, which only allowed partial licenses to be considered once the construction license was granted.

Hungary's top official in charge of energy policy, Technology Ministry State Secretary Peter Kaderjak, confirmed to Reuters the government was working with the European Commission to recast nuclear power plant construction rules. Kaderjak called the Paks 2 project "the cornerstone of Hungary's energy and climate strategy".

**Risky Move:** The modification carries risks and makes the project much more difficult to abandon or modify as the framework, literally, will be set in stone, according to seven sources with knowledge of the matter who spoke to Reuters on condition of anonymity.

But the move could help the Hungarian government in its haggling with Moscow to modify the current build-and-finance package. Hungary wants to extend the current payment start date of 2026, which was fixed when the project was first conceived. Russia wants to avoid paying delay penalties - by putting off the completion deadline to about 2029 and by having Hungary ease regulatory hurdles such as this one, these sources said.

The changes will appear in a government decree called the Nuclear Safety Regulations once the European Commission's nuclear arm, the Euratom Supply Agency, approves the changes. An EU source also confirmed the Commission was assessing draft legislation against the EU's latest Nuclear Safety Directive, adding it had three months to make recommendations, a deadline that is not yet up.

... Asked about the changes, the HAEA told Reuters that reactor hole and slurry wall work, and some equipment that takes a long time to manufacture, may undergo the licensing process parallel with the evaluation of the construction license application. ... Experts estimate the reactor hole to be several hundred meters wide and several hundred meters long, up to 100 meters deep, surrounded by a concrete slurry wall more than a meter thick. This phase alone could take a year or more to execute.

The changes are designed to save time so once the overall construction license is issued work can begin on the power plant buildings. But experts warned the slurry wall and reactor hole could cost hundreds of millions of euros, and hastening them carries risk: if the HAEA find faults with the overall design, it may require changes that conflict with the concrete already poured, causing a potential cost spike and long delay. ...

Source: Marton Dunai, <https://www.reuters.com/>, 26 November 2019.

## **TURKEY**

### **Turkey's First Nuclear Plant Delayed by Funding Problems**

Completion of Turkey's first nuclear power station is likely to be delayed as the Russian company building it is struggling to secure funding, former diplomat and Bosphorus Energy Club head Mehmet Ödütçü told Turkish daily Sözcü. A small part of the plant in Akkuyu, southern Turkey, may be opened for political reasons in 2023, the centenary of the founding of the Turkish Republic, Ödütçü said.

But Russian state-owned Rosatom is having difficulties financing the project, which is expected to cost between \$20 billion and \$25 billion, he said, adding that Western companies

**Under the proposed new rules, license applications to build the reactor hole and surrounding insulating slurry wall could be considered before the entire project receives the green light - a break with prior protocol, which only allowed partial licenses to be considered once the construction license was granted.**

were avoiding Akkuyu over concerns about nuclear armament. A Turkish consortium pulled out of the project last year, citing a failure to reach commercial terms with Rosatom, which owns a 51 percent stake in the project.

A report by the main opposition Republican People's Party this month (Nov 2019) criticised the terms of the government's deal with Rosatom, which has been guaranteed a price of 12.35 U.S. cents per kilowatt hour in a 15-year power purchase agreement.

Source: <https://ahvalnews.com/>, 30 November 2019.

## UK

### Manifestos Recognise Nuclear Energy's "Critical Role"

The Nuclear Industry Association has praised the UK's two largest political parties for backing nuclear power in their election manifestos. The NIA said pledges from both the Conservative and Labour parties was recognition of nuclear's "critical role" in fighting climate change and reaching the Net Zero 2050 target.

In its manifesto, the Tories say: "We will support gas for hydrogen production and nuclear energy, including fusion, as important parts of the energy system, alongside increasing our commitment to renewables." Labour has committed to kick-starting a "green industrial revolution to create one million jobs in the UK...transforming our economy into one low in carbon, rich in good jobs, radically fairer and more democratic".

**Russian state-owned Rosatom is having difficulties financing the project, which is expected to cost between \$20 billion and \$25 billion, he said, adding that Western companies were avoiding Akkuyu over concerns about nuclear armament. A Turkish consortium pulled out of the project last year, citing a failure to reach commercial terms with Rosatom, which owns a 51 percent stake in the project.**

It says that "new nuclear power is needed for energy security" with the party pledging to work with the community of Anglesey to realise its potential for new nuclear, following the shelving of plans for a power station at Wylfa Newydd, along with renewable energy developments.

The promise will be of particular interest in Cumbria following the collapse of NuGen's plans for a £15 billion power station at Moorside in West Cumbria. Fresh plans for the site are yet to surface, although hopes are high that a large-scale development or Small Modular Reactors (SMRs) will materialise.

... The NIA published a "Priorities for Government" document, setting out five key steps to secure the industry's role in cutting all CO2 emissions in just over 30 years' time, while at the same time creating long-term jobs. Its chief executive, Tom Greatrex, said: "There is an urgent opportunity for this Parliament to set in train the journey to net zero, as the UK embraces the environmental, economic and export opportunities of moving to a sustainable, low emissions future. "Whichever

**Nuclear power generates 20 per cent of the nation's electricity and supports 65,000 jobs—with around a quarter of those based in Cumbria. And while the county's focus remains on decommissioning and waste management at the Sellafield site, calls have been growing for new build at Moorside, which remains a designated site for nuclear development.**

party, or combination of parties, form the next government will have a formidable responsibility for real decarbonisation, of which nuclear will be an integral part."

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quarter of those based in Cumbria. And while the county's focus remains on decommissioning and waste management at the Sellafield site, calls have been growing for new build at Moorside, which remains a designated site for nuclear development.

Industry leaders have expressed hope that a new model for helping to finance nuclear new build will reignite interest in a large-scale power station at Moorside. Meanwhile, Rolls Royce said the consortium it was leading to develop a first-of-a-kind SMR, was actively targeting licenced nuclear sites in Cumbria to develop them.

Moorside, Sellafield and Fellside – which are all licensed sites – have been mooted as potential locations. Elsewhere, Labour has said it would push ahead with tidal lagoon projects should it grasp power following next month's election. That would mean reviving the £1.3bn Swansea Bay tidal lagoon project, which was shelved by the Conservative Government due to concerns over value for money. Its developer Tidal Lagoon Power had previously floated plans for another project off the coast of West Cumbria but backed away following the Government's decision.

Source: Luke Diccio, <https://www.timesandstar.co.uk>, 27 November 2019.

### URANIUM PRODUCTION

#### INDIA

##### India's Biggest Uranium Mine in Andhra Pradesh

India's biggest uranium mine will come up in Kadapa district of Andhra Pradesh where 6,000 tonnes of uranium will be produced every day. With an investment of up to Rs 6,000 crore, the mine at Kanampalli will beat the nearby Tummalapalli mines and the Turamdih mine of UCIL in Jharkhand, which produce 3,000 tonnes each.

UCIL CMD C.K. Asnani told TOI that the process of mining lease boundary fixation has begun and the corporation would soon approach the ministry of forests and environment for terms of reference and AP pollution control board for public hearing.

The DAE's Atomic Minerals Directorate will complete the initial work and hand over the mine area to UCIL. "UCIL will also go for a public hearing

in February or March 2020 for expansion of Tummalapalli mine from 3,000 tonnes to 4,500 tonnes. Kanampalli will be the biggest uranium mine in India. It will take six months to get terms of reference from MoEF, and for full-scale production, it will take seven years as it's a time taking process" Asnani said.

The ore body of Kanampalli and Tummalapalli mining block in Kadapa is spread over a length of 21 kilometres. Around 51 per cent uranium ore is in this block, holding 3.17 lakh tonnes of uranium. We had a record production of uranium in the past two months at UCIL. The percentage of purity of extracted uranium at Tummalapalli is 70," he said.

**UCIL working on mining lease boundaries at Chitral project:** Unlike in Tummalapalli, UCIL will acquire land where mine and mill will be constructed in Kanampalli and dig the uranium ore underneath. In

Tummalapalli, the mine lease areas are 2,405 acres and the area of tailing pond is 148 acres.

UCIL will be investing all together Rs 10,500 crore in 13 projects across the country in which majority of funds will come into Kanampalli block. Chitral project in Nalgonda district in Telengana is estimated to have an outlay of about 1,500 to Rs 2,000 crore. UCIL is working on mining lease boundaries for another project at Chitral, officials said.

Source: U Sudhakar Reddy, <https://timesofindia.indiatimes.com/>, 23 November 2019.

#### KAZAKHSTAN

##### Kazakhstan Increases Uranium Mining by 5%

The volume of uranium mining in Kazakhstan during ten months of this year increased by 5% and amounted to 18.7 thousand tonnes, Kazakhstan's Energy Ministry said on 11 November. "The volume of uranium mining amounted to about 18.7 thousand tonnes with an increase of 5% compared to the same period in 2018," the ministry said.

**UCIL will also go for a public hearing in February or March 2020 for expansion of Tummalapalli mine from 3,000 tonnes to 4,500 tonnes. Kanampalli will be the biggest uranium mine in India. It will take six months to get terms of reference from MoEF, and for full-scale production, it will take seven years as it's a time taking process.**

According to ministry, uranium production in Kazakhstan in January-October 2018 reached 17.8 thousand tonnes. The national company Kazatomprom in 2019 plans to produce 22.75-22.8 thousand tonnes of uranium. The production level in proportion to the share of Kazatomprom in other companies in 2019 will be 13-13.5 thousand tonnes, taking into account the announced plans to reduce production by 20%.

Kazatomprom is the national operator of Kazakhstan for the export of uranium and its compounds, rare metals, nuclear fuel for nuclear power plants and special equipment. The Samruk-Kazyna State Fund owns 81.2% of Kazatomprom shares, 18.8% is freely traded on the Astana International Financial Center (AIX) and the London Stock Exchange (LSE).

Source: <https://www.neweurope.eu>, 11 November 2019.

## **NUCLEAR COOPERATION**

### **GERMANY–BRAZIL**

#### **Germany and Brazil Renew Nuclear Cooperation Agreement; Third Nuclear Plant to be Built by 2026**

Germany's parliament, the Bundestag, ignored pleas from the Green party to scrap a nuclear agreement with Brazil. "Our cooperation in this area has worked well for decades," Parliamentary State Secretary for the Environment Rita Schwarzelühr-Sutter of the center-left Social Democratic Party (SPD) said. "There are currently no plans to cancel the agreement."

The deal, signed in 1975, pertains to the "peaceful use of atomic energy," that is, the

construction of nuclear power plants. It was originally negotiated by Brazil's military dictatorship and the SPD government of Helmut Schmidt.

But Sylvia Kotting-Uhl, the Green party chairwoman of the Bundestag's environmental committee, said there is no reason to maintain the treaty. The agreement comes up for a vote for extension or termination every five years. "We requested the agreement be terminated five years ago," Kotting-Uhl said "At the time, the government claimed that maintaining the deal would allow Germany to influence

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safety standards for Brazil's nuclear power plants. Meanwhile that has been proven false. Brazil's safety standards are entirely opaque. The German government has no idea what they even are."

Moreover, added Kotting-Uhl, with the election of far-right President Jair Bolsonaro, Brazil now has a leader with a long-term plan to develop nuclear weapons. "He wants to complete the fuel cycle, that means the risk of Brazil producing weapons-grade material is very high," she said.

The Green party request to terminate the deal notes that Germany, a country that has declared it no longer has faith in nuclear energy, must send a signal to Brazil: "Germany's planned 2022 national nuclear phase out should guide its policy within Europe and across the world. Germany could be a role model for the global phase out of nuclear energy."

**Brazil generates the majority of its energy through hydroelectric power plants. Nuclear energy, produced by Brazil's two existing nuclear power plants, currently contributes very little of the country's overall energy supply. Brazil plans on building a third nuclear facility, Angra 3, in the near future.**

Brazil generates the majority of its energy through hydroelectric power plants. Nuclear energy, produced by Brazil's two existing nuclear power plants, currently contributes very little of the country's overall energy supply. Brazil plans on building a third nuclear facility, Angra 3, in the near future. Materials for the Angra site, named for the coastal

city of Angra dos Reis where it is to be located, have been in storage for decades. Many of its components were produced in Germany.

Construction of the facility was scheduled to begin years ago, and now most of its parts are considered obsolete. That means the design for Angra 3 is similar to German nuclear power plants taken offline years ago. Furthermore, geologists say the Angra area is prone to landslides, raising further safety concerns.

Back in 2018, the German government justified its commitment to maintaining the agreement, despite objections from the Greens, by again arguing it would improve safety standards in Brazil: "There are no foreign policy or energy policy considerations that would necessitate termination of, or amendments to the nuclear agreement with Brazil.

The cooperation agreement on the peaceful use of nuclear energy affords, among other things, the German government the opportunity to exert influence over improvements to safety standards at Brazilian nuclear facilities."

Now, despite concerns about Bolsonaro, the treaty has been extended for another five years. Bolsonaro's government is currently planning to move ahead with construction of the Angra 3 plant, with completion slated for 2026. Cost projections, originally pegged at €2.1 billion, have now soared to €5.6 billion.

Source: <http://www.en.mercopress.com>, 15 November 2019.

## **INDIA–RUSSIA**

### **Rosatom Seeks Collaboration with India to Develop Small & Medium Sized Reactors**

Rosatom has expressed interest in collaborating with Indian companies not only for the construction large nuclear power plants, but also to jointly work on small and medium sized reactors

that could provide solutions for power woes in densely populated countries.

Nikita Masein, Vice President of Rosatom Overseas (a division of Russia's Rosatom State Atomic Energy Corporation) revealed this during the 11th edition of Nuclear Energy Conclave organised by Indian Energy Forum. Riding on the success of its nuclear reactor designs, which have seen one reactor being commissioned every year for the last 14 years.

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... Making a case for nuclear energy, the Rosatom representative said that besides coal, only nuclear can provide the base load energy required to curb Carbon Dioxide emissions. "India needs to understand the importance of base load energy solutions. So far coal has been meeting this requirement but the need is to shift to nuclear power plant. In NPP it is easier guess the economics cost as the operation cost remains more or less the same," he emphasised. ...

Source: <http://www.nuclearasia.com>, 13 November 2019.

## **NUCLEAR SECURITY**

### **GENERAL**

#### **IAEA Completes Nuclear Security Advisory Mission in Uruguay**

An IAEA team of experts completed a nuclear security advisory mission in Uruguay, which was carried out at the request of the country's government. The scope of the two-week International Physical Protection Advisory Service (IPPAS) mission included the legislative and regulatory framework for the security of radioactive material, as well as the regulatory practices in, and coordination between, national organizations involved in nuclear security. In April

2016, Uruguay ratified the 2005 Amendment to the CPPNM and its incorporation into the country's nuclear security regime was also included in the scope of the mission.

The team observed that Uruguay has a well-established nuclear security regime that incorporates essential elements of the IAEA's guidance on the fundamentals of nuclear security. The team offered recommendations and suggestions to support Uruguay in further enhancing and sustaining nuclear security. Good practices were identified that can serve as examples to other IAEA Member States to help strengthen their nuclear security activities.

The team was led by Antonio Perez Baez, Senior Security Inspector at the Spanish Nuclear Safety Council, and included five other experts from Bulgaria, Ukraine, the US, Venezuela and the IAEA. They met in the capital Montevideo with experts from various ministries and governmental organizations, including the National Defence Interministerial Committee and the National Nuclear Security Committee, as well as the National Regulatory Authority in Radioprotection (ARNR). As part of the mission, the team visited a radioactive waste repository, a hospital, the Technological Laboratory of Uruguay and a private engineering firm which imports and transports radioactive sources. The team also inspected industrial radiography techniques at the state fuel refinery. ...

**Background:** The mission was the 89th IPPAS mission conducted by the IAEA since the programme began in 1995. IPPAS missions are intended to assist States in strengthening their national nuclear security regime. The missions provide peer advice on implementing international instruments, along with IAEA guidance on the protection of nuclear and other radioactive material and associated facilities. During missions, a team of international experts observes a nation's system of physical protection, compares it with international good practices and

makes recommendations for improvement. IPPAS missions are conducted both on a nationwide and facility-specific basis.

Source: <http://www.iaea.org>, 22 November 2019.

## **INDIA**

### **Nuclear Plants in Country Safe: Government**

The government on 28 Nov assured the Rajya Sabha that nuclear plants in the country are absolutely safe and steps have been taken to ensure their safety after a "malware infection" was reported in the administrative network of the Kudankulam Nuclear Power Plant.

"Let me assure the House that the nuclear plants in the country are completely safe," Minister of State in the Prime Minister's Office Jitendra Singh said during Question Hour in Rajya Sabha. We follow the mantra of safety first and production later," he said while replying to

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supplementaries.

The minister said there was an identification of a malware infection on KKNPP administrative network which is used for day-to-day administrative activities. The plant control and instrumentation system is not connected to any external network such as Intranet, Internet and administrative system and thus was not affected, he noted. "The malfunctioning was confined to administrative block and the plant per se is absolutely safe," he said.

Source: *The Economic Times*, 28 November 2019.

## **NUCLEAR PROLIFERATION**

### **IRAN**

#### **Iran Increases its Enriched Uranium Production 10 Times**

Iran increased daily production of enriched uranium by 10 times compared to 2015, confirmed the vice president of the Organization of Atomic Energy of the Islamic Republic (OEAI), Ali Asquear

Zarean. The manager explained that the country processed 450 grams of enriched uranium and now reached five thousand grams. Zarean said there is a capacity to enrich fissile material at any level of purity, despite the measures of the US and its allies to hinder the Iranian peaceful nuclear program.

At present, the Islamic Republic has 500 kilograms in its reserves, 200 above the limit imposed by the JCPOA and which will increase in the coming days, according to the vice de la Oeai. 'We will not yield to the plots that prevent us from working and we will continue until we reach the final peaks in this industry', he said.

Tehran cut four times its commitments to the nuclear agreement, after waiting a year for a reaction from the European signatories to the departure of Washington and the return of anti-Iran sanctions. That consent was sealed in 2015 with the 5 + 1 group (US, United Kingdom, France, Russia and China plus Germany).

As part of that fourth step, the Islamic Republic resumed its uranium enrichment activities at the Fordo plant, although under the supervision of the International Atomic Energy Organization. And, in addition, it put into operation more modern and efficient centrifuges that provide greater speed and capacity when it comes to enriching uranium. The Iranian authorities said they will continue to decrease their participation in the Jcpoa, but will return to the beginning if the other signatories resume the provisions of the pact.

Source: <http://www.plenglish.com>, 24 November 2019.

### **France Regrets US Decision on Fordow, Rebukes Iran**

France lamented a US decision to end a sanctions

waiver related to Iran's Fordow nuclear facility, but also said it feared Tehran's latest violations of a 2015 deal could lead to serious nuclear proliferation. "We regret the decision of the US, following Iran's resumption of enrichment on the Fordow site, to terminate an exemption that would facilitate the conduct of civilian projects on this site," foreign ministry spokeswoman Agnes von der Muhll told reporters in an online briefing.

The Trump administration, which last year pulled out of the Iran nuclear deal and re-imposed sanctions on Tehran, had let the work go forward at the Fordow fuel enrichment plant by issuing waivers to sanctions that bar non-US firms from dealing with the Atomic Energy Organization of Iran (AEOI).

The U.N. atomic watchdog and Iran itself said this month (Nov 2019) Tehran is again enriching uranium at the sensitive site, which Iran hid from U.N. non-proliferation inspectors until its exposure in 2009. "France is extremely concerned by Iran's non-compliance with its nuclear obligations, which may have serious consequences for proliferation," von der Muhll said a day after Iran breached another limit in the nuclear deal by accumulating slightly more than 130 tonnes of heavy water. "Iran's resumption of enrichment activities at the Fordow site, with potentially serious proliferation consequences, is a new step that marks a regrettable acceleration of Iran's withdrawal from the Vienna agreement."

As the deal has slowly eroded, France, Britain and Germany have been torn between trying to save it and responding to Iran's breaches. French officials have in recent weeks stepped up efforts to try to bring Tehran and Washington back to the negotiating table, but with little sign of success.

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They are trying to convince Iran to go back on a raft of decisions violating the accord and the United Nations to begin lifting some sanctions that have strangled Iran's economy. "France calls on Iran to comply fully with the agreement without delay," von der Muhll said, adding that Paris was continuing its efforts to defuse tensions.

**The current international security environment is fraught with uncertainty and tension," the ministers of the 12-member Non-Proliferation and Disarmament Initiative said in a joint statement released after their gathering in Nagoya. "We reaffirm our commitment to the international community's goal of complete, verifiable and irreversible dismantlement of all North Korea's weapons of mass destruction and ballistic missiles of all ranges," the ministers added.**

Source: <http://www.reuters.com>, 19 November 2019.

**NUCLEAR NON-PROLIFERATION**

**NORTH KOREA**

**Nuclear Non-proliferation Group Vows to Work to Achieve North Korea's Denuclearization**

Foreign ministers from a coalition of non-nuclear weapons states pledged to work in tandem to achieve North Korea's denuclearization, as the country's negotiations with the US have been at a stalemate. "The current international security environment is fraught with uncertainty and tension," the ministers of the 12-member Non-Proliferation and Disarmament Initiative said in a joint statement released after their gathering in Nagoya. "We reaffirm our commitment to the international community's goal of complete, verifiable and irreversible dismantlement of all North Korea's weapons of mass destruction and ballistic missiles of all ranges," the ministers added.

**The Non-Proliferation and Disarmament Initiative is a coalition composed of Australia, Canada, Chile, Germany, Japan, Mexico, the Netherlands, Nigeria, the Philippines, Poland, Turkey and the United Arab Emirates.**

North Korea has warned that it will resume nuclear and intercontinental ballistic missiles tests unless the administration of US President Donald Trump makes concessions in talks over denuclearization by the end of this year. Since earlier this year, Pyongyang has continued to launch new weapons believed to be short-range missiles in defiance of UN Security Council

resolutions that prohibit the nation from developing a nuclear arsenal and ballistic missiles.

The meeting was held in the run-up to the quinquennial review conference of the NPT, scheduled for next spring. The gathering, co-chaired by Foreign Minister Toshimitsu Motegi and Australian Foreign Minister Marise Payne, was the 10th meeting of its kind since the

group was established in 2010 in an attempt to realize a "world free of nuclear weapons." The framework, created at the initiative of Japan and Australia, has demonstrated support for the NPT, a landmark multilateral treaty aimed at preventing the spread of nuclear technologies.

The global situation on nuclear weapons has become more uncertain as the US also pulled out of the 2015 Iran nuclear deal. Tehran has recently suspended some of its commitments under the nuclear pact involving the country and six major powers such as China and Russia, in response to Washington's withdrawal from the accord and reintroduction of sanctions. The Non-Proliferation and Disarmament Initiative is a coalition composed of Australia, Canada, Chile, Germany, Japan, Mexico, the Netherlands, Nigeria, the Philippines, Poland, Turkey and the United Arab Emirates.

Source: <http://www.japantimes.co.jp>, 23 November 2019.

**NUCLEAR DISARMAMENT**

**KAZAKHSTAN**

**Nazarbayev Proposes Way to Create Greater Eurasia**

"Pragmatic cooperation between the Eurasian Economic Union, the European Union, the SCO, ASEAN and the Belt and Road Initiative will give a powerful impetus to the formation of Greater

Eurasia, stabilising the entire political space of the largest continent in the world. I consider this an unacceptable situation, when a full-fledged dialogue between the EU and the Eurasian Economic Union is still not achieved," Nazarbayev said during his speech to open the plenary meeting.

In the reality of increased interdependence, countries should stop pursuing "narrow regionalism and bloc thinking, but reveal new cooperation opportunities in the Greater Eurasia. Only in this way will we be able to realise the huge potential that the Eurasian supercontinent possesses and I am pleased to note that it is our club that acts today as the ideological platform of a new geopolitical construction called Greater Eurasia," he added.

Nazarbayev stressed the importance of building the mechanism to support dialogue between the EU and EAEU in addressing the key risks to Eurasian geopolitics and world as a whole. "We are worried about the situation in the global economy, which is increasingly showing signs of an impending crisis. Amid growing trade contradictions and geopolitical instability in the world, global institutions give disappointing forecasts. Slowing global growth has a negative effect on world trade. All these factors undermine world stability," he said.

Nazarbayev proposed combining the potentials of the Conference on Interaction and Confidence-Building Measures in Asia (CICA) and the Organisation for Security and Cooperation in Europe (OSCE). The new arrangement, known as Greater Eurasia, could "form a single community of Euro-Atlantic and Eurasian security" as stated in the OSCE's Astana Declaration adopted nine years ago, he said .

... The majority of experts think unifying the institutions will resolve key Eurasian issues, said

Nazarbayev, who proposed using the Astana Club as a preliminary stage to prepare higher-level negotiations. As Honorary Chair of the Supreme Eurasian Economic Council, he stressed his readiness to provide comprehensive support in building the European Union (EU) – Eurasian Economic Union (EAEU) partnership dialogue mechanism.

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He also proposed creating a Global Alliance of Leaders for a Nuclear Weapons-Free World to promote the nuclear disarmament and non-proliferation agenda. ... In addition, Nazarbayev spoke about the need to develop effective guarantees of North Korea's security on the part of all UN Security Council members and create a catalogue of confidence-building measures between Pyongyang and Seoul to stabilise the situation on the Korean Peninsula.

Source: <http://www.astanatimes.com>, 13 November 2019.

## **NUCLEAR SAFETY**

### **JAPAN**

#### **South Korea Nuclear Regulator Wants Information on Radioactive Fukushima Water Release**

Japan's reluctance to disclose information about the release of radioactive water from its damaged Fukushima nuclear plant is hampering neighboring countries' efforts to minimize the impact, the head of South Korea's nuclear safety agency said.

Since the 2011 earthquake and tsunami caused a meltdown at some of the reactors the Fukushima plant, owner Tepco has been storing radioactive water in tanks at the site from the cooling pipes used to keep the fuel cores from melting. The utility will run out of space for the water in 2022.

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Japan has not yet decided how to deal with the contaminated water, but its environment minister said in September that radioactive water would have to be released from the site into the Pacific Ocean. "We have been raising Japan's radioactive water issue to the international community to minimize the impact ... but as Japan hasn't disclosed any specific plan and process we would need more details to run simulations and study," Uhm Jae-sik, chairman of the Nuclear Safety and Security Commission, told Reuters.

In addition to the Fukushima crisis, safety concerns about nuclear energy have increased in South Korea following a 2012 scandal over the supply of faulty reactors parts with forged documents, prompting a series of shutdowns of nuclear reactors. South Korea, the world's fifth-largest user of nuclear power, targets a long-term phase out of atomic power to allay public concerns.... South Korea operates 25 nuclear reactors, which generate about a third of the country's total electricity. Of the 25 reactors, 10 are offline for maintenance, according to the website of Korea Hydro & Nuclear Power.

Source: <http://www.reuters.com>, 20 November 2019.

**NUCLEAR WASTE MANAGEMENT**

**USA**

**Nuclear Waste Bill Gains Traction in the House**

A bill to amend the Nuclear Waste Policy Act (NWPA) of 1982 and give the DOE the authority to site, build, and operate one or more interim storage sites that would consolidate spent nuclear fuel (SNF) from decommissioned nuclear reactors

has passed out of committee and been reported to the full House of Representatives.

The full US Energy and Commerce Committee amended the May 2019-introduced "Nuclear Waste Policy Amendments Act of 2019" (H.R. 2699) by voice vote on Nov. 20. The committee received it from the subcommittee on Environment and Climate Change on Sept. 26. It now goes to the full House, where its future is uncertain. However, Energy and Commerce Committee Chairman Frank Pallone, Jr.—a Democrat from New Jersey—was hopeful that it would move the nation closer to a "real national solution for moving spent fuel to an interim facility and, ultimately, to a permanent repository."

**As well as furnishing the DOE with the authority to build interim storage sites, the bipartisan bill introduced by Reps. Jerry McNerney (D-Calif.) and John Shimkus (R-Ill.) seeks to prioritize the transfer of SNF from seismically active areas. Significantly, it also permits the DOE to undertake "infrastructure activities" intended to enable construction and operation of a repository at Yucca Mountain in Nevada, including safety upgrades, site preparation, construction of a rail line, and grid connection.**

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Additionally, the bill establishes ratepayer protections by reforming the finance mechanism of the Nuclear Waste Fund and assures that DOE has adequate funding to construct and operate a repository, Pallone said.

In a statement, Republican Reps. Shimkus and Greg Walden (R-OR), who is the Energy and Commerce Committee's ranking member, said the bill to amend NWPA—last amended in 1987—followed "science and law, both which say that

Yucca Mountain is the solution to the country's nuclear waste problem."

But despite a series of recent developments that could revive the Yucca Mountain deep geologic repository, making it the final destination for the nation's spent fuel, as required by amendments to NWPA in 1987, and though SNF has continued to accumulate at sites across the nation, a long-standing political deadlock has left the US with one option that has nearly every stakeholder attached to the nuclear power industry despondent—to wait.

In recent years, the House has repeatedly advanced measures to amend the NWPA. A bill introduced last year, for example, cleared the House with a broad bipartisan vote of 340-72 but stalled in the Senate. The issue is also compounded by a funding fight. The House this year stripped funding proposed by the Trump administration to continue the licensing process needed for a construction permit from the Nuclear Regulatory Commission (NRC). The measure is also faces staunch opposition by Nevada's entire congressional delegation.

Still, owing to backing by energy committee leaders in the House and Senate, the 2019 bill may have legs. Sen. John Barrasso (R-Wyo.), chairman of the Senate Committee on Environment and Public Works (EPW), introduced a companion bill to the Nuclear Waste Policy Amendments Act of 2019.

Along with assisting in the resolution of the pending Yucca Mountain license, the bill would provide the state of Nevada and local stakeholders the opportunity to "beneficially engage" with the federal government as the host state for the repository, Barrasso said.

Nuclear waste management will be pivotal to the future of nuclear power, he noted. "If we're serious about reducing carbon emissions in a meaningful way, we need to get serious about dealing with nuclear waste. Nuclear power is America's largest source of carbon-free energy, but it leaves left over spent fuel. Right now, that nuclear waste and high-level radioactive material is being stored in 39 different states."

*Source: <http://www.powermag.com>, 21 November 2019.*



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