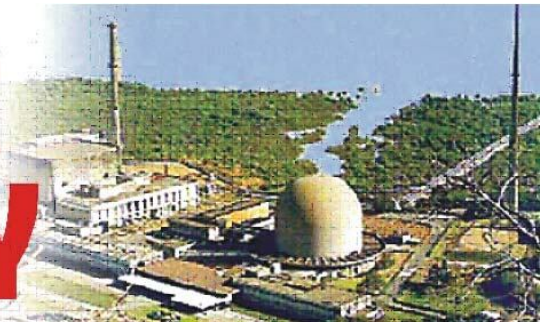
NUCLEAR SECURITY



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

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OPINION – Hina Pandey

Implications of North Korean Nuclear Exchange for South Asia

The North Korean nuclear crisis is getting increasingly complex. To begin with, it is now apparent that Pyongyang is no longer a nuclear threshold state that can be coerced or induced into giving up its nuclear capability, at least not in the current circumstances. It has moved away from the status of a nuclear weapons capable state post the Nuclear NPT withdrawal to having a "potent deterrent designed to prevent a US attack or disrupt one ..." and there does not seem to be any solution in sight. In the two and half decades of the permanent five members of the United Nations Security Council trying to resolve the issue, North Korea has walked out of all agreements, all the while advancing its nuclear and missile capabilities. It has demonstrated great resolve in continuing with the larger goal of acquiring a nuclear deterrent. During 2017 alone, North Korea has conducted approximately 19 nuclear capable missile tests.

Pyongyang is no longer a nuclear threshold state that can be coerced or induced into giving up its nuclear capability, at least not in the current circumstances. It has moved away from the status of a nuclear weapons capable state post the Nuclear NPT withdrawal to having a "potent deterrent designed to prevent a US attack or disrupt one ..." and there does not seem to be any solution in sight.

On the surface, the Korean Peninsula crisis does appear to be a "Cuban missile crisis in slow motion," as David Sanger and William Broad have described, when considering the presence of active agents, a relentless drive to assemble its nuclear arsenal, the propaganda and uncertainty surrounding Kim Jong Un's leadership, and hints of military action by the United States. Scott Sagan, in his recent article for *Foreign Affairs*, viewed the overall play of these factors as posing immediate dangers, wherein "the risk that an accident, a false warning, or a misperceived military exercise could lead to war is alarmingly high." According to him, the situation is compounded by the presence of unpredictable and impulsive leadership on both sides. Does all this imply that the United States and North Korea are inching closer to actual war? This is a scary possibility, especially when

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considering North Korean Foreign Minister Ri Su Yung's statement calling President Trump's United Nations General Assembly speech a "declaration of war" on North Korea.

Hypothetical: What implications would nuclear use in this scenario have for southern Asia, which has three states with nuclear weapons that are geographically proximate to North Korea? This breaking of a decades-old nuclear taboo would likely have some psychological impact on the thinking of nuclear weapons states in general. It can be argued that there lies some assurance in the no nuclear use norm, and the notion that nuclear deterrence works has been able to instill a sense of security and confidence in nuclear possessors. All this may be reversed when there is the occurrence of the "unthinkable." It is likely to leave the nuclear possessors immensely disconcerted about their larger security strategies involving nuclear weapons. It may raise questions about the purpose of nuclear weapons.

The very fact that nuclear use has occurred (by accident or by design) would likely strengthen the view that only nuclear abolition can guarantee complete security. Nuclear use anywhere in the world would arguably take away the justification of nuclear weapons in the first place.

If the purpose of history is to yield lessons for the future, then this action should ideally trigger greater responsibility towards nuclear weapons abolition. The very fact that nuclear use has occurred (by accident or by design) would likely strengthen the view that only nuclear abolition can guarantee complete security. Nuclear use anywhere in the world would arguably take away the justification of nuclear weapons in the first place. It would inevitably unify and strengthen the anti-nuke and pro-abolition movement like never before, further pressurizing nuclear weapons states to shed their nuclear-weapons-centric security strategies.

As for India, it can be argued that New Delhi would be affected by nuclear use in the same manner. Broadly, if there is an immediate and collective effort in containing the fallouts of such a grave situation, one can imagine India being a part of it. Alternatively, questions regarding a change in India's security perception, specifically its nuclear deterrence strategy, naturally arise. In the backdrop of nuclear use in the North Korean case, will India consider Pakistan as a more immediate threat, especially due to its first use policy?

To answer this, one must ask: how can the North Korean nuclear crisis alter Pakistan's calculus? In case of deterrence failure, what can change in Pakistan's stated nuclear posture? Pakistan's stated posture of first use will remain the same. But, at the same time, will Pakistan attempt to project an assertive nuclear posture, including maximizing its nuclear arsenal and strengthening its nuclear capabilities? In an environment where nuclear use occurs after over 70 years, being assertive regarding nuclear capabilities would only prove to be counterproductive for any country, more so for Pakistan because of its proliferation baggage. Thus, India's nuclear deterrence strategy is not likely to change because the North Korean nuclear crisis will not fundamentally change South Asian nuclear reality, especially in the immediate future.

In the backdrop of nuclear use in the North Korean case, will India consider Pakistan as a more immediate threat, especially due to its first use policy? To answer this, one must ask: how can the North Korean nuclear crisis alter Pakistan's calculus? In case of deterrence failure, what can change in Pakistan's stated nuclear posture? Pakistan's stated posture of first use will remain the same. But, at the same time, will Pakistan attempt to project an assertive nuclear posture, including maximizing its nuclear arsenal and strengthening its nuclear capabilities.

Reality: While one can imagine various hypothetical scenarios in a post-nuclear-use setting, in reality, fortunately, the crisis doesn't seem to be going out of hand. Various back

channels are indeed working to ensure that the world does not move closer to the hypothetical discussed above. It is good news that the international community shares the view that the crisis must be resolved; especially when there is an evident pattern in North Korea's brinkmanship and it has potential to set a dangerous precedent. So far, developments suggest that the United States has resumed back channel diplomacy with North Korea.

However, it has unfortunately met with little progress. While the EU may play a constructive role, it cannot be ascertained as to what extent back channels between the EU and North Korea have now been reduced to only medium-ranking foreign ministry officials attending the meetings. More importantly, North Korea might view the EU's role as speaking for American interests since the United States officially conducts its business with North Korea through the Swedish embassy. Does that imply that there is possible space for India to engage North Korea? While the issue does not hold major implication for India, it poses indirect consequences due to North Korea's proliferation linkages. Thus, one may suggest that based on its support to global nonproliferation norms, India may choose to engage.

India's tone might not be viewed as patronizing to Pyongyang as compared to the United States and this could be the first step towards a larger negotiation agenda. Additionally, Indian engagement would automatically shift the focus of the talks from "the United States single-mindedly pressuring to denuclearize North Korea" to "resolution of the immediate crisis by a non-Western nation," one which has helped North Korea's people on humanitarian grounds.

Does India Envision a Role?: While nothing has been said officially about India's possible role, New Delhi recently refused to close the Indian embassy in North Korea and conveyed to the United States that some "friendly countries should maintain embassies there so that some channels of communication are kept open." In fact, the United States also indicated that the Indian office might have some value to Washington as a conduit for communications. In this context, two observations can be made:

First, while India has traditionally shied away from such a third-party role in negotiations, this option aligns with India's larger nonproliferation agenda and thus, is not radical or outside of its declared nonproliferation position. The North Korean issue is an important one for India: New Delhi has categorically criticized every nuclear test by Pyongyang and even severed its ties with the country after discovering its illicit nuclear linkages with Pakistan. In recent times too, India "deplored" the latest nuclear test that was said to have given North Korea a thermonuclear capability. It had called upon North Korea to refrain from such action, so acting on it may not be unwise.

Second, it should be noted that India actually shares a practical relationship with North Korea. While it does not support Pyongyang's nuclear ambitions, New Delhi has been forthcoming in helping the country with medical and food supplies and bilateral relations have been steady in recent years, including diplomatic visits by North Korean officials to India. Being North Korea's third-largest trade partner, India can leverage the situation by proposing to resume all trade activities that it recently banned in response to North Korea's nuclear tests this year. India's tone might not be viewed as patronizing to Pyongyang as compared to the United States and this could be the first step towards a larger negotiation agenda. Additionally, Indian engagement would automatically shift the focus of the talks from "the United States single-mindedly pressuring to denuclearize North Korea" to "resolution of the immediate crisis by a non-Western nation," one which has helped North Korea's people on humanitarian grounds. While India doesn't enjoy as much clout with North Korea as China, it can still be useful in communicating significant messages. China may react negatively to Indian involvement but the fact that there is global consensus that the current nuclear standoff must be resolved immediately should be a mitigating factor.

Finally, on the surface, it might seem that a nuclear catastrophe in the extended neighborhood would spell panic for regional stability in southern Asia. However, this may not be the case as the only region with three nuclear powers sharing borders would be compelled to act wisely. Because when it comes to nuclear weapons, there is no scope for complacency.

Source: https://southasianvoices.org/, 27 November 2017.

OPINION – Richard Sokolsky

The Folly of Deploying US TNWs to South Korea

The mudslinging between US President Trump and North Korean leader Kim Jong Un and the near-daily handicapping of whether the US and North Korea are bound for war have overshadowed an important debate in South Korea over whether the US should redeploy TNW on ROK territory. Proposals that US government officials and defense experts have floated to ease South Korean worries about the credibility of the US extended deterrent have primarily focused on bolstering US/ROK conventional defenses against North Korean aggression. These measures, while necessary in the short-term, may not be sufficient to contain South Korean pressure for either US TNW deployments or development of an indigenous nuclear weapons program over the long-run, especially if the conservative party returns to power. If Washington wants to keep the South Korean nuclear genie in its bottle, the administration may need to draw the ROK more closely into US nuclear planning for the peninsula and elevate the visibility of its own nuclear footprint in and around the country. But this path should only be taken if the US is ready to simultaneously take diplomatic initiatives with North Korea to prevent misperceptions and potential escalation.

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It is difficult to predict the outcome of the South Korean debate over its nuclear future. President Moon is adamantly opposed to the re-introduction of TNW and to South Korean development of nuclear weapons—and his views are likely to prevail as long as his party stays in power and he remains committed to pursuing improved relations with China and dialogue with North Korea. However, the call for the redeployment of TNW began in 2013 and has steadily grown louder and stronger as North Korea's nuclear capabilities have improved—for the past year, the South Korean opposition party has mounted a full-court press on the Trump administration to return TNW to South Korea, which were withdrawn in 1991.

In a recent trip to Washington, Hong Joon-pyo, former ROK presidential candidate and now leader of the opposition Liberty Korea Party, urged the United States, South Korea and Japan to form a "freedom nuclear alliance" and to base nuclear weapons in all three countries to counter the growing North Korea nuclear threat. He also warned that if the United States turned a deaf ear to his appeal, South Korea and Japan should seek to join the ranks of nuclear powers to create a "nuclear balance of power" with the North. That said, the opposition has been out of power for less than a year and these hawkish views are no doubt politically opportunistic. Moreover, it is not axiomatic that the conservative party, should it regain power, would act on these convictions, given the serious costs it would confront if it decided to acquire nuclear weapons.

The US and South Korean governments have maintained a longstanding dialogue over extended deterrence and reassurance. But it is unclear whether any of the measures the US has proposed or taken, such as lifting restrictions on the South's ballistic missile capabilities, have assured the South Koreans about the credibility of America's nuclear umbrella.

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unclear whether any of the measures the US has proposed or taken, such as lifting restrictions on the South's ballistic missile capabilities, have assured the South Koreans about the credibility of America's nuclear umbrella. The administration has talked about deploying additional "strategic assets" to South Korea and the US Navy currently has three aircraft carrier battle groups operating in the western Pacific, although it has been vague about the specifics.

In the 1970s, South Korea tried to clandestinely develop nuclear weapons to confront overwhelming North Korean conventional military superiority. And while it abandoned its efforts under US pressure, Seoul possesses the material, technology and expertise to quickly resume this effort.

Until recently, South Korean fears of US nuclear abandonment and the proposals they spawned for the re-deployment of US TNW were largely confined to the extreme right wing of the Korean opposition. This is no longer the case, mainly because of North Korea's rapid progress toward an operational ICBM capability and growing doubts about the US commitment to South Korea arising from President Trump's antagonistic behavior toward key alliance issues. According to recent polls, 68 percent of the South Korean public currently supports the re-introduction of US nuclear weapons in South Korea and 60 percent want South Korea to acquire its own nuclear weapons.

The North Koreans are unlikely to accept denuclearization unless they face considerably more pressure, and a more robust US and South Korean nuclear presence would provide badly needed leverage to force the North to bargain away its own nuclear capabilities.

These shifting attitudes should not be surprising based on the US experience in maintaining its extended nuclear deterrent in Europe during the Cold War. Just as the French questioned whether the United States would trade Paris for New York, South Koreans have worried in the past and worry more today about whether Washington would risk Seattle for Seoul. These concerns will no doubt be magnified by North Korea's November 29 test of an ICBM with significantly improved capabilities to target the United States and the continued doubts of many experts about the ability of the US national missile defense systems to successfully intercept North Korean missiles.

In fact, in the 1970s, South Korea tried to clandestinely develop nuclear weapons to confront overwhelming North Korean conventional military superiority. And while it abandoned its efforts under US pressure, Seoul possesses the material, technology and expertise to quickly resume this effort. This type of reaction is not unique. Beginning in the 1950s, France started to lose confidence in America's resolve to risk nuclear war with the Soviet Union to defend it against a nuclear attack, leading the French to field an independent nuclear deterrent several years later. Perhaps more tellingly, in the mid-1980s, America's NATO allies insisted that only new ground-based deployments of intermediate-range nuclear weapons on NATO territory would counter Russia's growing capabilities in these systems, despite American assurances that sea-based nuclear weapons were sufficient to maintain the link between the US nuclear deterrent and the defense of Europe. These lessons should not be lost on American policymakers when considering Seoul's current strategic fears.

***The Case for and Against Deploying TNW in South Korea*:** South Korean hawks have marshalled several arguments to defend their view that the US should deploy nuclear weapons on their territory and even allow the South to become a nuclear weapons state. According to this perspective, the North Koreans are unlikely to accept denuclearization unless they face considerably more pressure, and a more robust US and South Korean nuclear presence would provide badly needed leverage to force the North to bargain away its own nuclear capabilities. In addition, US TNW in South Korea or a nuclear-armed South Korea would counterbalance North Korean nuclear weapons and thus deter the North from starting a nuclear war or trying to use its

unilateral nuclear advantage to coerce political concessions from the South. Moreover, confronting China with the prospect of a nuclear South Korea (and Japan) and an increased risk of nuclear escalation might be enough to scare China into using its leverage to force North Korea to give up its nuclear weapons.

Although these arguments have gained some traction among the South Korean public, there are compelling reasons for the US to refuse redeployment of TNW in South Korea and reject its development of nuclear weapons. First, the existing US nuclear umbrella, especially sea-based weapons that roam the waters of the Western Pacific, and the presence of US forces in South Korea provide ample deterrent to the use of North Korean nuclear weapons. If these capabilities do not deter the North from starting a war, basing a few more weapons on South Korean soil will not change this calculus.

A US decision to redeploy TNW would also raise the thorny issue of operational decision-making and command authority over the use of these weapons. The South Korean government, like the governments of NATO countries where nuclear weapons are based, might prefer command arrangements with shared authority (in NATO, parlance "dual key" arrangements exist that require positive actions by both the US and basing countries to order nuclear release.) However, the commander of US Forces Korea would almost certainly want sole authority to employ these weapons. And because of the compressed time for decision-making due to the short distances involved, he might be given pre-delegated launch authority in certain conditions. Under these circumstances, and especially because both US and North Korean nuclear weapons would be highly vulnerable to a pre-emptive first strike, there would be strong incentives on both sides to use these weapons first or risk losing them. Thus, the re-introduction of US TNW in South Korea, while aimed at deterring a North Korean nuclear attack, could actually increase the risk of a nuclear exchange.

Moreover, it is likely that North Korea would react to the deployment of nuclear weapons in South Korea by accelerating its own development and deployment of shorter-range nuclear weapons. This could trigger an arms race, with both sides locked in an action-reaction cycle, adding to their deployments but producing greater instability at a higher level. Although the US could draw on a stockpile of air-delivered nuclear gravity bombs in the United States, it would be difficult, expensive and time-consuming for the US to deploy these assets to South Korea and build the infrastructure to provide weapons security and maintenance, even if the ROK were prepared to defray some of these costs.

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Lastly, a decision by the US to re-introduce TNW to South Korea would likely draw strong congressional opposition amid already growing concerns about the president's unlimited authority to order nuclear strikes and the dangers of a nuclear war with North Korea.

Is There a Middle Ground?: Given Moon's opposition and the substantial risks and costs of a South Korean decision to join the nuclear club, it is not a foregone conclusion, as former Secretary of State Henry Kissinger seemed to suggest in a recent interview, that a nuclear South Korea is inevitable, and that crossing this threshold would ignite a chain reaction of nuclear dominoes throughout the region. But at the same time, Moon's position now reflects a minority view among the South Korean public—and whether he will be able to deflate pressure for a South Korean nuclear deterrent remains uncertain if the North Korean nuclear threat continues to grow unconstrained.

There is no military justification for developing or deploying nuclear weapons for use on the peninsula because US conventional and nuclear weapons can cover any targets that need to be destroyed in North Korea. Further, such improvements would invite potentially destabilizing reactions from North Korea and China, possibly even Russia, and legitimize North

Korean nuclear weapons.

Against this backdrop, regular demonstrations of the strategic nuclear capabilities the US already has for possible employment in a conflict could help to address the political, perceptual and psychological factors driving many South Koreans to consider nuclear weapons. The following measures should be considered if it looks like Moon is waging a losing battle with South Korea's nuclear hawks:

Regular demonstrations of the strategic nuclear capabilities the US already has for possible employment in a conflict could help to address the political, perceptual and psychological factors driving many South Koreans to consider nuclear weapons.

· Make more frequent ballistic missile submarine (SSBN) visits to South Korean ports and increase the tempo of their operations in the western Pacific; the goal should be to maintain a SSBN presence in the area at least 75 percent of the time if that can be done without compromising operational security;

· Conduct more frequent rotational deployments of US dual-capable aircraft to South Korean air bases so that these strategic assets are present on South Korean soil 75 percent of the year. These units would exercise regularly with South Korean forces;

The growing existential angst of the South Korean public and political class over the rapidly growing North Korean nuclear and ballistic missile threat has the potential to cause serious strains in the US-ROK alliance and hasten the proliferation of nuclear weapons in the Asia Pacific.

· Publicly offer a USG commitment, if operationally feasible, to put a handful of dual-capable aircraft on a 72-hour "tether" to South Korea prior to the commencement of hostilities and exercise this capability regularly to demonstrate our capacity to implement this commitment. The US has made similar commitments to other US allies (e.g., Saudi Arabia during the first Gulf War) and during the Cold War regularly exercised its reinforcement plans for Germany; and

· Create a US-ROK nuclear consultative group, modeled after the Nuclear Planning Group in NATO, to discuss nuclear policy, planning, doctrine, operations and incidence management procedures as they relate to operational plans for the defense of South Korea in a WMD environment. Japan could eventually be invited to join this mechanism if South Korean-Japanese security cooperation improves.

These improvements should only be made, however, in conjunction with three major changes in US strategy in order to reduce the risk of North Korean miscalculation:

· The administration should not engage in rhetoric implying a US commitment to regime change or that the US would use nuclear weapons against the North in response to further North Korean threats or provocations;

· The president and all senior US government officials must make it publicly clear that the US would only attack North Korea in response to a North Korean attack on the United States or one of its allies; and

· Washington should signal to Pyongyang that it is prepared to enter into bilateral negotiations without any preconditions.

The administration should also signal to the North that it is willing to roll back these measures in the context of progress toward its ultimate goal of a nuclear-free Korean peninsula. A dual-track strategy of visibly demonstrating existing US nuclear capabilities available for potential use against North Korea and gestures to advance dialogue and diplomacy offers the best prospects for defusing the threat of a nuclear South Korea without aggravating the risk of war with North Korea.

Conclusion: If left unaddressed, the growing existential angst of the South Korean public and political class over the rapidly growing North Korean nuclear and ballistic missile threat has the potential to cause serious strains in the US-ROK alliance and hasten the proliferation of nuclear weapons in the Asia Pacific. There's an old adage that "you can't beat something with nothing." Unless the US takes more concrete and visible steps to demonstrate the continued viability of its nuclear umbrella than it has offered to date, the

South Koreans may eventually decide to go their own nuclear way, with potentially disastrous consequences for peace and security in Northeast Asia and the future of the global nuclear nonproliferation regime.

Source: http://www.38north.org, 01 December 2017.

NUCLEAR STRATEGY

INDIA

India Kickstarts Process to Build 6 Nuclear-Powered Attack Submarines

India has kick-started an ambitious project to build six nuclear-powered attack submarines that is expected to boost the Navy's overall strike capabilities in the face of China's naval build-up and increasing military manoeuvring in the Indo-Pacific region. Confirming the launch of the mega project, Navy Chief Admiral Sunil Lamba also gave a clear indication that Indian Navy was ready to play a bigger role including under the proposed quadrilateral coalition among India, the US, Australia and Japan.

Soon after, as the newly-installed commander-in-chief, Trump signed a presidential memorandum instructing the secretary of defense to undertake a nuclear posture review ensuring "that the US nuclear deterrent is modern, robust, flexible, resilient, ready, and appropriately tailored to deter 21st-century threats and reassure our allies.

In a press conference on the eve of Navy Day, Admiral Lamba also touched on a range of key issues confronting the Navy including acquisition of a range of submarines, warships and weapons systems, asserting that it was ready to face any traditional and non-traditional threats. "It has kicked off and I will leave it at that. It is a classified project. The process has started. I will not comment further," Admiral Lamba said, replying to a question on the project. On the evolving security scenario in the maritime sphere around India, he said it was odd for China to deploy submarines for anti-piracy operations in the Indian Ocean region and that a threat assessment is being carried out by the Indian Navy on it. "We are all aware of the prevailing security scenario in our maritime domain. The continued presence of both traditional and non-traditional threats in the maritime domain demand constant attention and robust mitigating measures," he said.

He also spoke about possible security challenges in case of presence of Chinese warships in the strategically-important Gwadar port in Pakistan which is being developed by China. "It will be a security challenge. We will have to look at it and mitigate," he said. The Navy Chief said eight ships of Chinese PLA Navy were deployed in the Indian Ocean region at any point of time and that there was a unique situation in August 2017 when the numbers had gone up to 14. Additional deployment of Chinese warships and submarines were reported during the over two month-long standoff between Indian and Chinese armies in Dokalam.

On expanding the Indian Navy's presence in critical sea lanes, Admiral Lamba said it was gradually increasing its deployment in Andaman seas, Malacca Strait, Gulf of Oman, Persian Gulf, North Arabian and Sunda and Lumbok. "In short, our ships and aircraft are deployed from the Gulf of Aden to the Western Pacific on an almost 24x7 basis," he said. Referring to the bilateral naval agreement between India and Singapore providing for deeper cooperation including logistics support, he said similar agreements are being negotiated with a number of countries.

"We are negotiating similar pacts with a number of other countries," he said adding the Navy has activated the Logistics Exchange Memorandum of Agreement (LEMOA) with the US by taking fuel at sea from the US three months ago. Talking about the controversy in the Russian media that a US team was allowed to board nuclear-powered submarine INS Chakra, the Admiral said, "No US official has even seen it from close quarters."

Talking about modernisation of the Navy, he said 34 ships are under construction and projects worth Rs 40,000 crore have been identified for

participation of the private shipyards. He said 23 Indian private sector shipyards have qualified for participation in indigenous shipbuilding projects on the basis of their capacity, capability and infrastructure. The Navy chief said work on Indigenous Aircraft Carrier, IAC 1, is progressing well, adding he was hopeful that the ship would join the Navy by 2020.

The Indian Navy is at the threshold of joining a select league of navies capable of providing Submarine Search and Rescue in the Indian Ocean Region with two Deep Submergence Rescue Vessel Systems scheduled for induction next year.

He said steps have been taken to bolster the aviation arm of the Navy by induction of new fighters, surveillance aircraft and ship-borne helicopters. "The Indian Navy is at the threshold of joining a select league of navies capable of providing Submarine Search and Rescue in the Indian Ocean Region with two Deep Submergence Rescue Vessel Systems scheduled for induction next year," he said.

Source: *https://economictimes. indiatimes. com, 01 December 2017.*

NORTH KOREA

Kim Jong Un Vows to Make North Korea 'Strongest Nuclear Power'

Kim Jong-Un has vowed to make North Korea the "world's strongest nuclear power," state media reported Wednesday, as the reclusive nation shows little sign of reining in a weapons programme fuelling global alarm. North Korea has rattled the international community with a flurry of missile launches and its largest ever nuclear test in recent months in its bid to develop a warhead capable of striking the United States.

That the US military stands ready to act if necessary. Washington has ramped up the pressure on North Korea and the United States and South Korea launched their biggest-ever joint air exercise. Pyongyang slammed those manoeuvres as a provocation, accusing the drills of "revealing its intention to mount a surprise nuclear pre-emptive strike against.

Kim told workers behind the recent test of a new missile Pyongyang said was capable of that feat, that his country "will victoriously advance and leap as the strongest nuclear power and military power in the world," in a ceremony, according to state news agency KCNA. ...

Many analysts suggest that the rocket is capable of reaching the US mainland but voice scepticism that Pyongyang has mastered the advanced technology needed to allow the rocket to survive re-entry to the Earth's atmosphere. Last month's launch was the first test of any kind since September 15, and quashed hopes that North Korea may have held back in order to open the door to a negotiated solution to the nuclear standoff.

US Secretary of State Rex Tillerson said he was confident that Washington is doing all it can to force North Korea to discuss nuclear disarmament. "As I've told people many times, I will continue our diplomatic efforts until the first bomb drops," he said in a speech to the Atlantic Council policy forum.

But he also warned that the US military stands ready to act if necessary. Washington has ramped up the pressure on North Korea and the United States and South Korea launched their biggest-ever joint air exercise. Pyongyang slammed those manoeuvres as a provocation, accusing the drills of "revealing its intention to mount a surprise nuclear pre-emptive strike against."

Source: https://www. ndtv. com, 13 December 2017.

TAIWAN

Taiwan Wanted Nuclear Weapons to Deter China

It would have been one of the greatest crises of postwar Asia: the revelation of a Taiwanese atomic bomb. For Taiwan, the bomb would have evened the odds against a numerically superior foe. For China, a bomb would have been casus belli, justification

for an attack on the island country it considered a rogue province. Active from the 1960s to the 1980s, Taipei's efforts to develop nuclear weapons were finally abandoned due to diplomatic pressure by its most important ally, the United States.

Taiwan's nuclear program goes back to 1964, when the People's Republic of China tested its first nuclear device. The test was not exactly a surprise to outside observers, but it was still Taiwan's nightmare come true. Chinese and Taiwanese air and naval forces occasionally skirmished, and it threatened to turn into all-out war. Suddenly Taipei was confronted with the possibility that such a war could turn nuclear. Even just one nuclear device detonated on an island the size of Maryland would have devastating consequences for the civilian population.

From Taiwan's perspective, a nuclear arsenal would be the ultimate guarantor of national sovereignty. Even if the United States split with the country, as it eventually did, Taiwanese nukes would keep the Chinese People's Liberation Army at bay, a deterrent not only against Chinese nuclear power, but against conventional forces as well. In hindsight, this would have had a good chance of success, as North Korea's own procurement of nuclear weapons has made the United States and South Korea reluctant to retaliate over the country's various military provocations.

The Taiwanese bomb program began in 1967, using the Chung-Shan Institute of Science and Technology's Institute for Nuclear Energy Research as a cover. In 1969, Canada sold the country a heavy-water nuclear research reactor as a prelude to what it hoped were commercial energy-producing reactor sales—none too soon, as the Trudeau government recognized the People's Republic of China in 1970. The reactor, known as the Taiwan Research Reactor, went critical in 1973, and Taiwan set about creating a stockpile of weapons-grade plutonium.

Taiwan's nuclear program was under careful surveillance by the United States, which recognized Taiwan as the rightful Chinese government and protected the country from the mainland. Still, Washington was afraid a Taiwanese bomb would unnecessarily enrage China, and by 1966 took steps to prevent the bomb from happening. Washington ensured that Taiwanese reactors fell under IAEA guidelines, which would prevent diversion of nuclear fuel for the purposes of building a weapon.

But the entire point of the program was to build a weapon, and it was inevitable that Taiwan would be caught in the act. In 1975, the CIA reported, "Taipei conducts its small nuclear program with a weapon option clearly in mind, and it will be in a position to fabricate a nuclear device after five years or so." At this point, the United States, Germany, France, Norway and Israel had all supplied assistance. The program had procured heavy water from America and uranium from South Africa.

In 1975, the CIA reported, "Taipei conducts its small nuclear program with a weapon option clearly in mind, and it will be in a position to fabricate a nuclear device after five years or so.

In 1976–77, the IAEA inspected the activities at the military-run Institute for Nuclear Energy Research. The IAEA discovered discrepancies in the Taiwanese program, and in 1976, the United States protested the nuclear-weapons program. In response, the island government promised to "henceforth not engage in any activities relating to reprocessing."

Despite the promise, in 1977 the United States again detected suspicious activities at INER. The US State Department demanded changes to Taiwan's research program that were more in line with peaceful research than nuclear weapons, but stopped short of demanding Taiwan cease all nuclear research and development. In 1978 the United States yet again detected a covert program, this time a secret uranium-reprocessing program, and forced Taiwan to stop.

After being caught in the act many times, Taiwan's nuclear-weapons program went into a period of dormancy. In the mid-1980s, the program was started up again, and INER was detected building a uranium-reprocessing facility that violated the

commitments Taiwan made in the 1970s. In December 1987, Col. Chang Hsien-yi, the deputy director of INER and a longtime CIA asset, defected to the United States [9] with proof of Taiwan's nuclear program. The previously top-secret material was used to confront the Taiwanese government, which ended its nuclear program once and for all in 1988. At the time of Colonel Chang's defection, Taiwan is thought to have been just one or two years away from a bomb.

What kind of bomb was Taiwan attempting to develop? Two possibilities are low-yield tactical nuclear weapons and a higher-yield city killer. A tactical nuclear weapon would be useful to target the mainland ports, airfields and headquarters driving a Chinese invasion of Taiwan. While that wouldn't initially be of much help on the invasion beachheads, it might bring the logistics supporting such an invasion to a halt. This tactical nuke would probably have been delivered by the Ching Feng, a.k.a. the "Green Bee," a short-range tactical missile that bore an uncanny resemblance to the US-made Lance missile. There are rumors the missile was actually of Israeli origin, having been drawn from stocks supplied by the United States, or developed based on Lance technology.

There are rumors the missile was actually of Israeli origin, having been drawn from stocks supplied by the United States, or developed based on Lance technology Another, far worse possibility is that Taiwan could have developed a larger, city-killing bomb. This could have been used to threaten Beijing directly, trading the destruction of one government for another, and would have been a more useful deterrent.

Another, far worse possibility is that Taiwan could have developed a larger, city-killing bomb. This could have been used to threaten Beijing directly, trading the destruction of one government for another, and would have been a more useful deterrent. Still, the 1,800-mile distance it would take to deliver a nuke on Beijing was at the time as insurmountable as the Taiwan Strait itself. Not even Israel had the technology to assist in developing long-range missiles or aircraft to deliver such a nuke.

Taiwan's nuclear-weapons program, although understandable, was ill considered. A Taiwanese-Chinese nuclear standoff would have destabilized the entire region—ironic, considering Taiwan was seeking nuclear weapons to stabilize its defense posture. There was really no military dilemma that Taiwanese nuclear weapons would have decisively solved; any strike would have only been made worse by the inevitable Chinese nuclear counterattack.

Source: Kyle Mizokami, http://nationalinterest.org, 05 December 2017.

USA

Trump's Pentagon Wants to Make Nuclear Weapons More 'Usable'

May be you thought America's nuclear arsenal, with its thousands of city-busting, potentially civilization-destroying thermonuclear warheads, was plenty big enough to deter any imaginable adversary from attacking the United States with nukes of their own. Well, it turns out you were wrong.

The Pentagon has been fretting that the arsenal is insufficiently intimidating. After all—so the argument goes—it's filled with old (possibly unreliable) weapons of such catastrophically destructive power that maybe, just maybe, even President Trump might be reluctant to use them if an enemy employed smaller, less catastrophic nukes on some future battlefield. Accordingly, US war planners and weapons manufacturers have set out to make that arsenal more "usable" in order to give the president additional nuclear "options" on any future battlefield. (If you're not already feeling a little tingle of anxiety at this point, you should be.) While it's claimed that this will make such assaults less likely, it's all too easy to imagine how such new armaments and launch plans could actually increase the risk of an early resort to nuclear weaponry in a moment of conflict, followed by calamitous escalation.

That President Trump would be all-in on making the American nuclear arsenal more usable should come as no surprise, given his obvious infatuation with displays of overwhelming military strength. (He was thrilled when, last April, one of his generals ordered, for the first time, the most powerful nonnuclear weapon the United States possesses dropped in Afghanistan.) Under existing nuclear doctrine, as imagined by the Obama administration back in 2010, this country was to use nuclear weapons only "in extreme circumstances" to defend the vital interests of the country or of its allies. Prohibited was the possibility of using them as a political instrument to bludgeon weaker countries into line. However, for Donald Trump, a man who has already threatened to unleash on North Korea "fire and fury like the world has never seen," such an approach is proving far too restrictive. He and his advisers, it seems, want nukes that can be employed at any potential level of great-power conflict or brandished as the apocalyptic equivalent of a giant club to intimidate lesser rivals.

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Making the US arsenal more usable requires two kinds of changes in nuclear policy: altering existing doctrine to eliminate conceptional restraints on how such weapons may be deployed in wartime and authorizing the development and production of new generations of nuclear munitions capable, among other things, of tactical battlefield strikes. All of this is expected to be incorporated into the administration's first nuclear posture review (NPR), to be released by the end of this year or early in 2018.

Its exact contents won't be known until then—and even then, the American public will only gain access to the most limited version of a largely classified document. Still, some of the NPR's features are already obvious from comments made by the president and his top generals. And one thing is clear: restraints on the use of such weaponry in the face of a possible weapon of mass destruction of any sort, no matter its level of destructiveness, will be eliminated and the planet's most powerful nuclear arsenal will be made ever more so.

Altering The Nuclear Mindset: The strategic guidance provided by the administration's new NPR is likely to have far-reaching consequences. As John Wolfsthal, former National Security Council director for arms control and nonproliferation, put it in a recent issue of *Arms Control Today*, the document will affect "how the United States, its president, and its nuclear capabilities are seen by allies and adversaries alike. More importantly, the review establishes a guide for decisions that underpin the management, maintenance, and modernization of the nuclear arsenal and influences how Congress views and funds the nuclear forces."

With this in mind, consider the guidance provided by that Obama-era nuclear posture review. Released at a moment when the White House was eager to restore America's global prestige in the wake of George W. Bush's widely condemned invasion of Iraq and just six months after the president had won the Nobel Prize for his stated determination to abolish such weaponry, it made nonproliferation the top priority. In the process, it downplayed the utility of nuclear weapons under just about any circumstances on just about any imaginable battlefield. Its principal objective, it claimed, was to reduce "the role of US nuclear weapons in US national security."

As the document pointed out, it had once been American policy to contemplate using nuclear weapons against Soviet tank formations, for example, in a major European conflict (a situation in which the USSR was believed to possess an advantage in conventional, non-nuclear forces). By 2010, of course, those days were long gone, as was the Soviet Union. Washington, as the NPR noted, now possessed an overwhelming advantage in conventional weaponry as well. "Accordingly," it concluded, "the United States will continue to strengthen conventional capabilities

and reduce the role of nuclear weapons in deterring non-nuclear attacks."

A nuclear strategy aimed exclusively at deterring a first strike against this country or its allies hardly requires a mammoth stockpile of weaponry. As a result, such an approach opened the way for potential further reductions in the arsenal's size and led in 2010 to the signing of the New Start treaty with the Russians, mandating a sharp reduction in nuclear warheads and delivery systems for both countries. Each side was to be limited to 1,550 warheads and some combination of 700 delivery systems, including ICBMs, SLBMs, and heavy bombers.

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Such an approach, however, never sat well with some in the military establishment and conservative think tanks. Critics of that sort have often pointed to supposed shifts in Russian military doctrine that suggest a greater inclination to employ nuclear weapons in a major war with NATO, if it began to go badly for their side. Such "strategic deterrence" (a phrase which has a different meaning for the Russians than for Western strategists) could result in the use of low-yield "tactical" nuclear munitions against enemy strong points, if Russia's forces in Europe appeared on the verge of defeat. To what degree this doctrine actually governs Russian military thinking no one actually knows. It is nevertheless cited regularly by those in the West who believe that Obama's nuclear strategy is now dangerously outmoded and invites Moscow to increase its reliance on nuclear weaponry.

The administration is thought to favor the acquisition of "low-yield tactical nuclear munitions" and yet more delivery systems to go with them, including air- and ground-launched cruise missiles. The argument will predictably be made that munitions of this sort are needed to match Russian advances in the field.

Such complaints were typically aired in "Seven Defense Priorities for the New Administration," a December 2016 report by the Defense Science Board (DSB), a Pentagon-funded advisory group that reports to the secretary of defense. ... This sort of thinking now appears to be animating the Trump administration's approach to nuclear weapons and is reflected in the president's periodic tweets on the subject. Last December 22, for example, he tweeted, "The United States must greatly strengthen and expand its nuclear capability until such time as the world comes to its senses regarding nukes." Although he didn't elaborate—it was Twitter, after all—his approach clearly reflected both the DSB position and what his advisers were undoubtedly telling him.

Soon after, as the newly installed commander in chief, Trump signed a presidential memorandum instructing the secretary of defense to undertake a nuclear-posture review ensuring "that the United States nuclear deterrent is modern, robust, flexible, resilient, ready, and appropriately tailored to deter 21st-century threats and reassure our allies."

Of course, we don't yet know the details of the coming Trumpian NPR. It will, however, certainly throw the Obama approach to the sharks and promote a far more robust role for nuclear weapons, as well as the construction of that more "flexible" arsenal, capable of providing the president with multiple attack options, including low-yield strikes.

Enhancing The Arsenal: The Trumpian NPR will certainly promote new nuclear-weapons systems that are billed as providing future chief executives with a greater "range" of strike options. In particular, the administration is thought to favor the acquisition of "low-yield tactical nuclear munitions" and yet more delivery systems to go with them, including air- and ground-launched

cruise missiles. The argument will predictably be made that munitions of this sort are needed to match Russian advances in the field.

Under consideration, according to those with inside knowledge, is the development of the sort of tactical munitions that could, say, wipe out a major port or military installation, rather than a whole city, Hiroshima-style. As one anonymous government official put it to Politico, "This capability is very warranted." Another added, "The [NPR] has to credibly ask the military what they need to deter enemies" and whether current weapons are "going to be useful in all the scenarios we see."

The likely cost of replacing all three legs of the US nuclear triad (intercontinental ballistic missiles, submarine-launched missiles, and strategic bombers) over a 30-year period will reach a minimum of $1.2 trillion, not including inflation or the usual cost overruns, which are likely to push that figure to $1.7 trillion or beyond.

Keep in mind that, under the Obama administration (for all its talk of nuclear abolition), planning and initial design work for a multi-decade, trillion-dollar-plus "modernization" of America's nuclear arsenal had already been agreed upon. So, in terms of actual weaponry, Donald Trump's version of the nuclear era was already well underway before he entered the Oval Office. And of course, the United States already possesses several types of nuclear weapons, including the B61 "gravity bomb" and the W80 missile warhead that can be modified—the term of trade is "dialed down"—to produce a blast as low as a few kilotons (less powerful, that is, than the bombs that in August 1945 destroyed Hiroshima and Nagasaki). That, however, is proving anything but enough for the proponents of "tailored" nuclear munitions.

A typical delivery system for such future nukes likely to receive expedited approval is the long-range standoff weapon (LRSO), an advanced, stealthy air-launched cruise missile intended to be carried by B-2 bombers, their older cousins the B-52s, or the future B-21. As currently envisioned, the LRSO will be capable of carrying either a nuclear or a conventional warhead. In August, the Air Force awarded both Raytheon and Lockheed Martin $900 million for initial design work on prototypes of that delivery system, with one of them likely to be chosen for full-scale development, an undertaking expected to cost many billions of dollars.

Critics of the proposed missile, including former secretary of defense William Perry, argue that the United States already possesses more than enough nuclear firepower to deter enemy attacks without it. In addition, as he points out, if the LRSO were to be launched with a conventional warhead in the early stages of a conflict, an adversary might assume it was under nuclear attack and retaliate accordingly, igniting an escalatory spiral leading to all-out thermonuclear war. Proponents, however, swear that "older" cruise missiles must be replaced in order to give the president more flexibility with such weaponry, a rationale Trump and his advisers are sure to embrace.

A Nuclear-Ready World: The release of the next nuclear-posture review will undoubtedly ignite a debate over whether the country with a nuclear arsenal large enough to destroy several Earth-sized planets actually needs new nukes, which could, among other dangers, spark a future global arms race. In November, the Congressional Budget Office released a report indicating that the likely cost of replacing all three legs of the US nuclear triad (intercontinental ballistic missiles, submarine-launched missiles, and strategic bombers) over a 30-year period will reach a minimum of $1.2 trillion, not including inflation or the usual cost overruns, which are likely to push that figure to $1.7 trillion or beyond.

Raising questions about the need for all these new weapons and their phenomenal costs couldn't be more important. After all, one thing is guaranteed: any decision to procure such weaponry will, in the long term, mean budget cuts elsewhere, whether in health, education, infrastructure, or fighting the opioid epidemic.

And yet questions of cost and utility are the lesser parts of the new nuclear conundrum. At its heart

is the very idea of "usability." When President Obama insisted that nuclear weapons had no battlefield use, he was speaking not just to this country but to all nations. "To put an end to Cold War thinking," he declared in Prague in April 2009, "we will reduce the role of nuclear weapons in our national security strategy and urge others to do the same."

If, however, the Trump White House embraces a doctrine that closes the distance between nuclear weapons and ordinary ones, transforming them into more usable instruments of coercion and war, it will also make the likelihood of escalation to all-out thermonuclear extermination more imaginable for the first time in decades. There is little question, for instance, that such a stance would encourage other nuclear-armed nations, including Russia, China, India, Israel, Pakistan, and North Korea, to plan for the early use of such weaponry in future conflicts. It might even encourage countries that don't now have such weaponry to consider producing them.

The world imagined by President Obama in which nukes would be a true weapon of last resort was certainly a more reassuring one. His vision represented a radical break from Cold War thinking in which the possibility of a thermonuclear holocaust between the planet's two superpowers seemed like an ever-present possibility and millions of people responded by engaging in antinuclear protest movements.

Without the daily threat of Armageddon, concern over nukes largely evaporated and those protests came to an end. Unfortunately, the weaponry and the companies that built them didn't. Now, as the seemingly threat-free zone of a post-nuclear era is drawing to a close, the possible use of nuclear weapons—barely conceivable even in the Cold War era—is about to be normalized. Or at least that will be the case if, once again, the citizens of this planet don't take to the streets to protest a future in which cities could lie in smoldering ruins while millions of people die from hunger and radiation sickness.

Source: Michael T. Klare, https://www. the nation.com, 20 November 2017.

BALLISTIC MISSILE DEFENCE

JAPAN

Japan Wants Missiles with Enough Range to Strike North Korea

Japan is preparing to acquire precision air-launched missiles that for the first time would give it the capability to strike North Korean missile sites, two sources with direct knowledge of the matter said. Japan plans to put money aside in its next defence budget starting April 2018 to study whether its F-15 fighters could launch longer-range missiles including Lockheed Martin Corp's extended-range Joint Air-to-Surface Standoff Missile (JASSM-ER), which can hit targets 1,000 km (620 miles) away, said one the sources with knowledge of the plan. "There is a global trend for using longer range missiles and it is only natural that Japan would want to consider them," he said. The sources asked to remain anonymous as they were not authorised to talk to media.

The growing threat posed by North Korean ballistic missiles has given proponents of a strike capability the upper hand in military planning. Restrictions on strike weapons imposed by its war-renouncing constitution means Japan's missile force is composed of anti-aircraft and anti-ship munitions with ranges of less than 300 kms.

Japan is also interested in buying the 500 km-range Joint Strike Missile designed by Norway's Kongsberg Defence & Aerospace to be carried by the F-35 stealth fighter, Fuji Television reported earlier. Neither of those two items are included in a 5.26 trillion yen ($46.76 billion) budget request already submitted by Japan's Ministry of Defence, however additional funds would be made available to evaluate the purchase of these missiles, the sources said.

The change suggests that the growing threat posed by North Korean ballistic missiles has given proponents of a strike capability the upper hand in military planning. Restrictions on strike

weapons imposed by its war-renouncing constitution means Japan's missile force is composed of anti-aircraft and anti-ship munitions with ranges of less than 300 kms (186 miles). Any decision to buy longer range weapons capable of striking North Korea or even the Chinese mainland would therefore be controversial, but proponents argue that the strike weapons can play a defensive role.

...Before he took up his post in August 2017, Onodera led a group of ruling Liberal Democratic Party lawmakers that recommended Japan acquire strike weapons to deter Pyongyang from launching any attack on Japan. North Korea has since fired ballistic missiles over Japan and last week in November 2017 tested a new type of intercontinental ballistic missile that climbed to an altitude of more than 4,000 km before splashing into the Sea of Japan within Japan's exclusive economic zone.

Source: *http://economic times. indiatimes. com, 05 December 2017.*

NUCLEAR ENERGY

UK

UK to Support 'Next-Generation' Nuclear Technology

The UK government has announced a series of measures that aim to realise the full potential of the of the country's nuclear power industry. The document 'Government to support development of next-generation nuclear technology' follows publication of the Industrial Strategy white paper in November 2017, a core objective of which is to "ensure the UK is developing the technologies of the future and preparing to seize the opportunities they bring and build on its strengths", the Department for Business, Energy and Industrial Strategy (BEIS) said.

In the UK, a white paper is a statement of policy, and often sets out proposals for legislative changes or the introduction of new laws. It normally follows a green paper, which is a preliminary report of government proposals published to stimulate discussion. The Industrial Strategy green paper was published in January 2017.In the BEIS document published on December 07, 2017, Business Secretary Greg Clark noted that the UK's civil nuclear sector contributed GBP 6.4 billion to the UK economy in 2016. "Today's announcements recognise the importance of industry driving innovation, supported by government, so the sector continues to compete at the very highest level, not just in the UK but globally," Clark said.

Subject to Stage 1 demonstrating clear value for money through a formal re-approval process with the Treasury, up to GBP 40 million will be available for advanced modular reactor R&D projects and up to a further GBP 5 million for regulators. In addition, the government plans to launch soon the second phase of its Nuclear Innovation Programme, including up to GBP 8 million for work on modern safety and security methodologies and studies in advanced fuels.

Advanced and Small Modular Reactors: Funding is being made available over the next three years to help support R&D into innovative advanced and small modular reactors as well as assess their feasibility and accelerate the development of promising designs. The government will also be supporting "early access" to regulators to build the capability and capacity needed to assess and licence small reactor designs and will establish an expert finance group to advise how small reactor projects could raise private investment in the UK.

It is providing up to GBP 56 million funding for new technologies through a two-stage advanced modular reactor R&D project over three years. Stage 1 comprises up to GBP 4 million for feasibility studies and up to GBP 7 million to further develop the capability of nuclear regulators who support and assess advanced nuclear technologies. Subject to Stage 1 demonstrating clear value for money through a formal re-approval process with the Treasury, up to GBP 40 million will be available for advanced modular reactor R&D projects and up to a further GBP 5 million

for regulators. In addition, the government plans to launch soon the second phase of its Nuclear Innovation Programme, including up to GBP 8 million for work on modern safety and security methodologies and studies in advanced fuels.

Tender: Separately announcing a tender for GBP 4 million in funding to develop feasibility projects for nuclear advanced modular reactors, BEIS said that up to GBP 40 million of further funding may be available for development, subject to government approval. Applicants to lead such a project need a "viable route to market", it said, and can be an organisation of any size or type, and work with others as sub-contractors. This is a Small Business Research Initiative and projects will receive 100% of their eligible costs. The competition opens on December 07, 2017, and a briefing event is scheduled for 12 December. The final date for registration is 07 February and applications must be submitted by 14 February. A decision will be made to applicants on 30 March, with contracts to be awarded in May 2017.

This is phase 1 of the competition. "In phase 1 there is a share of up to GBP 4 million (excluding VAT) available. This is to undertake a series of feasibility studies for advanced modular reactor designs. Phase 1 contracts for technical feasibility studies will be worth up to GBP 300,000 (excluding VAT)," BEIS said. "Funding for phase 2 is subject to government approval. We estimate a share of up to GBP 40 million (excluding VAT) may be available. This will be for successful selected projects from phase 1 to undertake development work," it added. An additional invitation to tender and bid process will not take place for phase 2.

Fusion: A further GBP 86 million was announced today for fusion research to set up a national fusion technology platform at the Culham Centre for Fusion Energy in Oxfordshire. The government has awarded the funding to UK Atomic Energy Authority (UKAEA) to establish a centre to support innovation and expertise in nuclear fusion technologies. The funding will establish a National Fusion Technology Platform (NaFTeP) at UKAEA's Culham Centre.

NaFTeP will bring together organisations from across the supply chain to provide a unique, world-leading set of nuclear research and innovation facilities in tritium and fusion technology, BEIS said. NaFTeP will support UK industry in targeting major scientific and engineering contracts in nuclear fusion and safeguard the future of the Culham site and the world-class scientists and engineers that work there, it added.

The new investment will allow UK firms to compete for up to a further GBP 1 billion of international contracts for fusion technologies, including for the ITER. Science Minister Jo Johnson said: "Our new Industrial Strategy clearly detailed our ambition to build on the UK's existing scientific strengths and ensure UK expertise remains at the forefront of pioneering research that has global impact. "This new funding for nuclear fusion research will establish a unique set of research and innovation capabilities that will safeguard the exceptional work already taking place in Culham by scientists and engineers from across the world, and emphasises the UK's commitment to international collaboration." ITER, the successor project to the EU's Joint European Torus (JET) reactor in Culham, is currently under construction in France and will continue efforts to develop a clean, safe and virtually limitless energy source.

Our new Industrial Strategy clearly detailed our ambition to build on the UK's existing scientific strengths and ensure UK expertise remains at the forefront of pioneering research that has global impact.

Large Nuclear: Speaking at the Nuclear Industry Association's annual conference in London today, Energy Minister Richard Harrington also set out the next steps to allow large new nuclear projects to apply for planning consent after 2025. "As we set out in our Industrial Strategy, the nuclear sector has a key role to play in increasing productivity and driving clean growth across the country. Nuclear is a vital part of our energy mix, providing low-carbon power now and into the future so today's package of new measures will

help to boost innovation and provide greater clarity on our future plans.

"Today, in recognising value of policy certainty, we are launching a consultation on siting of large-scale nuclear plants, which begins the process towards designating a new National Policy Statement (NPS) for conventional nuclear power stations deployable between 2026 and 2035. The initial consultation sets out the proposed siting process and assessment criteria for a site potentially suitable for nuclear plants with single reactor capacity above 1 GWe. In having this new national policy statement in place, we provide reassurance and certainty to the 2030s."

Today's announcements, and the recent launch of the Industrial Strategy white paper, "set out the government's vision for an economy that can drive growth across the country, boost national productivity and provide UK business with certainty," he said.

The government's intention is to carry forward existing sites into the new NPS, subject to them meeting the updated siting criteria and environmental assessments. This consultation and the subsequent NPS being developed under this process will not apply to SMRs. The government will consider planning issues related to smaller reactors of less than 1 GWe separately.

BEIS said the current NPS for nuclear will remain in place for as long as it is required, adding that the government is consulting on the arrangements for the siting of nuclear power stations for the period beyond 2025. This consultation - National Policy Statement for new nuclear above 1 GW post 2025: siting criteria and process - sets out the process and the updated high-level criteria used to assess potentially suitable sites. There will be a further consultation on a new NPS during late 2018.

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This consultation and the subsequent NPS being developed under this process will not apply to SMRs. The government will consider planning issues related to smaller reactors of less than 1 GWe separately.

***Geological Disposal Facility*:** The government also said it intends to launch two public consultations in 2018 on working with communities in an intended consent-based siting process; and on a National Policy Statement for Geological Disposal Facility (GDF) infrastructure. Harrington signalled that the government would bring forward consultations in the New Year on the GDF. This will enable the development of a multi-billion-pound infrastructure project, creating thousands of jobs and opportunities for UK companies in the supply chain, he said....

***Nuclear Innovation Programme*:** The BEIS statement also announced the second phase of the Nuclear Innovation Programme, which consists of GBP 3.7 million for work on reactor design and safety engineering and GBP 4.3 million for work on advanced nuclear fuels. As part of the first phase of this programme, launched last year, the government has also awarded GBP 5 million of contracts for work on nuclear advanced materials and manufacturing.

***Nuclear Industry Council*:** The government support announced today comes as the Nuclear Industry Council (NIC) published proposals as part of its ongoing work to drive down the cost of nuclear energy for consumers while maintaining UK expertise. The Industrial Strategy green paper, published in January 2017, cited nuclear as suitable for a potential Sector Deal. Since then Lord Hutton, NIC chairman, has led the sector in the development of a range of proposals across key areas including new build, waste and decommissioning, R&D and skills.

The industry has today published its proposals for a nuclear Sector Deal, including ideas that target significant cost reductions in new build and decommissioning. NIA Chief Executive Greatrex said: "We share the desire expressed by Richard Harrington to finalise agreement on the ambitious proposals for a nuclear Sector Deal which the NIC has put to government. ...

Source: http://www.world-nuclear-news.org/, 07 *December 2017.*

NUCLEAR COOPERATION

BANGLADESH–INDIA–RUSSIA

India Closer to Signing Nuclear Pact with Russia, Bangladesh

India has moved closer to signing its tripartite Inter Governmental Agreement (IGA) involving Russia and Bangladesh for Rooppur Nuclear Power plant near Dhaka — Delhi's first such civil nuclear document — amid foundation stone laying for the project on Thursday that would power South Asia's second fastest growing economy. Bangladesh on November 30, 2017 saw the first concrete pouring into the reactor building foundation of its first Rooppur Nuclear Power Plant, which will mark the construction of Bangladesh's first nuclear reactor and make it the third country in South Asia after India and Pakistan to have a civil nuclear project. While India has been working with major powers (USA, Russia and Japan) across various sectors as well as firming up joint ventures in third countries in Africa, SE Asia and Central Asia, it would be the first occasion where Delhi will conclude a tripartite civil nuclear project marking India's global entry into a strategic sector.

India for the first time ever is playing a substantive role in building a nuclear power plant on foreign soil with the proposed supply of equipment and material for the power station being built by Bangladesh with Russian assistance.

In fact, India for the first time ever is playing a substantive role in building a nuclear power plant on foreign soil with the proposed supply of equipment and material for the power station being built by Bangladesh with Russian assistance, officials said, adding Bangladeshi nuclear scientists and technicians are undergoing training at the Kudankulam Nuclear Power Plant which is also built with Russian assistance and uses Russian nuclear technology. It will also boost the Make in India initiative amid a proposal by Delhi to Moscow for manufacturing of some nuclear power reactor equipment in India. The three sides are currently negotiating tripartite pact and are expecting to conclude it in the near future, officials familiar with the matter told ET. Few years back Delhi and Moscow had concluded a pact for joint civil nuclear ventures in third countries. Later India signed a civil nuclear cooperation deal, along with two more related agreements, with Bangladesh in April 2017 during PM Sheikh Hasina's India visit. This was Delhi's second such agreement in the neighbourhood after an agreement with Sri Lanka reflecting India's growing stature as a responsible nuclear power.

The Rooppur plant involves two units, each with a capacity of 1200 MW and is situated on the bank of Padma river. Rooppur Nuclear Power Plant's generation units will be based on VVER-1200 reactors of the 3+ generation technology. The VVER-1200 is the most powerful reactor in Russia and it has three key advantages: it shows high-performance, it is durable and safe. The main feature of VVER-1200 project (one of the world's advanced reactors) is its unique combination of active and passive safety systems, which provide the maximum resistance against external and internal impact, including tornadoes, hurricanes, earthquakes, and plane crash. VVER-1200 technology is also likely to be offered to India for the second set of six Russian built nuclear reactors. This technology uses "post-Fukushima" safety standards for a nuclear power plant, Russian officials told ET.

Source: *https://economictimes.indiatimes.com, 30 November 2017.*

RUSSIA–BRAZIL

Russian and Brazilian Firms to Cooperate in Nuclear Power

Russia's Rosatom has signed a MoU with Brazilian companies Centrais Elétricas Brasileiras (Eletrobras) and Eletrobras Termonuclear SA (Eletronuclear) to promote cooperation in nuclear power. It includes the possible construction of a new nuclear power plant in Brazil, Rosatom said. The MoU also covers services, including operation, maintenance and decommissioning work; nuclear fuel management; the life extension

of existing nuclear power plants in Brazil; education and training of nuclear power personnel; and developing public awareness of Brazil's nuclear power programme.

The document was signed on November 27, 2017 by Kopmarov, Rosatom's first deputy director general for corporate development and international business, Ferreira Junior, Eletrobras president, and Santos Guimarães, Eletronuclear acting president. Komarov said the MoU has "laid a foundation" for bilateral cooperation between the two countries. "Cooperation between Russia and Brazil has seen renewed life in recent years," Komarov said. "We are implementing projects in the framework of the nuclear fuel cycle and nuclear medicine. The signing of this MoU marks a new phase in our partnership. Brazil has substantial experience in using nuclear technologies and has big plans for the development of its national nuclear sector," he added.

A Russian-Brazilian joint working group will define the framework of cooperation for implementation of the programme. The two countries signed an inter-governmental agreement on cooperation in the peaceful use of nuclear energy in September 1994. Brazil has two nuclear reactors, Angra 1 and 2, which generate 3% of its electricity, and a third under construction. Its first commercial nuclear power reactor began operating in 1982. Four more large reactors are proposed to come on line in the 2020.

Source: *http://www.world-nuclear-news.org, 28 November 2017.*

RUSSIA–EGYPT

Putin and Sisi Finalize $30 Billion Nuclear Plant Deal

Egypt and Russia signed a $30 billion deal to build North Africa's first nuclear power plant as the Kremlin moves to expand its influence in the region. Russian President Vladimir Putin and his Egyptian counterpart Abdel-Fattah El-Sisi witnessed the signing ceremony in Cairo on 11 Dec 2017.

The project increases Russia's economic presence and political influence in the Middle East, already on the rise since Putin intervened in Syria's war in 2015 and began a more active role in Libya, conflicts where he and El-Sisi see eye to eye. The Cairo visit comes less than two weeks after the countries said they were in talks to use each other's military air bases.

... Russia and Egypt agreed three years ago to begin work on a nuclear power project, with Russia's state nuclear monopoly Rosatom Corp. initially expecting the deal to be sealed in early 2016. But progress was delayed after the 2015 bombing of a Russian airliner over Egypt which killed 224 holidaymakers.

... Rosatom plans to commission the first unit of the El Dabaa power plant in 2026, the company said in a statement after the signing. It will also supply nuclear fuel to each of the four 1,200MW reactors throughout the plant's entire operational lifetime. The project, which is to be built some 130 kilometers northwest from Cairo, will cost an estimated $30 billion and Russia is expected to provide a $25 billion loan.

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Source: Salma El Wardany et al., https://www.bloomberg.com,11 December 2017.

USA–SAUDI ARABIA

Trump Considers Easing Nuclear Rules for Saudi Project

The Trump administration is encouraging Saudi Arabia to consider bids by Westinghouse Electric Co. and other US companies to build nuclear reactors in that country and may allow the enrichment of uranium as part of that deal, according to three people familiar with the plans. Energy Secretary Rick Perry visited Saudi Arabia this month where the projects were discussed, according to two people. The people familiar asked not to be identified discussing the confidential negotiations.

Previous US agreements have prohibited the enrichment and reprocessing of uranium, and that

had scuttled negotiations to use US technology in Saudi nuclear projects during the Obama administration. The administration is mulling easing that requirement now as a way to help Westinghouse and other companies win Saudi Arabian contracts, two people said. A meeting to hammer out details of the nuclear cooperation agreement, known as a 123 Agreement for the section of the US Atomic Energy Act that requires it, will be held at the White House Wednesday, two administration officials said.

A successful US bid would help deliver on President Donald Trump's promise to revive and revitalize the domestic nuclear industry, helping American companies edge out Russian and Chinese competitors to build new fleets around the world. Saudi Arabia plans to construct 16 nuclear power reactors over the next 20 to 25 years at a cost of more than $80 billion.

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Westinghouse, the nuclear technology pioneer that is part of Toshiba Corp., went bankrupt in March, after it hit delays with its AP1000 reactors at two US plants. After it declared bankruptcy, Westinghouse – whose technology is used in more than half the world's nuclear power plants – said it shifted its focus to expanding outside the US. Winning contracts in Saudi Arabia could provide a new market that Westinghouse needs and provide at least a partial vindication for the investment in the AP1000 technology. ...

Source: Article by Jennifer Jacobs, Ari Natter, and Jennifer A Dlouhy, https://www. bloomberg.com, 12 December 2017.

URANIUM PRODUCTION

KAZAKHSTAN

Uranium Suppliers Respond to Production Cuts

Kazakh uranium producer NAC KazAtomProm announced on December 04, 2017 that it will reduce planned uranium production by 20% for a period of three years beginning in January 2018. The cuts are to better align output with demand, the company said. This followed Cameco's November 08, 2017 announcement of a 10-month temporary suspension of production from the McArthur River mining and Key Lake milling operations in northern Saskatchewan by the end of January "due to continued uranium price weakness".

Kazakhstan has 12% of the world's uranium resources and has been the world's leading uranium producer since 2009. Its 2015 production of 24,560 tU accounted for 39% of world production. The McArthur River and Key Lake operations together produced 11.1 million pounds of uranium (4270 tU) in the first nine months of 2017, with Cameco's share being 7.8 million pounds. Cameco is the operator of both the McArthur River mine and the Key Lake mill that processes all the ore from McArthur River, and owns 70% of McArthur River and 83% of Key Lake. Areva Resources Canada Inc. owns the remainder.

Kazakhstan has 12% of the world's uranium resources and has been the world's leading uranium producer since 2009. Its 2015 production of 24,560 tU accounted for 39% of world production. The uranium market has long been acknowledged to be in a state of oversupply, with material entering the market from commercial and government inventory, by-product production and enrichment plant underfeeding, and producers largely shielded from falling prices by long-term contracts made when prices were higher. Many of these contracts are now coming to an end.

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and producers largely shielded from falling prices by long-term contracts made when prices were higher. Many of these contracts are now coming to an end.

Young, CEO of Australia's Vimy Resources, commended KazAtomProm and Cameco for their announcements, which he said indicated rapidly changing dynamics in the supply side of uranium in response to unsustainably low prices. ...In response to the announcements, Vimy has reviewed, and revised upwards, the uranium price and foreign exchange assumptions used in the definitive feasibility study (DFS) it is currently preparing for the Mulga Rock project in Western Australia. The study is now scheduled for release early in the second quarter of 2018, he said.

Colorado-based Western Uranium Corporation described KazAtomProm's announcement as positive news. The company said that Cameco and KazAtomProm's announcements, taken together with Honeywells' 20 November announcement of a suspension of operations at the Metropolis uranium conversion facility, would effectively remove about 37 million pounds of uranium, on aggregate, from world supply in 2018. "Consequently, the aggregate effect of these production cuts, if implemented as announced, will eliminate a large portion of oversupply," the company said.

Munro, CEO of Bannerman Resources which is developing the Etango uranium project in Namibia, said KazAtomProm and Cameco's announcements alone would remove more than 25 million pounds of uranium from 2018 supply. ... The company is currently carrying out test work on uranium-bearing solutions from Etango using a variety of nano-filtration membranes, the first phase of which has now been completed. Early indications from the study are positive, the company said yesterday. Full results of the study are expected early next year, and confirmed cost savings will be incorporated into Etango's DFS, it said. ... Commenting on Cameco's announcement in November and ahead of KazAtomProm's announcement, Antony, CEO of US uranium producer Energy Fuels, said further production cuts were to be expected.

Source: *http://www.world-nuclear-news.org, 07 December 2017.*

NUCLEAR PROLIFERATION

NORTH KOREA

Nuclear Proliferation & Security Dilemma in Asia Pacific

Debates about nuclear weapons (NWs) and their imminent destruction have continued to occupy the center stage in international security affairs since first introduced in 1945 by the United States at the ebb of WWII. The desolation caused by the two bombs dropped on Hiroshima and Nagasaki respectively is still very fresh in the annals of world history.

Following the Soviet Union's A-bomb test and America's subsequent nuclear tests, other nations such as Britain, France, and China also followed suit, bringing the number of states with nuclear weapon possession to five by the mid-1960s. In spite of the 1968 NPT which was meant to curtail the further spread of nuclear weapons, the craving for it by states and their leaders has soared momentously. The end of the Cold War, which has led to a multi-polar system, has also signaled a period of unparalleled desire for nuclear arsenals by many states.

On November 29, 2017, DPRK once again tested its latest interconnected ballistic missile, Hwasong-15, which it claims to be an indication of the completion of Pyongyang's nuclear statehood, thus becoming a full blown nuclear state. This new development is described as a great success due to its capability of reaching the entire US mainland. This new ballistic missile test coupled with those tests conducted since the beginning of the 21st century has raised concerns about security in the region and around the globe. It has also wittingly or unwittingly led to a growing desire by many Asian states, particularly those in the Asia Pacific (South and East Asia) to acquire NWs.

... A security dilemma arises when a state's mechanism for boosting its security apparatus adversely impacts the security and perceptions of other states, thus, incentivizing those feeling endangered to take similar actions. ..

In East Asia, elements of security dilemmas are evident in the relationship between North Korea and Japan, ROK and DPRK, Japan/ROK and China, Taiwan and mainland China; the US and China and the US and DPRK. Does this complicate the already fragile situation or ensure peace and stability?

DPRK has been labeled as a rogue state because it does not conform to international norms, nor observe the dictates of international sanctions leveled against it. Despite the warnings and incentives from world leaders and international groups to discourage Pyongyang from developing its nuclear program, no significant progress has been made. In fact, the first quarter of the 21st century has witnessed an increase in its test firing of ballistic missiles under Kim Jong-un. With the introduction of its "byungjin policy", Pyongyang now claims to be a nuclear weapon state determined to advance both economic development and nuclear capability.

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As conceived by Kang Choi, several diplomatic efforts aimed at denuclearizing North Korea have proved futile. Such initiatives include the Geneva Agreed Framework (October 1994), the September 19th agreement (September 2005), the "leap day" agreement (February 2012) and the six-party talks aimed at peaceful denuclearization of DPRK—involving Russia, China, the DPRK, ROK, Japan, and the United States. The dispatch of the US THAAD and other naval ships to the Korean peninsula is an indication of the volatility of the situation. As a consequence, most states around the Korean peninsula want to strengthen their own military and defense systems. Both Russia and the United States are now involved in the politics of the region. This obviously raises concerns of hegemony, sovereignty, balance of power, particularly between China and the United States. The "US-Asia Pivot" concerns Chinese authorities.

DPRK is a test case for both the proliferation 'pessimists' and proliferation 'optimists'. Seongwhun Cheon, a senior research fellow with the Korea Institute for National Unification has called for a US nuclear presence in the region. He has suggested that a small US nuclear arsenal in South Korea would go a long way to 'Provide a trump card that would enable a breakthrough in the North Korean nuclear problem.' Cheon argues that such a move would become a game changer in the geopolitical and strategic dynamics surrounding the nuclear crisis and could be likened to the "dual-track strategy" used by the Reagan administration in Western Europe in the 1980s. Other scholars and experts like Bolton and Peter Hayes and Scott Bruce believe that DPRK's nuclear program is mainly for state pride and glory of a nuclear statehood. To them, "the only credible use of the DPRK's nuclear arsenal is to detonate a bomb within DPRK." However, given the progress made so far in DPRK's missile development program, the latter's argument is whitewashed.

Pyongyang's actions have culminated in a complex security dilemma that involves neo-liberal domestic politics in the nuclear ambition of a state and realist regional and extra-regional powers with varying interests.

Pyongyang's actions have culminated in a complex security dilemma that involves neo-liberal domestic politics in the nuclear ambition of a state and realist regional and extra-regional powers with varying interests. Wheeler and Booth have warned that the interpretation of the intention and the capabilities of the other nation is a major factor that determines the birthing of a security dilemma. Whenever, an action of a state is erroneously interpreted, there is bound to be a miscalculated reaction which will ultimately have serious

security corollaries.

Thus, misinterpreting China's nuclear assertiveness as offensive instead of defensive by India may lead to a miscalculation; misjudging India's reaction to China's nuclear actions by Pakistan as a sign of aggression in South Asia could culminate in unfortunate repercussions. In effect, both the actions and the reactions put states in security dilemmas, thus, repeating the cycle. Suffice to say that misinterpreting North Korea's missile program by neighboring states and the United States and misinterpreting the US-South Korea drills by the North may all aggravate the situation.

DPRK's nuclear ambition is a result of mistrust and fear of an attack on the regime in power. However, its own very actions have led to a security quagmire and increased tensions within the region and the tendency of abuse of nuclear weapon is very high. Malaysia and DPRK are still arguing over the VX nerve agent saga. China and ROK have not overcome the row over the deployment of the US THAAD. Pyongyang is even suspicious of China's reaction to its nuclear programs and vice versa. These uncertainties often lead to mutual suspicion and fear and could lead to reciprocal actions and reactions. Even China is likely to factor the ever increasing ICBM success of Pyongyang in upgrading its own nuclear systems and as this happens, India and Pakistan will also join the bandwagon; Japan, ROK, Taiwan and the other Asian countries like Singapore, Malaysia, Indonesia, Bangladesh, Myanmar would react should their regions become nuclearized.

Undeniably, so long as DPRK continues with its nuclear program, the USA and ROK are unlikely to halt their military drills; great power intrusions in the regions might also increase and issues of geopolitics and geo-economics and balance of power will continue to plague these regions. Thus, the complex security dilemma precipitated by the nuclear power proliferation in these regions is even likely to get murkier so long as DPRK factor lingers.

Source: http:// moderndiplomacy. eu, 12 December 2017.

NUCLEAR NON-PROLIFERATION

INDIA

India's Entry into Wassenaar Arrangement may Boost NSG Prospects

In a major development, the elite export control regime Wassenaar Arrangement (WA) has agreed to accept India's application for membership. The WA's decision came at its two-day plenary meeting in Vienna. The move boosts India's nuclear non-proliferation credentials despite it not being a signatory to the NPT. It's expected to improve India's membership chances at the NSG.

India has been attempting to gain entry into crucial export-control regimes such as the NSG, WA, MTCR and Australia group which regulate conventional weapons and nuclear technologies. India's admission to such groups allows it to import and access such high technologies.

What is the Wassenaar Arrangement? The 41-member WA looks to promote transparency and more responsibility in the sale of conventional arms and dual-use goods and technologies. Dual-use items are those having both civilian and military applications. WA members must ensure that the transfer of any such items don't undermine these goals. The WA is aimed at preventing terrorists from acquiring such items.

India was earlier admitted to crucial missile control regime. In a statement, the WA said its members "agreed at the plenary meeting to admit India which will become the Arrangement's 42nd participating state as soon as the necessary procedural arrangements for joining the WA are completed." This comes a year after India was admitted as a full member into the MTCR, another crucial export control regime.

Why India Seeks Entry into Key Export Control Regimes? It's worth noting that China, which has been repeatedly blocking India's entry into the NSG, isn't a member of the WA. India has been attempting to gain entry into crucial export-control

regimes such as the NSG, WA, MTCR and Australia group which regulate conventional weapons and nuclear technologies. India's admission to such groups allows it to import and access such high technologies.

Source: https://www.newsbytesapp.com, 08 December 2017.

NUCLEAR SAFETY

USA–RUSSIA

Cyber and Space Weapons are Making Nuclear Deterrence Trickier

If you can't trust your networks or satellite communications in a crisis, 'use-or-lose' scenarios get a lot closer. **Stability was an overriding concern at last** week of November 2017 Senate Foreign Relations Committee hearing on nuclear command authority, the first in four decades. Senators wondered aloud whether one individual — the American president — should have the sole authority to direct a nuclear attack. The focus is understandable, but there are other challenges to nuclear stability that deserve more attention than they're getting. In particular, advances in cyberweapons and counter-space capabilities are creating new pressures on concepts of nuclear deterrence as traditionally construed. As a result, and as we outlined in a recent report, there exists a real and growing possibility of rapid and unintended escalation of any US-Russia crisis or conflict.

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Consider three potentially overlapping scenarios.

First, as is increasingly clear, activities that originate in cyberspace could provoke crisis and spread beyond the cyber domain. Over the past several weeks alone, startling new reports have detailed the extent of Russian efforts to influence the 2016 US presidential election and to undermine our democratic system. *The Wall Street Journal,* for instance, reports that Russian Twitter accounts posing as Americans began their campaign much earlier than previously thought — in June 2015, more than a year before the election. Google reported recently that Russian operatives spent tens of thousands of dollars on Google search, Gmail, and YouTube ads. And Facebook now says that over 120 million users viewed fake content created by Russian operatives.

Such efforts have not been limited to the United States. More than 400 fake Russian-origin Twitter accounts were used to influence the British Brexit vote, according to recent research conducted by the University of Edinburgh. As investigations continue, we will no doubt learn more about Russian influence operations in the United States, the UK, France, and elsewhere. At the same time, Symantec and other cyber security firms have identified Russian government hackers in widespread penetrations of the US energy sector. The head of Britain's National Cyber Security Centre announced that Russia had infiltrated his country's energy, telecommunications, and media sectors.

Cyber penetrations of critical infrastructure amount to what the military calls "preparation of the battlespace." Russian cyber implants in the United States and other NATO countries provide potential leverage in a crisis, and – if push comes to shove – the ability to impose significant pain through non-kinetic, non-lethal cyber-attacks. The use of such tools is not some hypothetical distant possibility. Russia undertook cyber-attacks on Estonia more than a decade ago, and it employed cyber weapons in support of its invasion of Georgia in 2008. Moscow used them again in 2014, both in support of its annexation of Crimea and its military intervention in eastern Ukraine.

Cyber weapons are not, of course, the sole preserve of Russia. Washington has acknowledged its own development of them, and

senior US officials have highlighted their use against ISIS. Their possession by both Russia and the United States complicates traditional notions of strategic stability. Using non-kinetic, non-lethal cyber tools is likely to be very attractive in a crisis, and certainly in a conflict. Yet with both sides possessing the means to disrupt or destroy the other's military systems and critical infrastructure – both war-supporting infrastructure as well as purely civilian infrastructure - a small "cyber-spark" could prompt rapid escalation. Such an attack could inadvertently "detonate" a cyber weapon that had been intended to lay dormant in the other side's systems.

Or a spark produced by sub-national actors – "patriotic hackers" inside or outside the government – could generate unintended cascading effects. The spark could even come via a false flag attack, with a third-party trying to pit the United States and Russia against one another.

The incentive to use non-kinetic cyber or space attacks to degrade the other side's military, with few if any direct casualties. By moving first, the cyber- or space-attacker could gain military and coercive advantage, while putting the onus on the attacked side to dare escalate with "kinetic" lethal attacks.

A second scenario could appear if armed conflict looks likely. At the outset, there would exist strong incentives to use offensive cyber and counter-space capabilities early, in order to negate the other side's military. The US and Russian militaries depend (though not equally) on information technology and space assets to collect and disseminate intelligence, as well as for command, control, and communications.

Hence the incentive to use non-kinetic cyber or space attacks to degrade the other side's military, with few if any direct casualties. By moving first, the cyber- or space-attacker could gain military and coercive advantage, while putting the onus on the attacked side to dare escalate with "kinetic" lethal attacks. Would the United States or Russia respond with, say, missile strikes or a bombing campaign in response to some fried computers or dead robots in outer space? Given the doubt that they would, large-scale cyber and space attacks – before a kinetic conflict even starts – are likely to be seen as a low-risk, high-payoff move for both sides.

A third scenario plays out if one side believes that its critical infrastructure and satellites are far less vulnerable than the other side. In that case, a severe crisis or conflict might prompt the country to threaten (and perhaps provide a limited demonstration of) cyber-attacks on civilian critical infrastructure, or non-kinetic attacks on space assets. Such a move would require the attacked side to respond not in kind but by escalating.

So far, the three scenarios we have described could well undermine stability between the United States and Russia, but need not implicate nuclear stability. Yet consider this: US and Russian nuclear forces rely on information technology and space assets for warning and communications. Attack the right satellites, or attack the right computers, and one side may disrupt the other's ability to use nuclear weapons – or at least place doubt in the minds of its commanders. As a result, a major cyber and space attack could put nuclear "use-or-lose" in play early in a crisis. While we are generally accustomed to thinking about nuclear use as the highest rung on the escalatory ladder, such pressures – generated via non-nuclear attacks – could bring the horrors of a nuclear exchange closer rather than substituting for them.

There is an array of steps the United States and Russia should take to manage these kinds of possible slides down the slippery slope. The first one, however, is understanding the interplay between advances in cyber and counter-space weapons and bilateral nuclear stability. The implications are potentially vast – and deserve close attention both in the ongoing Nuclear Posture Review and by the Congress.

Source: *http://www. defenseone. com, 26 November 2017.*

NUCLEAR WASTE MANAGEMENT

RUSSIA

Chernobyl's Nuclear Wasteland Primed for Solar Power Explosion

Some would be rightly spooked by the idea of electricity produced by a glowing source emanating from Chernobyl, but thanks to a €100 million investment plan, that's exactly what's could happen. It's not, however, what you think. The electricity will come from a solar park sprouting in the middle of the carcinogenic wastelands surrounding the site of the 1986 nuclear disaster as part of a joint project between a Kiev engineering firm called Rodina Energy Group and Enerparc, a clean energy company based in Hamburg, Germany. Ukraine's minister of ecology, Ostap Semerak, announced a plan last July to revitalize the nearly 2000-kilometer swathe of land encircling the plant that gave nuclear disaster its name.

That price will fall a little each year, but for solar projects that go live by the end of 2017, the price will be 15 euro cents per kilowatt – a price nearly 40 percent higher what's being offered renewable energy developers in Europe. In addition, Ukraine has dropped its rents on the state property surrounding Chernobyl by as much as 85 percent, and has made its leasing process easier to boot.

Long lasting radiation in the area makes farming, forestry, hunting, and just about anything else too dangerous, so renewable energy is seen as something productive to do with the huge empty area. Luckily, all of the transmission lines that were laid to carry electrons from the notorious plant to Ukraine's major cities – and that helped feed what is now the country's 50 percent reliance on nuclear energy – remain largely intact. When it's done, the solar park could provide half the energy that originally flowed from Chernobyl, marking an inspiring comeback for an area inhabited by dystopian radioactive wild boar. ...

The Ukrainian government, meanwhile, is doing everything it can to make the most famous disaster zone in the world more attractive to clean energy investors. Along with the power transmission infrastructure, they are offering a lavish feed-in-tariff system that will be in effect until 2030, which stipulates a fixed price per kilowatt. That price will fall a little each year, but for solar projects that go live by the end of 2017, the price will be 15 euro cents per kilowatt – a price nearly 40 percent higher what's being offered renewable energy developers in Europe. In addition, Ukraine has dropped its rents on the state property surrounding Chernobyl by as much as 85 percent, and has made its leasing process easier to boot.

Other energy companies are sniffing out the deals. France's Engie SA has told Bloomberg that it's conducting tests with a gigawatt-sized project in mind. China's System Integration Technology and China National Complete Engineering Corp have also said they are interested in building a solar park in Chernobyl. If all of this bears fruit, the Chernobyl area could end up producing 2.5 gigawatts of solar produced electricity, pumping out half of what Chernobyl uses to produce before it melted down and exploded – with absolutely none of the danger.

It would also curb Ukraine's dependence on Russia for nuclear fuel, natural gas and other energy needs that Moscow has not been shy about holding hostage in its ongoing political and military hostilities against Kiev. Pulling itself out of the social and psychological mire of Soviet produced nuclear past could only do Ukraine a lot of needed good, so long as the financial incentives for investors hold out.

The European Bank for Reconstruction and Development -– which financed Chernobyl's New Containment Structure – is understandably wary of bankrolling projects in a radioactive exclusion zone. The solar farms, after all, are installed and maintained by people. This poses some very real difficulties. Workers can only spend a limited

amount of time in the exclusion zone, so their shifts are short, which means a bigger workforce is required – as is more money to pay them. Yet they are challenges worth grappling with. If Ukraine manages to create a renewable energy rebirth on the site of the nuclear disaster that helped fell the Soviet Union, it would be a revolution of an altogether different kind.

Source: *http://www. bellona. org/news, 07 December 2017.*

Centre for Air Power Studies

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

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