



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

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OPINION – G Parthasarathy

Beware the China-Pakistan Nuclear Axis

Led by the US and Soviet Union, the five Permanent Members of the UNSC tried to ensure, some five decades ago, that they alone had the divine right to possess nuclear weapons in perpetuity, with the signing of the NPT. Their nuclear arsenals steadily increased and pleas for nuclear disarmament arrogantly disregarded. The world nuclear scenario today is now different to what the five envisaged. Nuclear stockpiles have steadily grown. In the past few decades, Israel, Pakistan, India and North Korea have joined the “nuclear club”. Others like Japan and Iran are capable of doing so when needed. There are an estimated 14,900 nuclear warheads in nine countries, with 93 per cent of these in the possession of the US and Russia.

Little Known Facts: While China tested and acquired nuclear weapons in the 1960s, the next country to acquire nuclear weapons was Pakistan, which commenced its quest for nuclear weapons after the 1971 Bangladesh conflict. India crossed the nuclear threshold only after it received a veiled nuclear threat from Pakistan during tensions over military exercises named “Operation Brasstacks” in January 1987. Instructions were issued in 1988 to nuclear scientist PK Iyengar and scientific

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adviser VS Arunachalam to assemble a nuclear arsenal. India’s distinguished strategic thinker, KSubrahmanyam, provided the strategic rationale for the nuclear weapons program. India decisively demonstrated its nuclear weapons capabilities 10 years later, with the Pokhran tests. Pakistan predictably followed suit, barely a fortnight later.

India is today confronted with a situation where China has not only provided Pakistan with designs and equipment for manufacturing nuclear weapons, but has also given Pakistan the knowhow and materials for manufacturing missiles capable of carrying nuclear weapons to every part of India, including

the Andaman Islands. While these facts are known to those involved inside and outside the government in monitoring nuclear developments, it is astonishing that public knowledge on this crucial issue is limited.

Sadly, it has never been debated seriously in Parliament. Surely, the public and Parliament need to know more on these issues, to promote awareness of the challenges the nation faces from two hostile neighbors working together dangerously. American nuclear analyst Gary Milhollin has perceptively noted: "If you subtract China's help from Pakistan's nuclear program, there is no Pakistani nuclear weapons program."

While Zulfikar Ali Bhutto moved to establish a nuclear weapons capability within weeks of the Bangladesh conflict, his prison memoirs suggest that he was guaranteed of Chinese assistance after his meeting with Chairman Mao in 1976. China, with antiquated uranium enrichment facilities, benefited from designs stolen by AQ Khan from European (URENCO) enrichment facilities. By the early 1980s, China was providing Pakistan designs for nuclear weapons. China currently has approximately 280 nuclear warheads for delivery by 150 land-based and 48 sea-based missiles and fighter aircraft. While India is estimated to possess 110-120 nuclear warheads. Pakistan has 130-140 nuclear warheads, designed for delivery by ballistic and cruise missiles and aircraft. Experts estimate that Pakistan's stockpile could potentially grow to 220-250 warheads by 2025, making it the world's fifth-largest nuclear weapons state. Pakistan's missiles, with ranges up to 2,750 km, are all of Chinese design and produced at the

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National Defence Complex facilities in the Kala Chitta Dhar mountain range to the west of Islamabad. The development, production and test launching of missiles is done at locations south of Attock, using road mobile Chinese-designed missile launchers, produced in Fatehjang.

The Chinese Hand:

According to former US Air Force Secretary Thomas Reed, himself a designer of nuclear weapons at America's Los Alamos Laboratories: "The Chinese did a massive training of

Pakistani (nuclear) scientists, brought them to China for lectures, even gave the design of the CHIC-4 device, which was a weapon that was easy to build as a model for export. There is evidence that AQ Khan used Chinese designs for his nuclear designs. Notes from those lectures later turned up in Libya. And the Chinese did similar things for the Saudis, North Koreans and Algerians."

The great champions of nuclear non-proliferation in the US, who lectured India for decades on non-proliferation, covered up and did nothing to curb these Chinese activities. Pakistan is also known to have received liquid-fueled ballistic missiles from North Korea in exchange for information on uranium

enrichment, in a deal evidently undertaken with Chinese blessings.

Though Pakistan has not enunciated a formal nuclear doctrine, its then head of strategic planning division of its nuclear command authority, Lt-Gen Khalid Kidwai, had averred that Pakistan's nuclear weapons were "aimed solely at India". Kidwai added that Pakistan would use nuclear weapons if India conquers a large part of Pakistani territory, or destroys a large part of its land and air forces. Kidwai also held out the possibility of

using nuclear weapons if India tries to “economically strangulate” Pakistan, or pushes it to political destabilization. India has declared that it will not be the first to use nuclear weapons and will use nuclear weapons only if its territory or armed forces face an attack anywhere, in which nuclear, chemical or biological weapons are used. Since India has no desire to conquer large parts of Pakistani territories or destroy its armed forces, there is no possibility of India provoking a nuclear conflict. But, given Kidwai’s utterances about a “full spectrum” deterrent, involving the use of tactical nuclear weapons, issued after he retired, New Delhi has to carefully review nuclear strategy imaginatively, bearing in mind that our “no first use” doctrine has served us well internationally.

Pressure Remains: It is obvious, especially after Xi Jinping’s recent enunciation of Chinese global ambitions at the Party Congress, that missile and nuclear proliferation by China to Pakistan will continue in its efforts to “contain” India. Pakistan has already tested a sea-based missile and China is set to strengthen Pakistan’s navy with substantial supply of submarines and frigates. China appears determined to use Pakistan as its stalking horse for its maritime ambitions to promote its OBOR projects in the Indian Ocean. The most crucial challenge we now face is how to deal with a jingoistic China, for which “containing” India has been a continuing strategic effort for over four decades now. Balancing Chinese power necessarily involves developing partnerships with others across the Indo-Pacific region. China’s policies are multi-faceted, and Beijing will likely avoid open hostility, even as it continues to keep up pressures along its borders with India and uses proxies across India’s immediate neighborhood to keep India tied up in South Asia. These issues will, hopefully, be reviewed and discussed in Parliament.

Source: <https://www.theindianpanorama.news>, 03 November 2017.

OPINION – Nancy Gallagher

Three Ways Trump’s Nuclear Strategy Misunderstands Iran

US President Trump has refused to tell Congress that the 2015 nuclear deal the Obama administration reached with Iran and five other world powers still serves US national interests. This refusal, or decertification, went against top officials in his own government and the IAEA.

Nobody should be surprised. Trump has attacked the Iran deal for years without offering a realistic alternative. His Oct. 13 speech on Iran was long on recriminations, but short on factual analysis and practical recommendations. This disconnect has kept experts and pundits guessing about what Trump’s decertification is meant to achieve. There are three common interpretations. Each makes different assumptions about how Iran will react. All rest more on wishful thinking than a solid understanding of politics in Iran.

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...The Center for International and Security Studies at the University of Maryland has worked with partners in Tehran and Toronto on nine surveys of Iranian public opinion before and after Rouhani’s recent reelection. Data from these surveys clearly suggest that each set of assumptions underlying interpretation of Trump’s strategy is wrong.

#1: Have your cake and eat it, too

In the most benign interpretation, responsible members of the Trump team are letting the president play to his domestic political base by denouncing the deal, but not allowing him to withdraw or reimpose sanctions that would violate it.

This interpretation depicts decertification as a “legal placebo” — a harmless, if ineffectual, way to make a petulant president feel better. It assumes

that Iran will honor its nuclear obligations so long as the US does not reimpose nuclear sanctions, thus preserving the benefits of a deal that Trump's secretary of defense testified does serve US interests.

Do Iranians really expect the economic benefits of the deal to outweigh the costs incurred by adhering to an agreement that is continually being undercut by the US? They might — but that hope is fading fast. In June 2017, 64 percent of respondents to our survey said that their economy was bad and 50 percent thought it was getting worse. Seven in 10 said that the deal had not improved living conditions of Iranians at all. Two-thirds still support the nuclear deal. But, US actions are eroding optimism that the deal will eventually make life better. That has dropped to 59 percent, down from 66 percent a year earlier.

Iranian confidence that the US will uphold its end of the bargain has already dropped precipitously, from 45 percent shortly after the deal was signed to 24 percent in June 2017. Confidence in the other parties to the agreement — Britain, France, Germany, China and Russia — is higher at 53 percent. But 71 percent of Iranians do not think the Europeans are moving as rapidly as they could to engage economically with Iran, mostly due to US obstructionism and pressure. A clear majority, 55 percent, say that if the US takes measures against Iran that violate the nuclear deal, Iran should retaliate by restarting aspects of its nuclear program. Only 41 percent want to abide by the agreement and try to resolve the problem diplomatically.

Trashing the Iran deal without tearing it up, in other words, is not a harmless outlet for Trump's animosity. The more he makes threats and sows

uncertainty, the more likely Iran's leaders are to decide that the gains are not worth the grief.

#2: Hardball bargaining strategy

The second interpretation takes at face value Trump's claim that decertification is meant to increase US bargaining leverage and get more out of the nuclear deal.

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Secretary of State Rex Tillerson implied that allied support for tougher sanctions on Iran's ballistic missile tests might be

required to keep the US in the nuclear deal. The administration is also supporting legislation co-sponsored by Republican Sens. Bob Corker and Tom Cotton that would automatically reimpose sanctions if Iran does not obey demands that go well beyond the terms of the nuclear deal itself. The Iranian public is strongly opposed to the kinds of additional restrictions that Trump wants Congress to impose. Seventy percent said that Iran should not agree to end enrichment under any circumstances, while 62 percent said categorically that Iran should not extend the duration of the

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When asked whether Iran should curtail certain nonnuclear activities in order to get all US sanctions lifted, 63 percent opposed reducing ballistic missile tests. Fifty-nine percent opposed ending aid to Syrian President

Assad. Iranians would be even more firmly opposed to these policy changes if they got nothing new in return. Thus, threatening to reimpose nuclear sanctions is counterproductive if the objective is to get more from Iran.

#3: Killing the deal to provoke regime change

A third interpretation suggests that Trump does not really want to prolong, or to improve, the nuclear deal. Instead, he wants to end it,

preferably without being blamed for the deal's demise, and help the people of Iran get a government that is peace-loving and democratic. If so, he would be following some version of a strategy proposed by John Bolton, a leading neoconservative from the George W. Bush administration.

Trump's speech denounced Iran's government as a fanatical dictatorship that violently suppresses its own people, supports terrorism and causes conflict throughout the Middle East. He also alleged that this "rogue regime" had been on the verge of total collapse before the nuclear deal lifted sanctions and provided a huge financial boost. From this perspective, the main effect of the nuclear deal has been to prolong the power of Iran's supreme leader and his "corrupt personal terror force and militia." Trump's pledge to terminate the nuclear deal if Congress and US allies cannot gain Iranian acquiescence to unacceptable demands would demonstrate "total solidarity with the Iranian regime's longest-suffering victims: its own people."

Our surveys show that Trump misunderstands what the Iranian people want. The vast majority list economic problems, particularly unemployment, as their greatest concern, not political issues, like corruption or human rights. Pre-election data showed that younger Iranians preferred Mohammad Bagher Ghalibaf, Tehran's conservative mayor who eventually dropped out of the race, to Rouhani, who is more moderate politically but has less impressive economic achievements. Iranians see US sanctions as making their life worse, not better. When asked in December 2016 what happened to the economic benefits Iran was supposed to get from the nuclear deal, 51 percent said they never materialized. Few blamed their own government. Only 21 percent said the economic gains from the

deal went to Iranians with special connections, while 15 percent thought they went to Iran's military and foreign allies. And, when asked in June 2017 about the effect of sanctions imposed because of Iran's alleged human rights violations, only 8 percent thought they improved human rights in Iran. Thirty-six percent thought they hurt them, and 52 percent said they had no effect.

The Iranian people want the US to fulfill the economic promises it made in the nuclear deal, not to foment internal unrest and radical political change. When asked about the meaning of Rouhani's reelection, only about a third said it showed that most Iranians wanted religion to play a lesser role in policymaking. Less than a quarter saw it as evidence that the Iranian public disapproved of the ideals of the Islamic revolution. In other words, by reelecting Rouhani, Iranians showed support for continuity and moderation, not fundamental changes to their political system.

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Trump seems to think that he gains a strategic advantage by keeping everybody else guessing. That might be true if he had a sound strategy that could achieve his objective so long as his opponents could not anticipate his next move and counteract it. With Trump's decision to decertify the Iran deal, though, the evidence suggests that whatever strategy he has will likely be self-defeating.

Source: Nancy Gallagher, Interim Director at the Center for International and Security Studies at Maryland, The Conversation, 23 October 2017.

OPINION – Tong Zhao

America's Efforts to Subdue North Korea Will Fail—Unless China Gets Involved

The US strategy of imposing "maximum pressure" and the Chinese strategy of addressing North Korean threat perceptions through engagement are mutually conflicting. President Donald Trump

will visit Beijing on 08 November 2017, against the background of North Korea's repeated threat to detonate a hydrogen bomb over the Pacific Ocean and an increasing sense of cluelessness among the international community about how to deal with Pyongyang.

One thing is certain when Trump meets President Xi Jinping in Beijing: he will push very hard for China to impose stronger pressure on North Korea. However, Trump is unlikely to achieve his goal. There has been a deep and fundamental divergence of views between China and the US about North Korea's nuclear ambition and how to deal with the threat. If Trump wants to make his upcoming summit meeting with Xi successful, it is time to take a step back and reflect on his overall approach to solicit China's cooperation. To start with, he needs to understand why China hasn't used all its seeming leverage and acted to constrain North Korea to the greatest extent possible.

There is no doubt that North Korea's nuclear weapons are a serious threat to China. Despite the proclaimed special relationship in the past, since the Korean War, North Korea has held deep grievances towards and been distrustful of China. Due to Pyongyang's nuclear ambitions, the bilateral relationship has continued to deteriorate in recent years. Many Chinese experts worry that, if the relationship turns adversarial one day, China would face another nuclear-armed enemy in its neighborhood. Moreover, North Korea's persistent pursuit of nuclear weapons is viewed by China as providing a sound excuse for Washington to

threaten China's core security interests by strengthening its security alliances in the region, and by deploying increasingly advanced military capabilities around China, including the Terminal High Altitude Area Defense system. Beijing also believes Pyongyang is handing Tokyo a convenient excuse to revitalize its military, further worsening China's security environment.

China has strong incentives, therefore, to constrain North Korea's nuclear ambitions, and that is why Beijing has agreed to impose increasingly painful economic sanctions. That said, China also has strong incentives to avoid destabilizing the North Korean regime. As many analysts have observed, China prioritizes regional stability over North Korean denuclearization because China would hate to see its economic development and national rejuvenation disrupted by a regional war that would likely involve China. In fact, even the United States seems to agree that trying to overthrow the regime would be a very risky option that involves too many uncontrollable variables to guarantee a desirable outcome. As a result, most senior U.S. officials have

repeatedly stated that Washington only seeks policy change, not regime change.

However, the dilemma for China is that, for economic sanctions to be effective, they must be sufficiently tough and comprehensive to directly threaten the stability of the North Korean regime. Only something resembling a comprehensive economic embargo that completely cuts off North

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Korea's economic lifeline from the outside world could force Pyongyang to recalculate that retaining nuclear weapons actually made it less secure. Anything short of that will further enrage North Korea and have little chance of denuclearizing it. This dilemma of wanting to impose more sanctions on North Korea without threatening the regime challenges the coherence of U.S. sanctions policy. In fact, the U.S. practice of pressing China to do more, without being able to explain the logic and objectives behind imposing additional sanctions, makes Beijing believe that the White House does not have a coherent strategy towards North Korea. For China, the U.S. policy of "strategic accountability" is simply an easy way for Washington to shift the blame and burden onto others and to refuse to face reality by considering more practical but difficult options, such as a negotiated agreement with North Korea. It makes China less willing to do more.

Moreover, the cost to China of imposing sanctions on North Korea is becoming prohibitively high. In addition to all the losses that China sustains in, for example, stopping imports of North Korean natural resources and the damage done to local economies in the border region, China faces an increasingly serious North Korean threat of retaliation for strangling its economy. Some senior North Korean officials have reportedly stated that their missiles can fly in any direction—a not too subtle reminder that if Beijing continues to take the lead in driving North Korea into a corner, Pyongyang, feeling it has nothing more to lose, can be as ruthless to Beijing as to Washington. To some extent, China is held

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China has agreed to impose increasingly tough sanctions because it wants to be cooperative, but that does not mean China agrees with this approach of addressing the North Korean nuclear crisis. China's own historical experience of successfully resisting long-standing economic sanctions without giving up its own nuclear weapon program makes China much more skeptical than other countries about the efficacy of economic sanctions.

hostage by a desperate North Korea. Beijing's economic relationship to Pyongyang is not so much leverage as a liability that it cannot easily rid itself of.

China feels disheartened, not only by the international community's failure to fully appreciate these costs, but also by the United States appearing to want to coerce Beijing into doing more by undermining China's security. Some foreign experts acknowledge that the plan to install advanced missile defense systems in the region and the calls for deploying more U.S. strategic military assets to allied countries, including the possibility of reintroducing U.S. nuclear weapons to South Korea, are partially aimed at making China feel uncomfortable and thus forcing China to impose more sanctions against North Korea. This strategy is only encouraging China to take a more confrontational approach towards these countries and to become less cooperative with them on North Korea.

In recent years, China has agreed to impose increasingly tough sanctions because it wants to be cooperative, but that does not mean China agrees with this approach of addressing the North Korean nuclear crisis. China's own historical experience of successfully resisting long-standing economic sanctions without giving up its own nuclear weapon program makes China much more skeptical than other countries about the efficacy of economic sanctions. The similarities between the political ideologies and systems in China during the Cold War and in North Korea today also convince Chinese decisionmakers that they understand the thinking and mindset of their North Korean counterparts better than Western politicians.

Chinese leaders believe that economic sanctions only increase North Korea's threat perception and make it less likely to denuclearize.

As North Korea's nuclear and missile programs accelerate, Washington wants to broaden the scope of economic sanctions with the ultimate goal of threatening the stability of North Korea's economic system. Yet, the room for China to impose additional sanctions in the future without cutting off North Korea's economic lifeline and hence undermining its regime is quickly disappearing. The current model of Washington-Beijing cooperation on pressuring North Korea is quickly approaching a dead end. When President Trump becomes disappointed about the ineffectiveness the new sanction measures in UN Security Council Resolutions 2371 and 2375, US discontent will fuel a direct bilateral struggle between Washington and Beijing.

To avoid this outcome and to facilitate continued cooperation, the two countries need to shift focus away from arguing about specific tactics—such as what additional items should be included in the next round of trade sanctions—and towards reconciling their different overall strategies. The current U.S. strategy of imposing “maximum pressure” and the Chinese strategy of addressing North Korean threat perceptions through engagement are mutually conflicting. Without some basic common ground on strategy, substantive and sustainable cooperation is unlikely.

Washington and Beijing have so far embraced different strategies because they have divergent understandings on a range of key issues about

North Korea. Besides their different views about the efficacy of economic sanctions, another major difference is over their beliefs about what North Korea seeks to achieve with nuclear weapons, and

whether it can be deterred from using them. China believes North Korea's nuclear program is to safeguard regime survival; its leaders have no interest in starting a suicidal nuclear war and can be deterred from using its nuclear weapons for aggressive purposes.

As a result, China is more willing to consider the option of allowing North Korea to retain its existing nuclear capabilities for now while negotiating a step-by-step agreement to gradually denuclearize in the long run. But many U.S. experts believe North Korea will attempt to threaten nuclear use coercively for more offensive objectives, including by attempting to drive U.S. forces out of South Korea and forcing South Korea into reunifying on North Korean terms. Moreover, senior U.S. officials have expressed concerns about Pyongyang not just threatening but actually using its nuclear missiles. As a result,

Washington is less interested in considering more practical near-term agreements such as capping and freezing North Korea's capabilities.

One manifestation of these differences is whether North Korea is sincere in offering to suspend its nuclear and missile tests in return for the United States and South Korea restraining their joint military exercises—a proposal Pyongyang has made repeatedly over the past couple of years. Beijing seems to believe that Pyongyang has some interest in making and implementing such an agreement whereas Washington dismisses North Korea's seriousness. This divergence of views explains why

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China has made so much effort to promote the so-called suspension-for-suspension negotiation strategy but the United States has given China a very cold shoulder.

These are only some examples of the differences in views between Washington and Beijing. If they want to achieve deep and long-term cooperation in addressing the North Korea nuclear threat, they need to start substantive engagement to bridge the gap on these basic but critically important issues.

For starters, the United States and China need to devote immediate attention to making an important decision: whether to continue the current competition of risk-taking with North Korea, or instead to pursue a risk-reduction agenda to reduce the likelihood of a nuclear conflict. When Pyongyang and Washington are increasingly threatening each other's core security interests in the hope that more pressure will force the other party to back down, red lines for employing military forces can be crossed due to misjudgment. Washington and Beijing do not currently see eye to eye on the importance of pursuing risk reduction, which increases the danger of miscalculation between themselves. That variance in perspective also creates the risk of North Korea exploiting their differences and of the practice of brinkmanship ultimately leading to a hot war. The two countries need to quickly come to a common understanding about the urgent need to jointly contain crisis.

Without a joint strategy based on common understandings, the United States and China run a growing risk of combating each other rather than the common threat they both face. Such a dialogue will take time, patience and persistent efforts. But given the lack of easy solutions over the Korean Peninsula, Beijing and Washington have a clear common interest in embarking on that endeavor.

Source: Tong Zhao is a fellow at the Carnegie-

Tsinghua Center for Global Policy, The National Interest, 05 November 2017.

OPINION – Megan Geuss

Cost of Wind Keeps Dropping, and There's Little Coal, Nuclear can do to Stop it

Though a lot has changed since 2016, not much has changed for energy economics in the US. The cost of wind generation continues to fall, solar costs are falling, too, and the cost of coal-power energy has seen no movement, while the cost of building and maintaining nuclear plants has gone up. And none of those conclusions reflect subsidies and tax credits applied by the federal government.

The conclusions come from Lazard, an asset management company that publishes cost

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estimates for various types of electricity-generation assets each year. Lazard's numbers reflect the Levelized Cost of Energy (LCOE), which averages the estimated costs of construction, maintenance, and fuel for electricity-generating assets over the number of megawatt-hours

that each asset is expected to produce over its lifetime. In other words, the LCOE is the lifetime cost of a turbine divided by the amount of energy that turbine will produce over its lifetime. LCOE is a good way of comparing electricity generation sources that vary dramatically in cost to build and cost to maintain.

The result, tracked over years, is one way of gauging how the US energy mix is changing and could change in the coming year. Though the new presidential administration was expected (and still is expected) to be a boon to coal and nuclear energy, those efforts are still mired in the political process. And even if they succeed, thwarting the cost advantages of wind and solar energy while propping up coal and nuclear power will require not-inconsiderable amounts of intervention from the US government.

According to Lazard, in the last year, the cost of onshore wind has fallen six percent and the cost of utility-scale solar has fallen six percent, too. Those cost reductions are slower than reductions in previous years, but the cost of coal-fired generation remained stagnant in 2017.

For coal, the cost of building and maintaining plants has hardly changed at all. Combined with the plummet in wind and solar panel prices, this can mean that in some scenarios, the operating costs of coal plants are more than the cost of building and operating renewables projects. “This is expected to lead to ongoing and significant deployment of alternative energy capacity,” a press release from Lazard says. The implication is that for some energy companies, the choice isn’t: “is it cheaper to build new coal or to build new renewables?” Instead the choice is: “is it cheaper to continue operating an existing coal plant or to build new renewables?”

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The cost of building and maintaining nuclear plants has actually increased in the last six years as well. Lazar wrote that “the estimated levelized cost of energy for nuclear generation increased [approximately] 35 percent versus prior estimates, reflecting increased capital costs at various nuclear facilities currently in development.” Facilities like the incomplete Vogtle and Summer nuclear plants made headlines this year due to their financial troubles in the wake of the bankruptcy of nuclear reactor designer Westinghouse.

Still, the cost of energy storage hasn’t fallen quite as quickly as renewables advocates might have hoped. That means that for now, individual renewable energy sources can’t always compete with dispatchable energy on price alone. This has

created a sticking point politically. US Department of Energy Secretary Rick Perry has contrived an argument that reliably meeting US energy demand means artificially propping up coal and nuclear energy, while most grid operators contend that diverse renewable energy sources and natural gas can meet demand with dwindling (but still considerable) support from coal and nuclear.

But some encouraging numbers can be found in the energy storage analysis, too. Lithium-ion battery cost has declined a lot in recent years. In fact, Lazard says that lithium-ion batteries are generally the most economical to deploy, with a few application-specific advantages for zinc and vanadium flow batteries. Those numbers are just for utility-scale storage though. Commercial and residential storage is still incredibly expensive (and, currently, residential energy storage makes little economic sense for most US utility customers).

Storage is still nascent though. “Industry participants expect costs to decrease significantly over the next five years, driven by scale and related cost savings, improved standardization, and technological improvements,” Lazard writes, adding that increased demand could also spur some of that decrease in costs. Still, “the majority of future cost declines are expected to occur as a result of manufacturing and engineering improvements in batteries,” Lazard asserts. Those improvements may be significant, too, as Lazard reports that capital costs associated with installing lithium-ion batteries “are expected to decline as much as 36 percent over the next five years,” according to industry watchers that the firm spoke to.

Source: <https://arstechnica.com/i>, 06 November 2017.

NUCLEAR STRATEGY

USA–RUSSIA

Russia and America are Conducting Massive Nuclear Exercises

Both Russia and the US undertook major tests of their respective nuclear forces at the end of October 2017. Oddly, that was not sufficiently newsworthy and no coverage appeared in America’s leading newspapers. It’s particularly strange—and even ironic—because the steady drip of articles alleging every type of Russian conspiracy, from manipulation of social media to meetings with senior Trump administration officials to the supposed attempted penetration of voting systems, has been front-page news every day, playing no small part in accelerating the downward spiral in US-Russia relations.

One half expects a spate of new revelations detailing the current administration leaders’ unexplained fondness for borsht and pelmeni. All joking aside, a simple miscalculation in this most crucial bilateral strategic relationship could rather quickly destroy both nations and end life on earth. As long as American media outlets do not cover these nuclear exercises, which are ominous developments, they seemingly can escape any culpability for bringing on the “new Cold War,” its catastrophic risks and the related consequences.

Some would prefer to suggest that cyber tensions, election-interference allegations, accusations regarding nefarious activities in crises from Syria to Afghanistan to North Korea—not to mention the escalating proxy war in East Ukraine—are all discreet and complex issues demanding US strategic attention, that will not, however, cumulatively lead to a US-Russia nuclear showdown. But that all too tenuous assumption is belied by high-level assessments from the Pentagon, as well as these recent nuclear weapons exercises that admittedly have become quite commonplace. Even if the actual chance of military conflict remains thankfully low, it is extremely disturbing, and wholly contrary to the national interest. The stoking of further tensions with Moscow will cost Americans trillions of

taxpayer dollars—a fool’s errand if there ever was one.

At one level, this is just a case of bad journalism—the failure to distinguish the titillating (e.g. the Steele dossier) from the truly important (e.g. nuclear force modernization and crisis doctrines). How poorly informed the US political establishment is by such bad choices made regularly in the country’s newsrooms is suggested, for example, by the somewhat remarkable fact that neither the New York Times, nor the Washington Post, bothered to report on President Vladimir Putin’s visit to Iran on November 1 either. If Washington’s so-called “adversaries” are coalescing against it, America, so it seems, will remain blissfully ignorant. The newspaper *Nezavisimaya Gazeta* provided significant space to discussing both nuclear exercises. As I have done for years with my Dragon Eye column in sharing insights from Chinese press and academic writings, here I will endeavor in a new column called Bear Cave, to impart some perspective on Russian strategic viewpoints in the hopes of contributing in a small way to deescalating bilateral tensions, which now genuinely threaten world peace and stability.

The title of the *Nezavisimaya Gazeta* piece may itself convey some frustration with the pointlessness of the mutual show of force: “Moscow and Washington Frightened One Another with Nuclear Might.” In a rare bit of Russian optimism, the article observes that US Strategic Command had actually informed the Russian Ministry of Defense regarding the nuclear exercises in advance in conformity to the START-3 Agreement. As a seeming point of pride regarding Russian status, the article observes pointedly that Beijing was not so informed, since it is not a party to such agreements. Dismissing any “politically correct blather” of antiterrorism doctrines for nuclear forces, this analysis suggests that “in fact, both Washington and Moscow were training for an exchange of nuclear blows against one another.”

The Russian analysis concedes that the *Global Thunder* exercise organized by US Strategic

Command “looks like a saber-rattling by the Americans of a nuclear cudgel in response to Russian training and combat launches of ballistic and cruise missiles.” In the Russian exercise, according to the article, four intercontinental ballistic missiles were apparently launched. Lest anyone be confused regarding the payload, the article explains these missiles are “intended to carry nuclear warhead payloads.” Three missiles were launched from submarines (both Northern and Pacific fleets), while the fourth was a Topol rocket fired from the Plesetsk Cosmodrome. The exercise also involved a sortie of Russian bombers of several types and so the “entire nuclear triad of Russia was tested.” This exercise was undertaken with the direct participation of the supreme commander of the Russian armed forces President Vladimir Putin, according to the article, as if to underline that he is the only world leader who could likely reduce nearly the entire US homeland to glowing rubble well inside of an hour.

Happily, the article does mention some additional context for the recent US nuclear tests, including the ongoing North Korea crisis, which the Nezavisimyya Gazeta article states was “provoked by Pyongyang.” And yet the next sentence states quite unequivocally that Moscow is “extremely nervous” regarding the continuous buildup of US forces in Northeast Asia. That point raises yet another cost of the new Cold War. In addition to the risk of catastrophic war and enormous resources wasted on military rivalry, we may add the further escalation of regional conflicts, whether in the Middle East or Northeast Asia, that have resulted from deepening mistrust among the great powers, which now seem more interested in the concept of “relative gains,” vice genuine conflict management.

My first instructor in Russian politics, Professor Richard Pipes, told his charges some decades ago

not to take seriously analyses of Russia written by people who have never been to Russia, nor speak a word of the Russian language. But one does not have to speak Russian to appreciate that the costs of the new Cold War will reach far in excess of trillions of dollars for Americans when expenses for additional nuclear and conventional systems are tallied together to meet “the high-end challenge.” This lamentable trend was actually noted among Russian experts as well. And while some Russian hawks are undoubtedly cheerful about such developments, as are some

American hawks, the great majorities in both countries will suffer under such burdens. Instead of badly needed investments in infrastructure, health care, green energy and education, we, and Russians too, will have more nuclear (and conventional) weaponry.

Hawks may continue their boisterous rejoicing: there

will be no relaxation of grave international tensions any time soon. The noxious fusion of neoconservative and neoliberal thinking in the Washington “Blob” will continue to coalesce around the supposedly grave “challenge to the liberal order.” And the Blob’s “grand Russian conspiracy,” which is long on xenophobia, innuendo and spooky techno-bling, but appallingly short on evidence or historical context, will regrettably stifle any progressive policy agenda that seeks to put first America’s domestic priorities.

Source: Lyle J. Goldstein, <https://scout.com/>, 11 November 2017.

USA

\$1.2 Trillion Triad: Weighing the Cost of Modernizing America’s Nuclear Weapons

With approximately 1,550 deployed nuclear warheads and additional 4,000-plus stockpiled weapons, the US is tied with Russia in having the

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planet's largest nuclear arsenal. The cost of maintaining that force will be \$1.2 trillion, according to a new study by the Congressional Budget Office. Over the next 30 years, the trillion-dollar-triad will undergo the first major modernization since the end of the Cold War, which will include upgrades to the country's air, land and sea-based deterrent.

Yet, that \$1.2 trillion price tag may end up being on the cheap side. Already, President Trump has made it clear that the country's nuclear weapons are a critical priority. In October 2017, Trump stressed that the nuclear arsenal needs to be "in perfect condition," adding he wants the force "in tip-top shape."

...In the coming months, the Pentagon will be outlining the Trump administration's priorities for nuclear policy, strategy, capabilities and force posture in its Nuclear Posture Review. The CBO anticipates that the Trump administration may recommend changing modernization plans and even the size of the nuclear force he inherited from the Obama administration. When the Obama administration completed its initial review in 2010, North Korea had not yet claimed to have tested a hydrogen bomb or an intercontinental ballistic missile, and US relations with the other nuclear superpower, Russia, had not yet taken a turn for the worse. Kingston Reif, director of disarmament and threat reduction policy at the Center for Arms Control, believes the Trump administration is likely to change the doctrine developed under his predecessor. "The indications are that the administration could take steps to increase the role that nuclear weapons

play in US policy and could pursue new types of nuclear weapons that aren't currently part of the US arsenal," he said.

Recent reports have suggested that Trump may be considering reintroducing tactical or battlefield nuclear weapons into the mix. The weapons, sometimes described as being below 0.3 kilotons or 300 tons of TNT equivalent, were discontinued by George H.W. Bush in 1991 at the end of Cold War.

...Trump could, however, decide to start a new program for a low-yield nuclear weapon, something that would be added to the budget and "which could have strategic implications on its own," Harrison noted. Some proponents of these low-yield weapons have argued that they are more practical and make a more credible deterrent than larger bombs in the US arsenal. Opponents have warned that reintroducing mini-nukes could lower the threshold for use, or cause other nuclear powers like Russia or China to rethink their own doctrines. Both scenarios, critics warn, would increase the risk of a nuclear conflict.

Despite the steep price, lawmakers are currently on track to fully fund the nuclear modernization effort for this year. The defense authorization bill has called for funds for the new Columbia-class nuclear submarine, the new B-21 bomber, and a new ground-based strategic deterrent to replace the aging Minuteman III ICBMs.

The costs of modernization are expected to be around \$30 billion over the next decade, but as the programs get closer to completion, the costs

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go up. According to the CBO estimate, by the 2030s the cost to upgrade and maintain the triad will top \$50 billion per year.... He warned that under current projections, there will not be enough money to pay for everything the Pentagon has planned for both the nuclear arsenal and recapitalizing conventional forces. ...There is nothing easy about the trade-off between spending money on conventional forces that have been strained after 16 years of war and budget cuts and a deterrent that many leaders believe has kept the peace for the past 70 years.

...In the CBO report, there are nine recommendations for how to cut the cost of the nuclear arsenal. Essentially, they boil down to cutting programs, cutting the size of the force, or delaying their implementation. Under the 2010 New START Treaty, the US and Russia are currently limited to 1,550 deployed nuclear warheads across various platforms. That agreement was made at the beginning of the Obama administration after the president became the first US leader in the atomic age to call for a "world without nuclear weapons."

While the cuts in New START only amounted to a 10 percent reduction in the total number of nuclear weapons on the planet, it prompted calls for even further cuts. One proposal was made during Obama's term in office to continue to reduce the overall level of deployed nuclear warheads down to 1,000 warheads. According to a Pentagon follow-up nuclear review, reducing the deployed arsenal to 1,000 warheads would still be sufficient to achieve US deterrent objectives. Some staunch arms control advocates have called on the US to unilaterally limit its arsenal without a new treaty with Russia, but the Pentagon argued against such steps, ultimately deciding that a unilateral arms reduction would not be prudent.

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Kingston Reif is among the arms control proponents who believes the current US arsenal is already overkill. "Given that the US has more nuclear weapons than it needs for its security, it would be counterproductive and undermine US security to overspend on nuclear weapons at the expense of higher priority programs," he said.

Others have proposed cutting the triad down to a dyad, eliminating an entire delivery platform. Former Secretary of Defense, William Perry has repeatedly recommended getting rid of the ICBM leg of the triad. Perry argued in a *New York Times* editorial that by downsizing the modernization plan to replace the Minuteman III missiles could save tens of billions of dollars, improve nuclear security and reduce the risk of an "accidental nuclear war."

...There is little question among policymakers, defense officials and national leaders that as long as the threat of nuclear weapons persists, the US needs to have a credible, functional, safe nuclear arsenal. "If we don't modernize parts of our nuclear arsenal, then, over time, those delivery systems, the ICBMs, the sub-launched ballistic missiles, and the platforms...they will gradually age out of our inventory," Harrison said. Then the US will be left with no choice in the matter of having a smaller arsenal.

The cost of maintaining and modernizing the US nuclear arsenal is something that Americans should take an interest in, Harrison continued. "This money belongs to the American taxpayers; it's being used to provide for the national security of the country."

As the CBO recommendations make clear, there are a lot of choices available for managing and upgrading America's strategic deterrent, he concluded. "It's not just a matter of keeping all of

the nuclear weapons and modernizing them or getting rid of them all. There are a lot of choices in between.” During a September 2017 visit to Minor Air Base in Nebraska, home to two of the three legs of the triad, Secretary of Defense James Mattis made it clear that the Pentagon is open to all considerations in its upcoming nuclear posture review. ...

Source: <http://wjla.com/>, 10 November 2017.

White House Requests \$4B for Missile Defense to Counter North Korea

The White House is requesting another \$4 billion for missile defense in the face of growing threats from North Korea. “This request supports additional efforts to detect, defeat, and defend against any North Korean use of ballistic missiles against the US, its deployed forces, allies or partners.” ...

...“Providing for the safety and security of the American people is my top priority,” Trump wrote in the letter. “That priority is reflected in both the enclosed [Department of Defense] Budget amendments and the border wall request, which provides the down payment on what [Customs and Border Protection] needs to secure the southwest border.” Defense hawks in Congress have long sought more missile defense funding as North Korea advances its nuclear and missile capabilities.

The administration originally requested \$9.9 billion for fiscal 2018 for missile defense, which defense hawks slammed as insufficient and a cut from its current funding level. Trump himself promised “billions” more for missile defense in August 2017.

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...The \$4 billion request which comes as Trump is on an Asia trip dominated by worries about North Korea, would go toward construction of an additional Ground-Based Interceptor field at Fort Greely, Alaska, as well as initial funding to buy 20 new interceptors for the system.

The money would also pay for 16 Standard Missile-3 Block IIA interceptors, 50 Terminal High Altitude

Area Defense interceptors, missile detection radar upgrades, intelligence and reconnaissance capabilities, and long-range strike capabilities, among other areas. ...Finally, the request asks for \$674 million to repair the USS Fitzgerald and the USS John S. McCain. Both ships were badly damaged in separate collisions this summer that left 17 sailors dead. In a statement, Senate Appropriations Chairman Thad Cochran (R-Miss.) said he hopes Congress will “act expeditiously” on the request. ...

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Source: *The Hill*, 07 November 2017.

BALLISTIC MISSILE DEFENCE

INDIA

India Successfully Test Fires Indigenous Nuclear-Capable Cruise Missile

The DRDO successfully test-launched a nuclear-capable Nirbhay cruise missile, the country’s first indigenously designed and developed long-range cruise missile on 07 November 2017, the Indian MoD announced in a statement.

The test took place at the Integrated Test Range on Abdul Kalam Island off the coast of Odisha.

NUCLEAR ENERGY

GERMANY

Germany to Miss 2020 Carbon Dioxide Emissions Target Because of Nuclear Closure

“The flight test achieved all the mission objectives completely from lift-off till the final splash, boosting the confidence of all scientists associated with the trial,” the MoD said... “The missile majestically cruised for a total time duration of 50 minutes, achieving the range of 647 km. The missile was tracked with the help of ground based radars and other parameters were monitored by indigenous telemetry stations developed by DRDO.”

The Nirbhay is a subsonic long-range land attack cruise missile that can be armed with a 300-kilogram warhead. The missile is capable of reaching speeds of 0.6-0.7 Mach and has an estimated strike range of around 1,000 kilometers. The Nirbhay, designed to be launched from air, sea, and land, reportedly is highly maneuverable and has loitering capabilities.

The recent test is good news for the Nirbhay program. The indigenous cruise missile project was kicked off in 2004 and projected to be completed by the end of 2016. However, the program has been plagued by many difficulties including technical problems with the missile’s flight control software and navigation system. Since the inception of the program, DRDO engineers have repeatedly voiced their concern over the tight timeline of the project and lack of funding.

The last Nirbhay test launch in December 2016 ended in failure as the missile had to be destroyed in mid-air after it deviated from its course. “So far, only a flight trial of the missile conducted on 17 October 2014 met all test criteria. The missile reportedly traveled 1,010 kilometers while being monitored by the ground station and an Indian Air Force fighter jet....

Source: *The Diplomat*, 08 November 2017.

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Germany’s nuclear capacity has reduced markedly this decade as part of its phase-out policy, from 20.4 GWe in 2010 to 10.8 GW in 2016, with an additional 2.9 GW due to close by 2020. If Germany had prioritized closing coal plants instead of nuclear plants it would have avoided the emission of 80 MtCO2 by 2020, more than enough to make up the deficit needed to achieve Germany’s emissions target.

The Germany government’s Federal Environment Agency has predicted that Germany is on the path to have emissions of at least 816 MtCO₂ in 2020, compared to a target of 750 MtCO₂, a deficit of 66 MtCO₂. However, Germany would be on track to meet its target if it had prioritised closing coal plants instead of nuclear

plants. One reason for the continuing high level of emissions in Germany is its continuing dependence on coal-fired electricity generation.

In 2016 coal was responsible for 40% of electricity generation. Nuclear supplied 13%, gas 12%, wind 12%, biomass 7%, solar 6% and hydro 4%. Germany’s nuclear capacity has reduced markedly this decade as part of its phase-out policy, from 20.4 GWe in 2010 to 10.8 GW in 2016, with an additional 2.9 GW due to close by 2020. If Germany had prioritized closing coal plants instead of nuclear plants it would have avoided the emission of 80 MtCO₂ by 2020, more than enough to make up the deficit needed to achieve Germany’s emissions target.

The 80 MtCO₂ emissions avoidance would be delivered if the nuclear plants were operating in a baseload, rather than load following, mode. Over the last seven years the increasing share of intermittent renewable generation has required coal, and on rare occasions those nuclear reactors still operating to curtail their generation. So would

nuclear plant have been able to operate at close to full output to deliver the full emissions saving required?

Analysis data from Fraunhofer ISE shows that, for the twelve month period to the end of September 2017 this would be the case. Crucially, the output from coal was almost always higher than the output that would have been produced from the closed nuclear generation, so the closed nuclear plant could have operated at close to full capacity in place of coal. Since 2010, Germany has increased its renewables capacity from 47.4 GW to 106.1 GW in 2016. Its fossil fuel capacity has also increased from 79.4 GW to 83.0 GW.

The capacity of coal-fired generation as part of that fossil fuel total remains high, almost unchanged from 49.7 GW in 2010 to 49.2 GW in 2016. The additional output from renewables since 2010 has barely compensated for the loss of nuclear generation and growth in electricity output. Coal generation remained virtually unchanged, with lignite and hard coal producing 262.9 TWh in 2010 and 261.5 TWh in 2016. Nuclear generation fell from 140.6 TWh to 84.6 TWh, all renewables increased by 84.0 TWh and total electricity output increased by 15.9TWh.

The impact of nuclear closures will worsen soon after 2020. A further 8GW of nuclear capacity is due to close in 2021 and 2022. Such a rapid loss of baseload capacity is unlikely to be compensated for by renewable generation, leading to further reliance on fossil fuel, particularly coal-fired generation. Earlier the German government announced a series of measures intended to reduce emissions by a further 78 million tonnes of CO₂, in an effort to meet their 2020 target. These included a reduction in emissions from coal plants of only 22 million tonnes of CO₂. Industry groups say these measures will harm jobs and the economy and Greens describe them as “a hodge podge of nothingness”.

Even if the new measures are effective the existing programme of closing nuclear plants instead of coal plants will have resulted in the emission of half a billion tonnes of CO₂ by 2020. The global nuclear industry has proposed the Harmony goal, advocating the decarbonisation of the world’s electricity generation mix by 2050. It is proposed that nuclear generation supply 25% of all electricity demand in 2050, with the remainder coming from other low carbon generation.

Source: World Nuclear News, 10 November 2017.

INDIA

Westinghouse Recovery Boosts India Nuclear Power Programme

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New Delhi’s plans to allow some of the world’s biggest nuclear power companies to build reactors in India have been boosted by the news that Westinghouse, one of those companies, is planning to exit bankruptcy within months.

But with renewable power dropping in price and India now provided with a surfeit of electricity generation, some analysts are doubting the wisdom of spending millions of dollars on large and expensive foreign-built plants.

Krish Rajan, vice-president for Westinghouse in India, said last month that the company expected to exit Chapter 11 proceedings early next year, adding that it still intended to build six reactors in India. That news has been welcomed by some in the Indian government, which is one of few around the world still looking to expand its nuclear power capacity following the 2011 Fukushima disaster.

Ravi Grover, a nuclear scientist and adviser to the department of atomic energy, says: “Electricity generation in India will continue to grow at about 6 per cent. India can provide for this on the basis

of coal-fired power plants or low carbon sources, and it is desirable that low-carbon sources are given preference.... Others, however, argue that India should focus instead on its growing renewables revolution, which has seen the cost of solar power drop below that of coal. ...

Another reason for the lack of progress has been the dire financial health of both Westinghouse, a subsidiary of Toshiba, and Areva, which remains deep in debt even after being recapitalised by the French state. Nuclear power companies worldwide have struggled since Fukushima, which saw several of the world's biggest economies cancel their atomic energy programmes.

The comments last month by Westinghouse's Mr Rajan have provided hope to some in New Delhi that talks might soon resume. But some experts believe they are going nowhere. "There are no active negotiations with foreign vendors," says Brahma Chellaney, a professor at the Centre for Policy Research in New Delhi.

"Years after India signed the nuclear deal with the US, not a single western-designed power plant is under construction, and even if you started now it would not be built for another 10 years." ...

Source: <https://www.ft.com/>, 06 November 2017.

USA

Vogtle Critics Press Georgia Power on Nuclear Costs

The future of the US nuclear industry is on the line in Georgia, as regulators consider the future of the only nuclear power construction project in the country. The Georgia Public Service Commission heard four days of testimony on Plant Vogtle, which critics say is too expensive. Construction on two nuclear reactors at Plant Vogtle is running five years behind schedule, and the total cost has doubled to more than \$22 billion. The timeline and cost were already growing before the lead contractor on the project, Westinghouse, went bankrupt earlier this year.

Now, Georgia Power, which is the biggest owner of the plant, is pushing to keep the project going.

...Georgia Power did look at other options, including canceling the project completely or converting it to natural gas. Chiock said that completing the two reactors came out as the best choice. The utility's customers are paying now for financing. Once the reactors are finished, ratepayers will pay for capital costs, too.

Georgia Power is asking the Georgia Public Service Commission to sign off on its new cost and schedule. Without a decision from the PSC deeming the new projections "reasonable," Georgia Power says it and the co-owners of the plant will not go through with their plans.

One point of contention is the lack of control on spending. As long as the PSC judges Georgia Power's spending to have been prudent, the utility's customers will pay for the capital costs. "Is there a cap on what you're asking this commission to approve?" Liz Coyle,

executive director of Georgia Watch, asked Georgia Power comptroller David Porocho during cross-examination. ...Georgia Power has spent about \$5 billion on the two nuclear reactors so far. Even if the project is canceled, customers could pay for those capital costs. And Georgia Power could also write the \$5 billion off in its taxes. The next round of hearings is in December 2017. The Public Service Commission will decide whether or not to keep Vogtle construction going in February.

Source: <https://www.wabe.org/>, 10 November 2017.

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NUCLEAR COOPERATION

BANGLADESH-INDIA

India's First Atomic Energy Venture Abroad will Take Off in Bangladesh on Nov 30

India's first atomic energy venture abroad will

take off on November 30 with the ‘first pouring of concrete’ for the Rooppur Nuclear Plant in Bangladesh. The highpoint of Bangladesh’s first nuclear energy project is India’s collaboration with Russia to help build the plant. Once the project is completed, Bangladesh will become the third Asian country after India and Pakistan to harness energy from atomic fission.

Dhaka informed New Delhi about its plan to hold the ceremony on the last day of this month in Rooppur on the eastern banks of the Ganga in Pabna district, 169 km from Bangladesh’s capital. New Delhi will have role in “training of personnel and consultancy” in the initial phase and all equipment will be provided by the Russians, officials privy to the developments said. This is in line with a civil nuclear cooperation deal India signed along with two other agreements with Bangladesh.

Rooppur power park will have two Water-Water Energetic Reactor (pressurised water reactor units) of 1200 MW each, built by Russian company Rosatom. Russia will also provide major financial assistance as well as the fuel for the two reactors that are expected to go critical in 2022 and 2023. But subsequently, the plan is for India and Russia to collaborate for joint ventures in equipment manufacturing in accordance with their ‘strategic vision for strengthening cooperation in peaceful uses of atomic energy’ agreed upon in December 2014.

The agreement provided opportunities for sourcing materials, equipment and services from Indian industry for the construction of the Russian-designed nuclear power plants in third countries. In the initial phase, India will train professionals for various aspects of the plant, provide technical cooperation, besides sharing information in the field of nuclear safety and radiation protection in consonance with three nuclear energy related agreements that India and the Bangladesh signed

in April 2015, explained an official.

Source: Jayanth Jacob, Hindustan Times, 02 November 2017.

FRANCE-INDIA

French Ambassador Optimistic that Work on the Jaitapur Nuclear Plant will Begin

Even as the proposed Jaitapur Nuclear Power Project (JNPP) is back on the negotiating table between the Indian and French governments, talks on liability and costs are yet to see a breakthrough in this 9,900 MW plant — the world’s largest in terms of capacity. Speaking to *The Hindu*, Alexandre Ziegler, the Ambassador of France to India, said that the political will shown by the present government is pushing the project forward at a remarkable speed. “One must understand that it [Jaitapur] is the largest nuclear project in the world, and the way government has moved, I am sure the work will begin very soon,” he said.

Mr. Ziegler refused to specify any deadlines for the commencement of work on the project. The French Ambassador was speaking in the city after attending the 9th edition of India Nuclear Energy (INE), an exhibition for developing the nuclear energy sector in India, which has also seen participation from French companies. The French firm EDF is to build six reactors, each with a capacity of 1,650 MW using European Pressurised Reactor (EPR) technology, at Jaitapur, about 400 km south of Mumbai, on the coastal of Ratnagiri district. The project was earlier with another French company Areva, which ran into bankruptcy. Negotiations recommenced after EDF made a fresh proposal to NPCIL last year.

The Jaitapur project has seen intense opposition from locals, as well as anti-nuclear activists, over issues related to safety, technology and techno-commercial agreements between the two

The safety record of China-made atomic power stations is comparatively high...all countries which maintain cooperation with Beijing are interested in China’s assistance in the construction of nuclear power plants: “These are, for example, Pakistan, Iran, other countries of the Middle East, Central Asia, and even a number of developed countries.

countries. ... Replying to a question on the fear that EPR was not proven technology and not a single project under it has been commissioned till date, Mr. Ziegler said EPR is "the safest and most sufficient technology at present". "You might not see a commissioned plant, but three foreign countries, including the U.K., have already begun work using it," he said, adding that the U.K.'s acceptance of EPR is in itself a testimony to its reliability. The French Ambassador added that the reactor in U.K.'s Flamville will begin functioning by the end of 2018, while the project in China is likely to commence at around the same time. According to Mr. Ziegler, the project will benefit both India and France equally. ...

Source: <http://idr.org/>, 09 November 2017.

USA-CHINA

Bill Gates and China Partner on World-First Nuclear Technology

Bill Gates' nuclear firm TerraPower and the China National Nuclear Corporation have signed an agreement to develop a world-first nuclear reactor, using other nuclear reactors' waste. This joint venture aims to design and construct multiple nuclear power plants generating around 1150 megawatts over the next two decades which utilise this fourth generation nuclear technology. It expands a joint technology agreement between the two businesses signed in 2015.

Fourth generation Travelling Wave Reactors would differ from third generation, more traditional light water nuclear reactors, as they would not require enriched uranium to generate energy, and could instead use waste uranium. Travelling Wave

This joint venture aims to design and construct multiple nuclear power plants generating around 1150 megawatts over the next two decades which utilise this fourth generation nuclear technology. It expands a joint technology agreement between the two businesses signed in 2015.

Reactors would require less fuel per kilowatt-hour of electricity than light-water reactors, due to TWRs higher fuel burn, energy density, and thermal efficiency.

It is also safer as spent fuels, such as depleted uranium, from other reactor types could be recycled without separating out plutonium, and could operate without refueling for up to 40 years. TerraPower states that the US currently holds approximately 700,000 tonnes of depleted uranium, and the reactor would only need eight tonnes of this material to power 2.5 million homes for a year. They could also recycle their own fuel, with only 20 to 35 per cent of the fuel rendered unusable by the fission process.

Source: <http://www.smh.com.au/>, 07 November 2017.

NUCLEAR PROLIFERATION

IRAN

Iran to Pull Out of NPT if Sanction Reinstated

An Iranian lawmaker says if Tehran comes under further sanctions, the parliament will oblige the government to pull out of the NPT. In a recent address to the Iranian parliament, Mojtaba Zonnouri read out the third report by the Parliament's National Security and Foreign Policy Commission on the implementation of JCPOA and said the world witnessed that Tehran gave up its rights under the NPT to sit for talks with world powers to resolve the existing problems over its nuclear programs. ... Zonnouri went on saying that Iranian parliament has found at least 26 cases of JCPOA violation by the US including extending the D'Amato Law (the Iran Sanctions Act) and

TerraPower states that the US currently holds approximately 700,000 tonnes of depleted uranium, and the reactor would only need eight tonnes of this material to power 2.5 million homes for a year. They could also recycle their own fuel, with only 20 to 35 per cent of the fuel rendered unusable by the fission process.

imposing sanctions on Iran's defence capabilities.

The US must know that the Iranian lawmakers will not remain silent towards its aggression, he noted. "To this end, we have drafted two plans to cope with the US violations: First, we will call for a revision in our cooperation with the IAEA second, we will withdraw from the NPT."

He also said Iran will also pull out of the JCPOA if its interests are not met by the treaty; however, he added, our retreat doesn't mean that we will get back to the first square. Zonnouri noted the US officials should know the fact that Iranian lawmakers are ready to oblige the government to get out of the NPT if they don't stick to their commitments. He said Iran is legally entitled to leave the NPT and the Additional Protocol and limit IAEA's access to its nuclear sites.

Source: <http://ifpnews.com/>, 05 November 2017.

NORTH KOREA

Satellite Images Spot Increased Activity at North Korean Nuclear Test Site Tunnel Complex

Significant activity has been spotted at North Korea's main atomic test site's west portal — an as-of-yet unused tunnel complex where little or no activity had been observed over the past several months — raising the possibility of preparations for a fresh nuclear test, an analysis of new satellite imagery showed....

In the report on the Punggye-ri atomic test site, the North Korea-watching website 38 North said that the imagery, dating from 08 September 2017 to 01 November 2017, showed "significant movement of equipment, mining carts, material and netting within the area" of the west portal

after Pyongyang's sixth and most powerful nuclear blast on 03 September 2017.

...According to the imagery, two temporary structures near that portal's entrance believed to be associated with the September test have been removed, and no vehicles, mining equipment or materials have been observed there since the test. "While it is not possible to determine the exact purpose of these activities from imagery alone, they could be

associated with new nuclear test preparations at the west portal, further maintenance on the west portal in general and/or the abandonment of the north portal," the report said. While noting little change at the test site's south portal, the report maintained 38 North's long-held stance that tunnels there "have been sufficiently prepared to accommodate a test at any time."

The analysis also said that the available imagery could not corroborate a recent report by TV Asahi citing an unnamed North Korean source said that more than 200 personnel and rescuers had been trapped and feared dead in tunnel collapses at the site. TV Asahi reported 31 October 2017 that

the accident had killed scores around 10 September 2017. North Korea lashed out at Japan dismissing the report as "misinformation" and part of a bid "to secure a pretext for sending the Japan 'Self-Defense Forces' into the Korean peninsula on their own initiative by building up the

public opinion over [the] 'nuclear threat' from the DPRK."

... Analysis by 38 North, however, said the movement of equipment and material at the west portal provided "sufficient evidence that mining personnel have been inside" at least some tunnels

Iran will also pull out of the JCPOA if its interests are not met by the treaty; however, he added, our retreat doesn't mean that we will get back to the first square. Zonnouri noted the US officials should know the fact that Iranian lawmakers are ready to oblige the government to get out of the NPT if they don't stick to their commitments.

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at the site. It said that while the three most recent post-test tremors could have damaged the tunnel networks, there were no observable signs of such a tunnel collapse or intensive rescue or recovery operations outside any of the portals or within any of the support areas. ...

Source: *Japan Times*, 07 November 2017.

NUCLEAR SAFETY

SWEDEN

Sweden May Build More Nuclear Shelters

One of the regions in Sweden where most new nuclear shelters are expected to be constructed in the coming years is the island of Gotland, where military defences were recently expanded.

In September 2017, Norway's Nobel Peace Prize Committee handed a group dedicated to abolishing nuclear weapons its award. Now, the Swedish government is looking into expanding its existing network of nuclear fallout shelters, according to news website *The Local*. A first proposal was included in a report released several weeks ago and followed a review of existing shelters earlier this year, Swedish officials confirmed, saying that the proposed changes were still under consideration by the government.

Sweden already has 65,000 shelters, which would provide space for up to seven million people, but that leaves an estimated three million inhabitants without protection. Switzerland may have fewer citizens than Sweden, but it has still built about four times the number of nuclear shelters - easily enough for the country's entire population and then some.

In Sweden, the nuclear shelters are also supposed to protect the population from other hazards, like a biological weapons attack or more conventional warfare, as well. Until recently, few Swedes knew the location of the closest nuclear shelter in their neighbourhood, but the

government now offers an online map. Often located in publicly accessible buildings, such as schools or shopping centres, the shelters can usually also be used as storage sites or garages and are funded with taxpayers' money.

Number of people the shelters can accommodate, out of a population estimated at 10 million. In contrast, in Switzerland all houses above a certain size must include shelters in the basement, putting the financial burden on the citizens themselves. That rule was abolished in 2011 by the Swiss Parliament, but reintroduced months later, after the Fukushima nuclear accident in Japan. ...

Source: <http://www.straitstimes.com/>, 05 November 2017.

USA-RUSSIA

French Institute Suspects Nuclear Accident in Russia or Kazakhstan in September

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A cloud of radioactive pollution over Europe in recent weeks indicates that an accident has happened in a nuclear facility in Russia or Kazakhstan in the last week of September 2017, French nuclear safety institute IRSN said.... The IRSN ruled out an accident in a nuclear reactor, saying it was likely to be in a nuclear fuel treatment site

or center for radioactive medicine. There has been no impact on human health or the environment in Europe, the IRSN said.

IRSN, the technical arm of French nuclear regulator ASN, said in a statement it could not pinpoint the location of the release of radioactive material but that based on weather patterns, the most plausible zone lay south of the Ural mountains, between the Urals and the Volga river. This could indicate Russia or possibly Kazakhstan, an IRSN official said.

"Russian authorities have said they are not aware of an accident on their territory," IRSN director Jean-Marc Peres told Reuters. He added that the institute had not yet been in contact with Kazakh authorities. A spokeswoman for the Russian

Emergencies Ministry said she could not immediately comment. It was not immediately possible to reach authorities in Kazakhstan or the Kazakh embassy in Moscow.

Peres said that in recent weeks IRSN and several other nuclear safety institutes in Europe had measured high levels of levels of ruthenium 106, a radioactive nuclide that is the product of splitting atoms in a nuclear reactor and which does not occur naturally.

IRSN estimates that the quantity of ruthenium 106 released was major, between 100 and 300 teraBecquerels, and that if an accident of this magnitude had happened in France it would have required the evacuation or sheltering of people in a radius of a few kilometers around the accident site.

The ruthenium 106 was probably released in a nuclear fuel treatment site or center for radioactive medicine, Peres said. Because of its short half-life of about a year, ruthenium 106 is used in nuclear medicine. The IRSN ruled out an accident in a nuclear reactor, as that would have led to contamination with other radionuclides too. It also ruled out the crash of a ruthenium-powered satellite as an IAEA investigation has concluded that no ruthenium-containing satellite has fallen back on earth during this period.

Measurement from European stations showed high levels of ruthenium 106 in the atmosphere of the majority of European countries, at the beginning of October, with a steady decrease from 06 October 2017 onwards. The IRSN said that the concentrations of ruthenium 106 in the air that have been recorded in Europe were of no consequence for human health and the environment. The institute also said that the probability of importation into France of

foodstuffs, notably mushrooms, contaminated by ruthenium 106 near the site of the accident is extremely low.

Source: Reuters, 09 November 2017.

NUCLEAR WASTE MANAGEMENT

BELARUS

Belarus' Report on Spent Fuel, Radioactive Waste Management Submitted to IAEA

Belarus' national report on the implementation of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management has been submitted to the IAEA, BelTA learned from the Nuclear and Radiation Safety Department of the Belarusian Emergencies Ministry (Gosatomnadzor).

The sixth report has been prepared by Gosatomnadzor, in cooperation with other stakeholders. In accordance with the international obligations, Belarus has sent the report to the IAEA. The document is also available in open access on the website of Gosatomnadzor.

The sixth national report contains a list of spent fuel and radioactive waste treatment facilities in Belarus, the information about the state policy and practices in this field, the legislation, implementation of the recommendations issued following the previous report and other information. The document contains the information on the developments in 2014-2017.

In accordance with established procedure, the countries that have ratified the Convention examine the national reports of other contracting parties, formulate questions, and give answers to the questions. The national reports will be reviewed at the IAEA in

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May-June 2018 in the course of a review meeting of the contracting parties to the Joint Convention.

Source: <http://atom.belta.by/>, 10 November 2017.

CANADA

Nuclear Waste Management Organization Starts Drilling Near Ignace, Ont

The Nuclear Waste Management Organization (NWMO) is currently conducting drilling at a potential location for the repository. The drilling of a single hole in the Canadian Shield will help determine if it's feasible to bury nuclear waste in northwestern Ontario.

The Nuclear Waste Management Organization (NWMO) has started to drill a borehole about 35 kilometres west of Ignace, Ont. The first borehole will take about two or three months to drill, with the analysis of the rock taking up to a year. "This is where we're going to start," said Pat Dolcetti, the regional communications manager with the NWMO. "Now, there are, there still are other potential areas in the region, but we have to start somewhere, and everybody agreed this is a good place to start."

Other communities in the northwest that have

shown interest in hosting nuclear waste include Hornepayne and Manitouwadge. Other communities in Ontario include Elliot Lake, Blind River, Huron-Kinloss and South Bruce. The drilling in Ignace is the latest in a series of steps studying that particular area.

NWMO regional communications manager Pat Dolcetti said the first borehole drilled near Ignace is a "start" in the deeper search for a nuclear waste repository. "This would be the next step of geological studies for the Ignace area. Previously ... our geologists and other technicians have done fly-overs, airborne surveys, they've walked the land, they've looked at readily available information. But, this is the first time actually getting a core sample at or near the repository site."

It's a long process. Dolcetti said the NWMO hopes to have a site selected by 2023 to host the waste. It will take another two decades before the repository is built and operational.

The NWMO has stated the construction phase will provide 400 direct jobs for a decade, and the operations of the facility will provide 520 jobs over its 40 year lifespan.

Source: <http://www.cbc.ca/>, 10 November 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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