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INTERVIEW – Vladimir Angelov, Project Director at Rosatom

‘Unprecedented’ Safety Levels at Kudankulam NPP

Q: The second energy block at the KNPP was handed over to India on October 15. What does this mean for the energy system in India, which is experiencing chronic capacity shortages?

A: The Kudankulam NPP is making a significant contribution to electricity generation in India. Electricity from this plant (two completed energy blocks and four more to be built) are vital to the southern part of India – the states of Tamil Nadu, Kerala, Karnataka and the Union Territory of Puducherry. The construction of this station will contribute to achieving India's 2030 targets for development of nuclear energy. In addition, use of nuclear energy and renewable energy sources will enable India to reduce its dependence on hydrocarbons.

The achieved performance figures of the first energy block of the Kudankulam NPP exceeded its design expectations. The efficiency of the first block is 2.4% higher, and the power supplied is 2.5% more. India has received a better product than was originally planned. The connection of the second block of

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Q: Is India satisfied with the safety of the Russian energy units? To what degree do they comply with all current safety requirements?

A: The Kudankulam NPP is the first station in the world developed in accordance with the post-Fukushima safety requirements. The station is equipped with enhanced

safety systems, and can withstand earthquakes, tsunamis and tornadoes. The plant's passive safety systems are able to function even in the

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event of a total loss of power, and without any operator intervention. They meet the generally accepted criterion – “the overall probability of severe damage to the reactor core,” and, as much as possible, raise this project, in terms of its nuclear safety level, to that of new fourth-generation projects.

The technical innovations in the project ensure that no radiation is released into the environment. The block is equipped with two protective shells with a ventilated space between them. The inner shell ensures hermetical containment of the internal space, where the reactor facility is located. The outer shell of the nuclear power plant can withstand natural disasters (tornadoes, hurricanes, earthquakes, floods, etc.), technogenic and anthropogenic events (like explosions, plane crashes, and so on).

Even with the loss of all power sources and industrial water supply, the NPP's safety system will be able to provide reliable air cooling of the reactor, without the use of external energy sources. A distinctive feature of the Russian project is the high volume of diagnostic and corrective systems built in to the power units. The implementation of construction solutions and the technological systems – such as dual localizing and containment shells, systems of passive heat removal from the reactor plant, the core melt trap, passive system to quickly input high-pressure boron, additional capacity to ensure a passive way for long-term supply of borated water into the reactor, system of passive filtering of the space between the shells, closed ladle of industrial water intake for the NPP – provide an unprecedented design level of nuclear and environmental safety for this nuclear power plant that is being built.

Q: When will construction work start on the 3rd and 4th blocks of the KNPP? Are you ready to sign an agreement for the construction of the 5th and

6th blocks?

A: The KNPP project will involve building six power units with VVER-1000 type reactors. The General Framework Agreement for construction of the second phase of the NPP, which includes the third and fourth energy blocks, was signed in April 2014. The ceremony of pouring of the first concrete foundation slabs for units 3 and 4 took place during the BRICS Summit on October 15, 2016, with the participation of President Putin, PM Modi and Valera Limarenko, via videoconference.

Contracts for supplies of equipment and materials from Russia to India are already underway, while the working documentation is being finalised. Work is on for a draft contract to bring supplies in from

third countries. Since February 2016, work on the excavation of soil and preparation of pits for the main building has begun on the site of the NPP. For the 5th and 6th blocks, Russia submitted the complete technical and commercial offer for construction in November 2015. India has taken a decision, in principle, to continue with

building the 5th and 6th blocks – and use the same VVER-1000 type reactors in units 1 to 4. In February 2016, a road map was signed to move towards the signing of a General Framework Agreement for construction of the fifth and sixth power plants.

Q: What advantages have been offered by Russian NPP developers over the competition, including the Americans and the French?

A: Energy security is crucial for the sustainable development of India. On December 11, 2014, Russia and India signed an important document – the “Twenty Twelve” Roadmap, which sets out plans for construction of more than 20 nuclear power plants in India, cooperation in the construction of Russian design NPPs in third countries, joint production of natural uranium, nuclear fuel production, and waste management. We have laid the foundations for a long-term,

Russia and India have already reached a qualitatively new level of cooperation. This is no longer just trade in services, goods or technologies, but the creation of an entire industry, new to India. Real experience in building nuclear reactors and construction of nuclear power plants exists in the USA, France, China, Korea and, of course, Russia.

mutually beneficial cooperation in the nuclear sphere. Russia and India have already reached a qualitatively new level of cooperation. This is no longer just trade in services, goods or technologies, but the creation of an entire industry, new to India. Real experience in building nuclear reactors and construction of nuclear power plants exists in the USA, France, China, Korea and, of course, Russia. But for now, our partners in the nuclear market cannot demonstrate reference (benchmark, serial) technologies of the 3+ generation. Today we are significantly ahead of our competitors in the field of construction and operation of 3+ generation reactors.

On August 5, 2016, a Russian innovative energy block, the Novovoronezh NPP-2, was connected to the energy system of the country, making it the world's first nuclear power plant with a 3+ generation reactor of the VVER-1200 MW type, constructed and placed into operation. This allows potential customers to "feel" the finished product at the Novovoronezh NPP-2. Many foreign delegations, including representatives from India, have visited the NPP. We plan to serialize production of this unique technology and build it in new markets abroad, including in India. After the power unit with the new reactor at the Novovoronezh NPP was connected to the electricity network, we began discussing with our Indian counterparts the possibility of constructing 3+ generation energy blocks on a new site in India, as well as the capacity of these new energy blocks.

Q: What kind of long-term

projects in the nuclear cooperation sphere do you foresee? Will it be limited only to the construction of nuclear power plants?

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A: The Indian side highly appreciates the numerous advantages offered by the Russian nuclear power industry. In addition to the Kudankulam NPP, Russia and India are considering the possibility of building a series of additional power units. An agreement has

been reached on India allocating another site to build six new nuclear power plants of Russian design. In addition to our traditional business (nuclear power generation), Rosatom is actively developing new areas, such as nuclear medicine, use of radiation technologies in the field of agriculture, and sterilization of medical instruments.

Source: <http://in.rbth.com/>, 21 November 2016.

OPINION – Manpreet Sethi

'Nuclear' India and NPT 'Purist' Japan Meet Halfway

In May 1998 when India conducted nuclear tests, its relationship with Japan took the biggest hit. A staunch NPT loyalist vehemently opposed to nuclear proliferation beyond the five nuclear weapon states, Japan was quick to suspend aid to India under its ODA programme. India was then among the top five recipients of Japanese assistance, besides enjoying its support in the IMF, World Bank and ADB. But immediately after the tests, Japan moved to oppose India in regional and international economic and

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other fora such as the G-8, ASEAN Regional Forum and Conference on Disarmament. It also co-sponsored the UNSC Resolution 1172 asking India to roll back and eliminate its nuclear weapons programme.

In view of Japan's agonising experience with nuclear weapons, it was not so difficult to understand why it took such offence to Indian tests. However, the greater problem lay in the fact that Japan associated non-proliferation primarily with membership of treaties like the NPT and the CTBT.

India felt that Japan did not understand its threat perceptions from a nuclearised neighbourhood. Nor did Tokyo appreciate its principled approach to non-proliferation.

Given such mutual misgivings, the estrangement appeared unbridgeable. But, the dawn of the new millennium saw both countries reaching out to each other. Things eased further once the US abandoned its hard-line position on India's nuclear weapons. Japan too expanded its concept of the non-proliferation regime to acknowledge differences between subscribing to just the letter versus the spirit of non-proliferation treaties. This eventually enabled the recent signing of the Indo-Japan agreement on cooperation in the peaceful uses of nuclear energy on 11 Nov 2016.

Explained through the prism of a clean energy partnership, the agreement enables India to import nuclear material, technologies and reactors from Japan. Japan is a major user of nuclear generated electricity. Its fleet of about 50 nuclear power plants had been efficiently operating for over 40 years before the unfortunate event at

Fukushima in 2011 led to their closure in deference to public concern over nuclear safety. The plan is to slowly make them operational after

requisite safety checks. The nation has advanced nuclear technology and is a major player in the global nuclear supply chain. In fact, Japan Steel Works is amongst the only five companies worldwide that has the capacity to manufacture large-sized single-piece pressure vessels used in large capacity nuclear reactors, the kind that India plans to

import. American Westinghouse Electric, which is now owned by Toshiba uses components from JSW. In the absence of an Indo-Japan agreement, US nuclear industry with Japanese investment would have found it difficult to authorise transfers to India. The nuclear cooperation agreement, therefore, smoothes India's cooperation with others too.

Meeting Each Other Halfway: India and Japan have both met halfway to make this agreement possible. For Japan, to accept nuclear cooperation with a nuclear armed, but non-NPT member, marks a shift from its very 'purist' position on non-proliferation. India, on the other hand, has shown

respect for Japanese nuclear sensitivities by accepting, along with the main Agreement, a separate document in the form of a *Note on Views and Understanding*. This Note explicitly establishes the Indian commitment to a unilateral moratorium on nuclear testing offered by then Indian External Affairs

Minister in Sept 2008 as the basis for cooperation.

The Note elaborates upon Article 14 of the Agreement, which deals with circumstances of its

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termination. The Agreement itself makes no reference to conduct of a nuclear test causing termination of the agreement. But, the Note links cooperation to India's Sept 2008 statement. In case of violation of the test moratorium, Japan has, like the US, reserved the right to seek return of nuclear or non-nuclear material or equipment transferred as part of this agreement. Of course, the Agreement provides scope for consultations between the two.

Significantly, India is allowed to enrich uranium received under this Agreement or using equipment so received to upto less than 20%. India also has the right to go beyond that level of enrichment after receiving written consent from Japan. India is also at liberty to reprocess spent fuel obtained from imported reactors or equipment as long as its Additional Protocol with the IAEA is in force, and the activity is undertaken in a new, IAEA-safeguarded facility whose name, type, location and capacity is informed to Japan. Both these clauses are important. The enrichment rights would be useful if India decided to meet the fuel requirement of its ambitious light water reactor programme through indigenously enriched uranium. Meanwhile, right to reprocess spent fuel would be useful for the fast breeder leg of India's three stage programme. Evidently, India is keeping all options open to enhance the share of its nuclear generated electricity.

Given the strategic importance of such agreements, it is noteworthy that it has fructified when China is growing in its assertiveness and is a source of concern for both Japan and India. US President-

elect Trump did not exactly sound reassuring to Japan during his campaign speeches when he referred to a rethink on US extended deterrence. Who knows if Japan is compelled to conduct nuclear tests in the future?! While such a scenario appears surreal today and it will not be easy for Trump to undo years of US security and defence commitments, it is not surprising that Japanese leaders have begun to look for partners elsewhere in Asia. India is a natural choice given its own reservations about the uncontested emergence of China. Meanwhile, India can use the agreement to press China on its undue rigidity on NPT when Japan, the staunchest loyalist has relented.

Lastly, it may be mentioned that Indo-Japan nuclear cooperation has potential beyond only nuclear imports by India from Japan. One such area is for the nuclear Centres of Excellence of both countries to engage. Japan has long had a CoE particularly active in providing training in nuclear security and non-proliferation. India's CoE is relatively nascent but ambitious in its scope. Both could collaborate to provide support to emerging nuclear power programmes in Asia and avoid duplication of efforts. Also, there is scope for cooperation on nuclear R&D for next generation reactors since both India and Japan evince a role for nuclear power in their future energy mix.

India and Japan have overcome conservative positions to conclude the nuclear cooperation agreement. The much hyped 'nullification clause' actually became the facilitator of the agreement. By holding India up to a stringent promise, Japan has sought to reassure its domestic critics of the cooperation. Meanwhile,

Who knows if Japan is compelled to conduct nuclear tests in the future?! While such a scenario appears surreal today and it will not be easy for Trump to undo years of US security and defence commitments, it is not surprising that Japanese leaders have begun to look for partners elsewhere in Asia. India is a natural choice given its own reservations about the uncontested emergence of China.

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India has only reaffirmed its unilateral moratorium. It has not surrendered the right to test. But any decision to do so would depend on many politico-economic and military-diplomatic considerations. While such a requirement may or may not emerge in the future, Indo-Japan nuclear cooperation in the meanwhile is sure to be of mutual benefit.

Source: Dr Sethi is Nuclear Security Project Leader at the Centre for Air Power Studies, New Delhi, <http://capsindia.org/>, 17 November 2016.

OPINION – Manmohan Bahadur

Six Reasons Why a NFU Nuclear Doctrine is Good for India

Defence Minister Parrikar's recently articulated "personal" view that is contrary to India's NFU nuclear doctrine has come in for adverse comments from many strategists. But the current mood due Pakistan's aid to anti-India terrorists has led to many supporting the minister. This view is debatable because the NFU, as an enunciation of the country's nuclear intent, is beneficial in many ways.

Pakistan knows that it cannot afford to use any nuclear weapons in a war, including its tactical nuclear weapons, as India would respond with massive nuclear retaliation as per its doctrine. Additionally, with China heavily invested in Pakistan, it would be in Beijing's interest to ensure that the leadership of its geopolitical "outpost" does not take any rash decision of initiating a nuclear exchange.

The advantages of an NFU policy are many. First, a hair-trigger alert, to ensure that the other side does not get a chance to strike first, does not have to be maintained and so forces and equipment can be in a relaxed posture; nuclear forces can be maintained in a de-mated condition waiting for orders from higher echelons to go to a higher alert status, thus ensuring that command and control stays firmly with the civilian political leadership, which is a very important aim. Second, since there is no first use alert requirement, the chances of reacting to a false alarm are nullified. Third, the onus of taking the decision to escalate to a nuclear use lies on the adversary and not on the party having an NFU doctrine. Fourth, a first use would result in international opprobrium and weigh heavily on a country with a first use posture. Fifth, a first use posture still requires a country to

have survivable second strike capability as there is nothing such as a "splendid" first strike implying 100% decapitation of the adversary's assets and leadership. And last, a NFU doctrine is cheaper to implement; for India, which has many economic targets to achieve, this is a very important factor.

The questioning of India's NFU doctrine has been born out of the exasperation that has come about due to Pakistan's use of sub-conventional methods under the overhang of its nuclear weapons. However, Pakistan knows that it cannot afford to use any nuclear weapons in a war, including its tactical nuclear weapons, as India would respond with massive nuclear retaliation as per its doctrine. Additionally, with China heavily invested in Pakistan, it would be in Beijing's interest to ensure that the leadership of its geopolitical "outpost" does not take any rash decision of initiating a nuclear exchange.

As Parrikar said, India is a responsible nation; hence, India's nuclear capability and resolve of its leadership should be the signals that convey India's nuclear posture through its NFU doctrine. The avoidance of nuclear blackmail can be achieved by India demonstrating its

readiness to accept risks that are not less than that of Pakistan. This is already happening through the element of signalling in the conventional exchanges between the two armies across the LoC in J&K. The NFU policy is just right for India as it ensures security for the nation and does not detract it from its march towards better prosperity for its people.

Source: AVM (Retd.) Bahadur is a Distinguished Fellow at the Centre for Air Power Studies, New Delhi, <http://www.hindustantimes.com/>, 18 November 2016.

OPINION – Rakesh Sood

When Ministers Think Aloud

Since the dawn of the nuclear age in 1945 there has been an ongoing debate centred on defining

an appropriate role for nuclear weapons. Everybody agrees that these weapons are enormously destructive and should not be used. The question is whether the best way to prevent their use is to consider these as weapons for war fighting (just like conventional weapons but only more destructive), or to see them as qualitatively different, meant exclusively for deterrence. Different countries possessing nuclear weapons have evolved their doctrines based on the historical experiences shaping their world views, their threat perceptions and security obligations.

India is no exception and on January 4, 2003, it issued a statement regarding the decisions taken by the Cabinet Committee on Security on operationalising India's Nuclear Doctrine. This statement summarised the key principles: "a) building and maintaining a credible minimum deterrent; b) posture of 'NFU', nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere; c) nuclear retaliation to a first strike will be massive and designed to inflict unacceptable damage; d) non-use of nuclear weapons against non-nuclear weapon states; however, in the event of a major attack against India, or Indian forces anywhere, by biological or chemical weapons, India will retain the option of retaliating with nuclear weapons...."

The two key elements — a "credible minimum deterrent" and "no first use" — were first articulated by PM Atal Bihari Vajpayee in Parliament on May 27, 1998, days after India had undertaken a series of five nuclear tests in Pokhran and declared itself a nuclear weapon state. Mr. Vajpayee stated that India did not see nuclear weapons as weapons of war; that their role was to ensure that India is not subjected to nuclear threats or coercion; that India will not engage in an arms race; and that India believes in a "no first use" policy and remains ready to

discuss this with other countries, bilaterally or in a collective forum. These elements were further developed in the draft report of the NSAB released by then NSA Brajesh Mishra on August 17, 1999.

The 2003 statement, with some minor (but significant) changes, was consistent with what India had maintained since 1998. These were reiterated in Parliament on September 5, 2008 by the then External Affairs Minister, Pranab Mukherjee, and were critical to the Nuclear Suppliers Group's decision to grant an exceptional waiver to India.

The BJP manifesto in 2014 had declared that it would "study in detail India's nuclear doctrine and revise and update it, to make it relevant to the challenges of current times, (and) maintain a credible minimum deterrent that is in tune with changing geostrategic realities". This generated speculation that India was preparing to change its "no first use" policy but it was put to rest in August 2014 when in a series of interviews, Prime Minister Narendra Modi categorically stated that there was no change in policy and "no first use" remained India's nuclear doctrine.

Defence Minister Manohar Parrikar's unexpected response to a journalist at a book launch function in Delhi on November 10, 2016, reopened the issue when he said about India's no-first-use policy: "Why should I bind myself [to it]? I should say I am a responsible nuclear power and I will not use it (a nuclear weapon) irresponsibly." He added that these were his individual views, but since he is a member of the Cabinet Committee on Security as also a member of the Political Council of the Nuclear Command Authority, the Ministry of Defence felt it necessary to follow up with a statement that this "was his personal opinion", and not official position: "What he said was that India, being a responsible power, should not get into a first use debate".

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Debating the 'No First Use': A nuclear doctrine serves multiple uses — it determines the nuclear posture, provides guidance for deployment and targeting, chain of command and control, communication and signalling to adversary and, in the ultimate, the use of nuclear weapons. Naturally, the last would happen once deterrence has failed. So far, the nuclear triad (aircraft, land-based mobile missiles and sea-based assets) which is to guarantee India's assured retaliation remains a work in progress. Mobility for the land-based missiles is being ensured through canisterisation but the sea leg of the triad will take time before India is able to field adequate numbers of nuclear submarines with long-range nuclear-tipped missiles (SSBNs and SSNs). Some delays are inevitable as we seek to master the complex technologies involved.

India's doctrine does not mention any country, but it is no secret that the Indian nuclear arsenal is to counter threats from China and Pakistan. China has maintained a 'no first use' policy since 1964 when it went nuclear, and the Chinese leadership has always considered nuclear weapons as political weapons.

Pakistan has adopted a first-use policy to ensure full-spectrum deterrence; in other words, it envisages a tactical, operational and strategic role for its nuclear weapons. Since it maintains that its nuclear arsenal is exclusively against India, it seeks to counter India's conventional superiority at all levels. Recently, it has developed tactical nuclear weapons to hedge against a conventional military strike under the Cold Start doctrine.

The conventional criticism against a 'no first use'

policy is that India would have to suffer a first strike before it retaliated. This criticism is valid but only highlights the need for India to ensure that deterrence does not fail, and that there is a clear communication to the adversary of the certainty of punitive nuclear retaliation. This can happen when India's nuclear arsenal, its delivery systems and its command and control enjoy assured survivability.

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Does this imply that till then, it is preferable for India to shift to a first-use policy? That might be an attractive option if India was certain that in a first strike, it could take out all of Pakistan's (or China's) nuclear assets so that it would escape any nuclear retaliation. That is highly unlikely, today and in the future. Even the US with its vast arsenal, both conventional and nuclear, is unsure about denuclearising North Korea which has a much smaller arsenal and capability.

Implications of a Policy Change: Shifting to a first-use policy also has implications for the size of the arsenal, deployment posture, alert levels,

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delegation of command and control, defining redlines which would trigger a nuclear response and escalation management along the nuclear ladder. In short, it would mark a shift from deterrence towards nuclear war fighting. Further, declaring a first-use policy would create an incentive for either side for pre-emption because of the 'use it or lose it' syndrome brought on by hair trigger alerts. In short, it would lead to greater instability. The same instability would govern a situation of nuclear ambiguity. Given the short distances, it is impractical for India to envisage a 'launch on warning' posture even it developed and deployed a highly effective early warning system.

A shift towards nuclear war fighting also blurs the dividing line between conventional and nuclear. Today, the biggest conventional bomb in the US arsenal is the Massive Ordnance Penetrator (MOP) with an explosive yield of 15 tonnes equivalent of TNT. This is one-thousandth of the 16kt bomb dropped on Hiroshima in 1945, and today's nuclear devices are hundreds of times larger. Tactical nuclear weapons can be smaller but will remain much larger than the MOP, with the addition of long-lasting radiation fallout. Weapons designers are working on 'dial-a-yeild' systems and pure fusion devices without radiation fallout, but till that time, blurring the nuclear and conventional dividing line is inadvisable.

The Difference with Pakistan: There is another key difference. Pakistan's nuclear arsenal is totally under the military's control, and by and large, the military approach to any weapon system is to find a use for it; it is difficult for the military to possess a weapon system and then conceive of a doctrine that aims at deterring its use.

Deterrence is a product of 'technical capability' and 'political will'. In dealing with Pakistan, India has to define who is to be deterred and find ways of demonstrating the requisite political will even as we build up our technical capabilities. Israel is a classic example of a state possessing advanced technical capabilities and also having demonstrated political will. Yet, this has failed to deter rocket strikes and terror attacks on Israeli territory.

This is not to suggest that India's nuclear doctrine cannot be changed. It should be periodically reviewed and updated, possibly every decade or so, taking into account technological developments

and changes in the security environment. This is, however, not a simple issue of changing a few words here or there and casual remarks can only add to confusion.

Ultimately, deterrence is a mental construct which requires clarity in its planning. Even ambiguity needs to be a calculated ambiguity. Only then will the doctrine serve to reassure the Indian people even as it deters the adversary in order to safeguard India's security.

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Source: *The Hindu*, 26 November 2016.

OPINION – Gurmeet Kanwal

Don't Nuke the Debate

While speaking at the launch of *The New Arthashastra: A Security Strategy for India* (HarperCollins India, 2016), the book I have edited on India's national security strategy, Defence Minister Manohar Parrikar said that there should be an element of unpredictability in the country's military strategy.

Thinking aloud while answering a question, he wondered whether India's nuclear doctrine should be constrained by a "no first use" posture. He mentioned the advantages of unpredictability and said, "If a written strategy exists, you are giving away your strength. Why should India bind itself (to no first use)? India is a responsible nuclear power and (it should suffice to say that) we will not use nuclear weapons irresponsibly."

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by several nuclear strategists. However, he emphasised several times that there was no change in India's nuclear doctrine and that he was

The essence of the defence minister's introspection was that ambiguity enhances deterrence. This view has been expressed by several nuclear strategists. However, he emphasised several times that there was no change in India's nuclear doctrine and that he was expressing a personal view. While he has been criticised, there can be no doubt that fresh thinking is invaluable to the discourse on the subject.

expressing a personal view. While he has been criticised, there can be no doubt that fresh thinking is invaluable to the discourse on the subject.

There is no justification for the belief held by some that the nuclear doctrine should be debated only in government circles and not in public. Bernard Brodie, Herman Kahn, Henry Kissinger, Thomas Schelling et al and, nearer home, K. Subrahmanyam, Jasjit Singh and several others have made sterling contributions to advancing thought on nuclear deterrence.

With a pacifist strategic culture steeped in Gandhian non-violence, India is a reluctant nuclear power. India believes that nuclear weapons are political weapons, not weapons of warfighting; their sole purpose is to deter the use and threat of use of nuclear weapons. India's nuclear doctrine is built around "credible minimum deterrence" and professes a "no first use" posture.

As a corollary, India is willing to absorb the damage that a nuclear first strike may cause and has declared its intention to launch massive retaliation to cause unacceptable damage in return. Consequently, India follows a policy of deterrence by punishment through a counter value targeting strategy aimed at the destruction of the adversary's major cities and industrial centres.

A doctrine is a set of beliefs and principles that guide the actions of military forces in support of a nation's objectives. According to C. Von Clausewitz in *On War*: "Doctrine is a guide to anyone who wants to learn about war from books: It will light their way, ease their progress, train their judgement and help them to avoid pitfalls. Doctrine is meant to educate the minds of future commanders... not to accompany them to the battlefields."

Nuclear doctrines are not written in stone and are never absolutely rigid. They are not binding international treaties that must be adhered to in letter and spirit. The purpose of doctrine is partly declaratory — that is, to enhance deterrence by making public one's intentions; partly to provide

the basis for organising a country's nuclear force structure, including the command and control system; and, partly to reassure one's own people and, where applicable, one's allies. If deterrence breaks down, publicly declared doctrine becomes irrelevant and goes out of the window. During a crisis involving nuclear exchanges, the essence of national military strategy would lie in preventing escalation and minimising civilian and military casualties and material damage while ensuring the survival of the state.

The Political Council of the NCA will decide how to retaliate based on the advice given by the Executive Council, of which the army, navy and air force chiefs are members. The method and mode of the retaliation will take into account the prevailing operational-strategic situation and the likely responses of the adversary, especially the probability of further nuclear exchanges.

The assessment will also include the reactions of the international community — the threats held out, the appeals made and the course of the discussions held in the United Nations

Security Council.

Almost 14 years have passed since India's nuclear doctrine was approved by the CCS after reviewing the progress in the operationalisation of nuclear deterrence. The doctrine was enunciated in the Government of India statement issued on January 4, 2003. Since then, many new developments have taken place, including the development of "full spectrum deterrence" by Pakistan. Hence, a review of the nuclear doctrine is long overdue. In fact, a review should be carried out every five years. In its manifesto for the general elections of May 2014, the BJP had promised such a review, but no move appears to have been made in this direction so far.

Credible minimum deterrence and the posture of no-first-use have stood the test of time. There is no conceivable operational contingency that justifies a first strike, because it is guaranteed to result in the destruction of several great cities when the adversary retaliates with the nuclear forces that it will still have left in its kitty after

Many new developments have taken place, including the development of "full spectrum deterrence" by Pakistan. Hence, a review of the nuclear doctrine is long overdue. In fact, a review should be carried out every five years.

absorbing India's first strike.

India's declared strategy is that of massive retaliation. Ideally, the retaliatory strategy should have been "punitive retaliation, to inflict unacceptable damage", as envisaged in the Draft Nuclear Doctrine of August 17, 1999, prepared by the first National Security Advisory Board headed by K. Subrahmanyam. This would have permitted flexible response that offers a range of options.

However, massive retaliation is a viable deterrence strategy that has served India well; any change now would not be beneficial. It would even deter Pakistani plans to use TNWs against Indian forces on Pakistani soil as they cannot possibly risk massive retaliation that would result in the destruction of all major cities and lead to the end of Pakistan as a cohesive nation state.

However, the credibility of massive retaliation needs to be enhanced through a carefully formulated signalling plan. Signalling should be based on an elaborate plan designed to showcase the preparedness of India's nuclear forces and the firmness of its political will.

Source: The Indian Express, 16 November 2016.

OPINION – George Perkovich

Impolitic Musings

Defence Minister Manohar Parrikar expressed personal doubts about India's nuclear no-first-use policy last week: "Why should I bind myself? I should say I am a responsible nuclear power and I will not use it irresponsibly." The statement elicited buzz in South Asia and among nuclear cognoscenti around the world, even though Parrikar is unlikely to shape Indian nuclear policy. Intentionally or not, the defence minister's rhetoric provides an opportunity to think seriously about the dilemmas in the making of a sound national security policy in media-age democracies.

The musings on no-first-use were not Parrikar's first moment of impolitic candour. In May 2015, just as Pakistani military and civilian leaders were

mounting a public campaign against Indian covert operations in Balochistan, Parrikar blurted in New Delhi that "we have to neutralise terrorists through terrorists only. Why can't we do it? We should do it. You remove a thorn with the help of a thorn."

These statements reflect a common sense approach to contesting a state – Pakistan – that has long used covert operations and terrorists against India. Threatening to mount symmetrical responses against Pakistan could augment deterrence of such acts, and could add options for India to respond if deterrence fails and more terrorism occurs. Thus, Parrikar's observations and suggestions were far from crazy.

Intentionally or not, the defence minister's rhetoric provides an opportunity to think seriously about the dilemmas in the making of a sound national security policy in media-age democracies the musings on no-first-use were not Parrikar's first moment of impolitic candour.

But they are superficial, perhaps dangerously so. Their effects may undermine India's interests, especially with Pakistan. Nuclear doctrine, counter-terrorism strategy, and the conduct of covert operations require careful analysis of the potential risks and benefits of possible policies and

actions. Every declaration and action may cause reactions; intended positive effects may be vitiated by unintended negative ones. Maybe Parrikar thought all of this through, but there is little evidence of that.

Parrikar's statement regarding no-first-use reflects an intuitive concern that India's declared doctrine may be sub-optimal for inducing caution in the Pakistani military. Yet, saying "I am a responsible nuclear power and I will not use it irresponsibly" begs the question: What would be responsible use of nuclear weapons?

Indian governments and experts have long answered this question by saying that first use would be irresponsible. They have understood that if your adversary believes you will use nuclear weapons first, "he" has incentives to beat you to it and use "his" weapons first. Each contestant in a first-use competition then may seek to develop and deploy more sizeable and quickly useable nuclear forces and demonstrate preparations and resolve to launch these forces early enough in a

conflict to beat the adversary to the punch. This becomes a highly unstable and frightening situation. To believe otherwise would require confidence that nuclear war can be kept limited and somehow not result in massive destruction. There are no data to prove or disprove this proposition, because there have been no nuclear wars. ...

The Chinese authorities always have shared the traditional Indian view on first use. Israeli authorities, while not acknowledging possession of nuclear weapons, have said similarly that they “will not be the first to introduce nuclear weapons” into the Middle East. Of course, the US, Russia and other nuclear-armed states take a different approach, reflected in the massive, hair-triggered nuclear arsenals they built.

If Parrikar were more familiar with these issues or more serious in questioning no-first-use, he should have explained whether and how India will need to expand its nuclear forces and related infrastructure, and revise its operational plans, so as to manage the potentially destabilising dynamic of such a shift in policy. He would have acknowledged the enormous costs and complications involved in this.

Similar risks and economic and strategic costs are involved in the counter-terrorism and covert operations domains on which Parrikar also has loosely commented. The point is not that India should eschew developing and deploying covert capabilities to threaten to harm Pakistan as Pakistan has harmed India. It is, rather, that India should have a clear understanding how it would manage the effects of doing so.

Here, three considerations are particularly important, as my colleague, Toby Dalton, and I have analysed in our new book, Not War,

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There is evidence that each declaration of Indian bellicosity, doctrinal revision, covert capability, or putative military capability, reinforces the Pakistani military's narrative that India poses an unremittingly growing threat to Pakistan which only the Pakistani military can deter. This narrative reinforces the Pakistani establishment's claim for more resources and more deference in determining how best to protect the country from India.

Not Peace?. First, would adopting a first-use nuclear posture and doctrine, and conducting covert, subconventional violence in Pakistan, be likely to compel the Pakistani military to reduce its build-up and reliance on nuclear weapons and demobilise anti-Indian militants? Or, instead, would the Pakistani military become more empowered and determined to compete with India in these domains?

Second, would the policy shifts suggested by Parrikar make India more like Pakistan? Would India become an over-nuclearised state and/or be perceived as such,

domestically and internationally? Would India lose the high ground in the regional and global struggle against terrorism and create a basis for Pakistanis and others to say that both states are “guilty” and must either reap what they sow or mutually compromise? The answers are not self-evident, but before announcing new policies, Indian leaders could be expected to offer some.

Third, are public musings about shifts of policy in these areas counterproductive for India? There is evidence that each declaration of Indian bellicosity, doctrinal revision, covert capability, or putative military capability, reinforces the Pakistani military's narrative that India poses an unremittingly growing threat to Pakistan which only the Pakistani military can deter. This narrative reinforces the Pakistani establishment's claim for more resources and more deference in determining how best to protect the country from India.

Thoughtful Indians recognise these dilemmas, of course. But, as the American election just demonstrated more broadly, blustery candour can be politically appealing even if it does not improve a

country's international position.

Source: *The Indian Express*, 15 November 2016.

OPINION – Bharat Karnad

More, Mr Parrikar

Deterrence is a mind game. Nuclear deterrence is even more psychologically weighted because at stake, quite literally, is a nation's survival as a "social organism", to use the words of the geopolitical theorist Halford Mackinder.

What makes nuclear deterrence work is the ambiguity and opacity shrouding its every aspect. These range from weapons/warheads, delivery systems, their deployment pattern, command and control system to details about storage, reaction time, and physical, electronic and cyber security schemes, the weapons production processes, the personnel involved and policies relating to all these elements. The more anything remotely connected with nuclear hardware and software, strategy, policies, plans and posture is a black hole, the greater is the uncertainty in the adversary's mind and the unpredictability attending on the deterrent. Moreover, pronouncements emanating from official quarters that obfuscate matters and generate unease, especially about India's nuclear weapons-use initiation and nuclear response calculi, enhance the sense of dread in the minds of adversary governments. Dread is at the heart of successful nuclear deterrence.

It is the responsibility of the Indian government to make the ambiguity-opacity-uncertainty-unpredictability matrix denser, not make it easier for adversaries to plumb its political will and to read its strategic intentions by clarifying nuclear issues. The adversaries one needs to keep in mind

are as much the obvious ones — China and, to a lesser extent, Pakistan — as the "friendly" countries, such as the US. The US, in particular, was at the forefront of preventing India from crossing the nuclear weapons threshold, failing in which enterprise, it has done everything to ensure India stays stuck at the low-end of the nuclear weapons technology development curve. It insisted that India does not resume underground

nuclear testing, or depart from the US understanding of limited nuclear deterrence. It may also be recalled that, for geopolitical reasons of containing India to the subcontinent during the Cold War, Washington disregarded its own proliferation concerns and watched China nuclear missile-arm Pakistan even as it preached responsible behaviour to New Delhi.

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In this context, Defence Minister Manohar Parrikar's wondering why NFU is assumed to be a restraint on the Indian nuclear forces is just the monkey wrench that needed to be thrown into the Western considerations of this country's nuclear

security. American think-tanks help the US government to achieve its nuclear non-proliferation objectives, propagating, for instance, the hollow India-Pakistan "nuclear flashpoint" thesis that Washington has often used to pressure a usually diffident and malleable New Delhi. Pakistan naturally supports this thesis as a means of

Perkovich uses the morality card – the loss of India's supposed "high ground" which has been sufficient by itself in the past to subdue the Indian government – and labels Parrikar's statements as "superficial, perhaps, dangerously so". The truth, however, is that Perkovich – and by extension, Washington – is worried that Parrikar has upended the US-qua-Western nuclear construct for South Asia.

legitimizing its fast-growing nuclear arsenal, as do many Indian analysts for their own reasons.

No surprise, then, that Parrikar's stray thoughts on NFU have shocked the large community of flashpoint believers and acted as bait for George Perkovich, one of the stalwart proponents of this idea, to rise to it. Perkovich uses the morality card – the loss of India's supposed "high ground" which has been sufficient by itself in the past to subdue

the Indian government – and labels Parrikar's statements as "superficial, perhaps, dangerously so". The truth, however, is that Perkovich – and by extension, Washington – is worried that Parrikar has upended the US-qua-Western nuclear construct for South Asia.

But NFU is less of an issue for Perkovich than his desire to get Parrikar to explain "whether and how" India means to enlarge its nuclear forces and infrastructure and "revise its operational plans" contingent on New Delhi's apparent jettisoning of NFU. In this respect, it is pertinent to note that besides its intelligence agencies, Washington has always relied on American think-tankers and gullible Indians to help winkle out details of the Indian nuclear deterrent – Perkovich's primary intent. I recall that at a 1.5 track meet held under the US government's aegis in San Diego in December 1998 the hosts called in a surviving Manhattan Project biggie, Herbert York, to impress on the Indians there the dangers of the nuclear course India was embarked upon. They banked on an Indian patsy – the joint secretary (Americas), MEA – to repeatedly ask K. Subrahmanyam and me to speculate about what weapons strength constituted a "minimum" deterrent.

Indeed, far from being under any obligation to throw light on NFU or any other nuclear issue, Parrikar is almost duty-bound to air his "personal views" more frequently on the subject and thus keep confounding assessments regarding India's deterrent.

Source: The Indian Express, 21 November 2016.

OPINION – Alice Slater

Seeking Nuclear Disarmament in Dangerous Times

UN Secretary General Ban Ki-moon has championed efforts for nations to make good on their pledges to abolish nuclear weapons. In 2009 he published a five-point proposal for nuclear

disarmament, urging nuclear weapons states in particular to fulfill their promises under the NPT to negotiate for the total elimination of nuclear weapons as well as other complementary steps to that end such as banning missiles and space weapons. At the end of his term in 2016, there have been some stunning new developments after years of global gridlock and blocked efforts. At the UN General Assembly First Committee for Disarmament, 123 nations voted this October to support negotiations in 2017 to prohibit and ban nuclear weapons, just as the world has already done for biological and chemical weapons.

The most remarkable upset in the vote was a breach in what had always been a solid single-minded phalanx of 5 nuclear weapons states recognized in the NPT, signed 46 years ago in 1970 – the US, Russia, UK, France, and China. For the first time, China broke ranks by voting with a group of 16 nations to abstain, along with India and Pakistan, non-NPT nuclear weapons states.

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and Pakistan, non-NPT nuclear weapons states. And to the great surprise of all, North Korea actually voted YES in support of negotiations going forward to outlaw nuclear weapons. The ninth nuclear weapons state, Israel, voted against the resolution with 38 other countries including those in nuclear alliances with the United States such as the NATO states as well as Australia, South Korea, and, most surprisingly, Japan, the only country ever attacked with nuclear bombs. Only the Netherlands broke ranks with NATO's unified opposition to ban treaty talks, as the sole NATO member to abstain on the vote, after grassroots pressure on its Parliament.

All nine nuclear-weapon states had boycotted a special UN Open Ended Working Group for Nuclear Disarmament last summer, which followed three conferences in Norway, Mexico, and Austria with civil-society and governments to examine the catastrophic humanitarian consequences of nuclear war, thus opening a new pathway for how we think and speak about the bomb. This new "humanitarian initiative" has shifted the conversation from the military's traditional examination and explanations of deterrence,

policy, and strategic security to an understanding of the overwhelming deaths and devastation people would suffer from the use of nuclear weapons.

Today there are still almost 16,000 nuclear weapons on the planet, with nearly 15,000 of them in the US and Russia, now in an increasingly hostile relationship, with NATO troops patrolling on Russia's borders, and the Russian Emergencies Ministry actually launching a sweeping nationwide civil-defense drill involving 40 million people. The US, under President Obama, has proposed a \$1 trillion program for new nuclear-bomb factories, warheads, and delivery systems, and Russia and other nuclear-weapon states are engaged in modernizing their nuclear arsenals as well.

Perhaps one additional way to break the log jam for nuclear disarmament and find a silver lining in the crumbling neo-liberal agenda for globalization evidenced by the Brexit event and the shocking and unanticipated election of Donald Trump in the US, is to encourage Trump's repeated statements that the US should make "a deal" with Putin and join with Russia to fight terrorists. Trump has criticized the NATO alliance, the expansion of which has been very provocative to Russia and was the reason Russia gave, together with the US walking out of the ABM Treaty and installing a new missile base in Romania, for putting a halt to further US-Russian agreements for nuclear disarmament. Trump, who promotes himself as a "deal maker" has also suggested that he would have no difficulty in sitting down and talking with North Korea. These efforts should be encouraged, as North Korea has actually shown it

is willing to enter into negotiations to ban the bomb, which is more than the other eight nuclear weapons states have been willing to support.

Furthermore, North Korea has been seeking an official end to the Korean War of 1953, during which time the US continues to station about 28,000 troops on its borders while trying to starve North Korea out with drastic sanctions all these many

years. Perhaps Secretary General Ki-moon can leave his office with an important victory at the end of his term by seizing this opportunity and encouraging the "deal maker" in Trump to move forward with a US-Russia rapprochement, clearing a pathway for the elimination of nuclear weapons as well as putting an end to the hostilities on the Korean peninsula.

Source: <http://www.indepthnews.net/>, 22 November 2016.

OPINION – Hyuk Kim

Is a Nuclear Freeze an Option for North Korea?

The DPRK's current nuclear posture has left the world with little hope for denuclearization on the Korean Peninsula. The Six-Party Talks are dead and the DPRK now insists on "arms control talks" with the United States, in which the DPRK is viewed as a nuclear weapons state. In response, there have been some voices calling for a different approach in the United States and South Korea. In October 2016, James Clapper, US director of national intelligence, claimed that getting the DPRK to give up its nuclear weapons is probably "a lost cause." In

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September 2016, Sim Sang Jung, a member of the Korean National Assembly, stated that the world should focus on freezing the DPRK's nuclear program by providing economic incentives based on a "new Perry process." While US President-elect Trump's foreign policy toward the DPRK has yet to be shaped, he stated his willingness to talk to Jong-un in May 2016, leading some to suggest that he may be prepared to negotiate a "grand bargain" with the DPRK. If the US and South Korea are going to contemplate a "freeze" as a possible option for slowing down the DPRK's efforts, it is important to remember the lessons learned from the implementation of the Agreed Framework of 1994.

The Impact of Agreed Framework: Under the Agreed Framework, the DPRK agreed to freeze its five significant nuclear facilities, remain as a party to the Treaty on the NPT, and come into full compliance with IAEA safeguards. In return, the United States promised to make efforts to normalize relations with the DPRK, organize a project constructing two LWRs in the DPRK, and provide a supply of heavy oil until the LWRs become operational. While many accusations have been made regarding the failure of the Agreed Framework, not much attention is given to what happened between the IAEA and the DPRK. Yet recognizing that part of the story is critical to the success of any future strategy that would include a "freeze" on the DPRK's nuclear activities.

Undermining the authority of the IAEA has made restoring the DPRK's nuclear history a nearly impossible task. Delaying the IAEA's verification of the DPRK's nuclear history let the DPRK possibly eliminate or change information essential for such verification. The DPRK never allowed the IAEA to measure the amount of plutonium reprocessed before signing INFCIRC/403 and refused the IAEA's request to install monitoring equipment at the nuclear waste tank in the reprocessing plant.

we should refrain from excessively incentivizing a DPRK "freeze" on its nuclear activities since a "freeze" is not going to give the value hoped for in the Agreed Framework. If, as the DPRK claims, its nuclear weapons are already "miniaturized," capable of fusion explosions, and "standardized," then additional testing is less valuable for the DPRK than before – even though Pyongyang may try to demand a high price for a moratorium on nuclear tests.

First, the ambiguity in the Agreed Framework undermined the IAEA's authority to implement the DPRK's Comprehensive Safeguards Agreement (INFCIRC/403). The Agreed Framework stipulated that the DPRK would come into full compliance with its safeguards agreement when a significant portion of LWR construction was done, but before the delivery of key components of the LWRs to the DPRK. The Agreed Framework also included a provision for the IAEA to conduct ad hoc and routine inspections on the facilities "not subject to the freeze," which are not as significant as the five nuclear facilities.

Meanwhile, the DPRK claimed that implementation of INFCIRC/403 was contingent on the progress in the Agreed Framework and provided the IAEA with limited access and information, making it impossible for the Agency to implement the DPRK's safeguards agreement, which was still legally valid. Undermining the authority of the IAEA has made restoring the DPRK's nuclear history a nearly impossible task. Delaying the IAEA's verification of the DPRK's nuclear history let the DPRK possibly eliminate or change information essential for such verification. The DPRK never allowed the IAEA to measure the amount of plutonium reprocessed before signing INFCIRC/403 and refused the IAEA's request to install monitoring equipment at the nuclear waste tank in the reprocessing plant. Consequently, the IAEA couldn't verify that the nuclear waste was not altered, moved, or removed while it was only

allowed to observe the “freeze” of the facilities included under the Agreed Framework. ...

A Reshaped Approach to a “Freeze”: What lessons can be learned from the experience with the Agreed Framework? First, we should refrain from excessively incentivizing a DPRK “freeze” on its nuclear activities since a “freeze” is not going to give the value hoped for in the Agreed Framework. If, as the DPRK claims, its nuclear weapons are already “miniaturized,” capable of fusion explosions, and “standardized,” then additional testing is less valuable for the DPRK than before – even though Pyongyang may try to demand a high price for a moratorium on nuclear tests. Also, given the shortened time gap between the two nuclear tests conducted this year, we can assume that the DPRK’s fissile material production has been expanded. In addition, a verifiable “freeze” might be only imposed on facilities not designed for military purposes. In other words, a substantial amount of nuclear materials and a broad scope of activities could be left out of coverage under a “freeze.” Therefore, significant incentives should not be provided to the DPRK for a “freeze,” but should be offered only when there is a meaningful progress toward disarmament.

Second, it is vital to include the IAEA in the negotiation process with the DPRK, even if only in an advisory role. The IAEA will be responsible for verifying the denuclearization process in the DPRK and for implementing the CSA if or when the DPRK eventually returns to the NPT. Therefore, we should avoid a similar situation in which the IAEA’s credibility and international nonproliferation norms are challenged, as this could lead to another failure with far greater frustration. The participation of the IAEA in negotiations can help avoid exploitable ambiguities in a possible agreement with the

DPRK. Consultation with the IAEA can contribute to enhancing clarity in terms and conditions and to making them consistent with future safeguards measures.

Third, it is necessary to redefine or modify the meaning of “freeze.” The Agreed Framework did not prevent the DPRK from diverting nuclear materials and engaging in nuclear activities prohibited under INFCIRC/403. The DPRK modified the nuclear facilities that were once subject to safeguards under the CSA and built new facilities that have never been subject to safeguards. To ensure an up-to-date picture of nuclear materials and facilities in the DPRK, any “freeze” agreement should include IAEA item-specific safeguards (INFCIRC/66/Rev.2), similar to the cases of India, Pakistan, and Israel. Until the DPRK renounces its military-related nuclear activities and comes back to the NPT, imposing INFCIRC/66 type safeguards on the DPRK’s nuclear facilities will have to be part of any “freeze” agreement.

Closing: As the quote goes, “The only real mistake is the one from which we learn nothing.” For all the drawbacks of the Agreed Framework, its proponents used to claim that there needed to be a trade-off for

freezing the DPRK’s nuclear program, given the sense of urgency in between 1992 and 1994 and the DPRK’s intransigent position in the negotiation process. However, for those who are considering a “freeze” as an option this time around, it is important to reform their strategy by including the IAEA in the negotiation process, refraining from providing the DPRK with excessive incentives, and redefining the term. Otherwise, “freeze” proponents will let their efforts made in the past be a “real mistake.”

Source: <http://thediplomat.com/>, 19 November 2016.

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NUCLEAR STRATEGY

EUROPE

German Lawmaker Says Europe Must Consider Own Nuclear Deterrence Plan

Europe needs to think about developing its own nuclear deterrent strategy given concerns that US President-elect Donald Trump could scale back US military commitments in Europe, a senior member of Chancellor Angela Merkel's conservatives said. Roderich Kiesewetter, foreign policy spokesman for the conservative bloc in parliament, told Reuters

that Germany could play an important role in convincing nuclear powers France and Britain to provide security guarantees for all of Europe.

"The US nuclear shield and nuclear security guarantees are imperative for Europe," he said in an interview. "If the United States no longer wants to provide this guarantee, Europe still needs nuclear protection for deterrent purposes." Kiesewetter's comments reflect grave and growing concerns across Europe about what Trump's election will mean for the United States' commitment to NATO and to providing a strategic nuclear deterrent against a potential attack by Russia....

Expensive Umbrella:

Kiesewetter said a Franco-British nuclear umbrella for Europe would be costly, but could be financed through a joint European military budget that is due to begin in 2019, along with joint European medical, transportation and reconnaissance commands.

He said he had proposed development of a European nuclear deterrent within security circles

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before the US election, with little result, but believed the suggestion would be taken more seriously after Trump's win. Kiesewetter said Germany should not aim to become a nuclear power itself, so as to discourage any proliferation moves by other European countries....

German Defence Minister Leyen and other senior government officials have said it is clear that Trump's victory means Germany and Europe will have to take on more responsibility for their own defence. Rainer Arnold, defence spokesman for the Social Democrats in parliament, dismissed Kiesewetter's

suggestion as "off base," saying Trump's own US Republican Party would never accept a weakening of NATO and would be sceptical about any plans to boost European nuclear capabilities.

Source: <http://www.reuters.com/>, 16 November 2016.

INDIA

India has Effective Deterrence Against Chinese, Pakistan Nukes: Former NSA

India has effective deterrence against both China and Pakistan, but while China's nuclear weapons are a major strategic concern for India, Pakistan's nuclear programme "remains a daily source of tactical worry" and both countries' nuclear weapons programmes "are so closely linked...that they may effectively be treated as one", former NSA Menon has said.

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India has effective deterrence against both China and Pakistan, but while China's nuclear weapons are a major strategic concern for India, Pakistan's nuclear

programme “remains a daily source of tactical worry” and both countries’ nuclear weapons programmes “are so closely linked...that they may effectively be treated as one”, former NSA Menon has said. In his newly-published book *Choices* (Penguin), Menon, who served in the government of PM Singh, first as Foreign Secretary and then as NSA, says the Pakistan Army seems to believe, mistakenly though, that the country’s “nuclear shield permits Pakistan to undertake terrorist attacks on India without fear of retaliation”.

But India’s main worry is that Islamabad has developed “tactical nuclear weapons and their delivery systems” in the short, 60-km range and the decision to use these weapons would be in the hands of young officers “in an army increasingly religiously motivated and less and less professional and that has consistently produced rogue officers....” However, says Menon, if Pakistan were to use tactical nuclear weapons in the battlefield – as the country’s Defence Minister recently hinted darkly – “it would effectively be opening the doors to a massive Indian first-strike, having crossed India’s declared red lines”. That red line, Menon underlined, would also apply to the use of tactical weapons “even against Indian forces in Pakistan” – Indian special forces did cross over to conduct the September 29 surgical strike across the Line of Control against “terrorist launchpads”.

“In other words,” reiterated Menon, “Pakistani tactical nuclear weapons use would effectively free India to undertake a comprehensive first-strike against Pakistan” in what is perhaps the most clear enunciation of India’s nuclear doctrine to date by someone who has been closely involved in its policymaking and implementation. With a debate started by Defence Minister Parrikar on India’s no-first-use policy, which was earlier considered a strategic holy cow, Menon says “it is the uniqueness of India’s situation that explains the uniqueness of India’s nuclear doctrines and postures” as “no other nuclear-weapon state

faces as complex a combination of factors in its deterrence calculus as India”.

Menon says India’s nuclear weapons have always been treated as “political instruments – rather than war-fighting weapons as Pakistan treats them – that deter nuclear attack and attempts at coercion” and the “clearer and simpler the task of our nuclear weapons, the more credible they are”. “And the more credible they are, the stronger will be their deterrent effect”. Menon also said that, with possible reference to the present debate, that “there is nothing in the present doctrine that prevents India from responding proportionately to a nuclear attack, from choosing a mix of military and civilian targets for its nuclear weapons. “The doctrine speaks of punitive

retaliation. The scope and scale of retaliation are in the hands of the Indian leadership,” Menon emphasised.

He said while there was a “clear difference” between India’s nuclear doctrine and Pakistan’s, India’s doctrine is “closest to the Chinese doctrine” in no-first-use

policy (though somewhat hedged). For its nuclear strategy to be truly effective, India must develop a “genuine delivery triad on land, sea and air as soon as possible to ensure survivability of its second-strike capability and to assure retaliation”, he noted and added that the nuclear-armed Prithvi missiles developed with their limited range of 350 km “were effective deterrents in our situation”.

Source: <http://www.financialexpress.com/>, 23 November 2016.

BALLISTIC MISSILE DEFENCE

USA

The US Air Force Wants 400 New ICBMs

Air Force plans to build at least 400 new high-tech ICBMs intended to preserve millions of lives by ensuring annihilation of anyone choosing to launch a nuclear attack. The idea is to prevent major power wars.

The Air Force is now evaluating formal proposals from three vendors competing to build hundreds of new, next-generation ICBMs designed to protect the US homeland well into the 2070s and beyond, service officials said. Submissions from Northrop, Boeing and Lockheed are now being reviewed by Air Force weapons developers looking to modernize the US land-based nuclear missile arsenal and replace the 1970s-era Boeing-built Minuteman IIIs. If one were to passively reflect upon the seemingly limitless explosive power to instantly destroy, vaporize or incinerate cities, countries and massive swaths of territory or people – images of quiet, flowing green meadows, peaceful celebratory gatherings or melodious sounds of chirping birds might not immediately come to mind....

In an interview with Warrior several months ago, Lt. Gen. Weinstein, Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration, cited famous nuclear strategist Brodie as a way to articulate the seismic shift in thinking and tactics made manifest by the emergence of nuclear weapons. Considered to be among the key architects of strategic nuclear deterrence, and referred to by many as an “American Clausewitz,” Brodie expressed how the advent of the nuclear era changes the paradigm regarding the broadly configured role or purpose of weaponry in war....

“If another nation believes they can have an advantage by using a nuclear weapon, that is really dangerous. What you want to do is have such a strong deterrent force that any desire to attack with nuclear weapons will easily be outweighed by the response they get from the other side. That’s the value of what the deterrent force provides,” Weinstein said in an exclusive interview with Scout Warrior. Although Weinstein did not take a position on current administration considerations about having the US adopt a NFU, nuclear weapons policy, Air Force Secretary James has expressed concern about the possibility, in a news report published by Defense News. Limiting the US scope of deterrence, many argue, might

wrongly encourage potential adversaries to think they could succeed with a limited first nuclear strike of some kind.

Ground-Based Strategic Deterrence - New ICBMs: It is within the context of these ideas, informing military decision-makers for decades now, that the Air Force is in the early stages of building, acquiring and deploying a higher-tech replacement for the existing arsenal of Minuteman III ICBMs. Weinstein pointed out that, since the dawn of the nuclear age decades ago, there has not been a catastrophic major power war on the scale of WWI or WWII.... Nevertheless, despite clear evidence in favor of deploying nuclear weapons, modernizing the US arsenal has long been a cost concern and strategic liability for US strategic planners. In fact, Weinstein said there is concern that both Russian and Chinese nuclear arsenals are now more modern and advanced than existing US Minuteman IIIs. The new effort to build ICBMs, what the Air Force calls “Ground Based Strategic Deterrence,” aims

The government will likely include about ¥200 billion in the third supplementary budget for fiscal 2016 to reinforce its missile defense system in response to North Korea’s ballistic missile launches, according to government sources. The government intends to compile a total supplementary budget of around ¥1 trillion, excluding economic stimulus measures.

to construct durable, high-tech nuclear-armed missiles able to serve until 2075.

Source: <http://www.scout.com/>, 07 November 2016.

JAPAN

Govt Eyes ¥200 Billion for Missile Defense

The government will likely include about ¥200 billion in the third supplementary budget for fiscal 2016 to reinforce its missile defense system in response to North Korea’s ballistic missile launches, according to government sources. The government intends to compile a total supplementary budget of around ¥1 trillion, excluding economic stimulus measures, they said. PM Abe is expected to instruct FM Aso soon to start compiling the budget. The government will likely approve the supplementary budget at a Cabinet meeting in mid-December, and submit it to an ordinary Diet session to be convened next year (2017). The government plans to appropriate

about ¥188 billion for the purchase of improved PAC-3 surface-to-air guided missiles, and for the costs to upgrade a system to equip the advanced PAC-3 missiles.

While PAC-3 missiles currently deployed in Japan have a range of about 15 to 20 kilometers, the improved version could almost double the range. The Defense Ministry had previously made a budgetary request for fiscal 2017 to purchase improved PAC-3 missiles, among others. The government has decided to expedite part of the implementation of the budget. The government also will earmark about ¥7 billion to add the missile defense function to the Maritime Self-Defense Force's Aegis-equipped vessels. North Korea has test-fired more than 20 ballistic missiles so far this year. In most of the cases, the missiles were fired on mobile launching pads, which made the launches difficult to detect. In September, North Korea simultaneously fired three Rodong intermediate-range ballistic missiles with a range of 1,300 kilometers into roughly the same area within Japan's EEZ, demonstrating its technical improvement in the accuracy of such missiles.

For Japan, the reinforcement of its missile defense system is a pressing issue. The reason the government began considering earmarking about ¥200 billion for missile defense-related measures in the fiscal 2016 third supplementary budget is because threats from North Korea have reached an unprecedented level. Regarding North Korea's nuclear and missile development, Prime Minister Shinzo Abe said the threats "are in a different dimension from previous ones." Many of the third supplementary budgets in previous fiscal years focused mainly on economic stimulus measures or responses to disasters. The government's recent response to North Korea could be said to be unprecedented. As North Korea has engaged simultaneously in nuclear and missile development, Japan should be prepared for a situation in which North Korean missiles with

nuclear warheads could reach Japan. The missile defense system to intercept missiles is two-tiered – a SM-3 fired from an Aegis-equipped destroyer that can shoot down a missile at a high altitude outside the atmosphere, and a PAC-3 surface-to-air guided missile that can take down a missile at an altitude of a dozen kilometers from the ground.

However, if several ballistic missiles are fired simultaneously, "it's difficult to intercept all of them," a senior official of the Self-Defense Forces said. In addition to a plan to improve the PAC-3 system, the government has begun full discussions on the introduction of the United States' state-of-the-art missile defense system, the THAAD. If THAAD is introduced, Japan's defense capabilities to intercept missiles will be further improved with a three-tiered system – the SM-3, PAC-3 and THAAD.

The first working demonstration unit could begin real commercial operations as early as 2018. The plan could turn the growing Asian nation into one of the world's most aggressive actors on climate change – though just as important to China is nuclear's ability to help deal with its growing problem with air pollution. It could also kickstart the global nuclear industry, which was flagging even before the Fukushima disaster of five years ago.

Source: <http://the-japan-news.com/>, 27 November 2016.

NUCLEAR ENERGY

CHINA

Starting in 2018, China will Begin Turning Coal Plants into Reactors

It's a common refrain among climate change down-players – those who accept its reality, but who argue that we can't or shouldn't do much about it – that, sure, first world Western countries could be doing a lot more to reduce their emissions, but it hardly matters when you've got countries like India and China pumping more and more pollution into the very same biosphere. The argument has been getting weaker in recent years, as even developing nations have started to sign on to meaningful climate action plans. Now, Chinese atomic energy experts have announced an ambitious plan to begin turning the country's coal plant infrastructure into working nuclear power stations. The first working demonstration unit could begin real commercial operations as early as 2018. The plan could turn

the growing Asian nation into one of the world's most aggressive actors on climate change – though just as important to China is nuclear's ability to help deal with its growing problem with air pollution. It could also kickstart the global nuclear industry, which was flagging even before the Fukushima disaster of five years ago. China may be about to prove that newly advanced nuclear tech offers a way for some large industrialized nations to dramatically reduce their carbon footprint without bankrupting themselves, or simply betting that solar and wind power will progress fast enough to matter at all on the global utility scale.

The news comes from this year's High Temperature Reactor Conference, where Professor Zhang Zuoyi reportedly gave a talk on the subject, receiving a "sustained round of clapping," complete with "a few hoots" from the gathered scientists. The reason for their enthusiasm should be obvious. Here, we could have a potential solution to the biggest practical problem with a large-scale pivot toward "Generation IV" nuclear designs with advanced, passive safety systems: cost. Under the proposed plan, China can re-use a huge proportion of the money it spent building coal plants, removing the furnaces and boilers from its super-critical coal plants and replacing them with the stripped-down hearts of high-temperature gas cooled nuclear reactors (HTGRs). The coal stations targeted under this plan are numerous, but specific. Only super-critical steam plants are built to withstand the high operating temperatures HTGRs require. The early target stations should also be as close to population centers as possible – again, one of the main goals here is to reduce the health effects of coal plant air pollution, and you can't accomplish that by reducing emissions in the middle of nowhere. So, if this plan is to actually go forward, it will need to make a strong case for its own intrinsic safety.

As a result, the project will focus on a form of

nuclear plant called a pebble-bed reactor, in which the nuclear fuel is divided into little micro-fuel pellets that are then built up to baseball-sized spheres with successive layers of graphite and ceramic materials. The coatings on each fuel pellet act as the neutron moderator, doing the same job as the water that lies between the fuel rods in a classical thermal reactor, and the melting points of these coatings are all higher than any temperature the fuel pellets can create in this reactor. Hundreds of these spheres become a

rubble pile with space in between for gas to flow, in this in this case helium, and absorb heat before carrying it away. In some cases, this heated gas directly turns a turbine, but in this plan it will heat a duo of boilers to create steam, and turn the turbine more traditionally. The lack of the notoriously complex cooling systems of water reactors is one of the things that makes the Chinese retrofit plan so potentially affordable. And the gas that

The lack of the notoriously complex cooling systems of water reactors is one of the things that makes the Chinese retrofit plan so potentially affordable. And the gas that cools the system doesn't absorb neutron radiation nearly as easily as water, and thus HTGRs create a far lower volume of radioactive products that could leak or expose workers to hazard. The coolant is a gas at all temperatures, never condensing or evaporating, and as mentioned it cannot create a pressurized explosion like steam.

cools the system doesn't absorb neutron radiation nearly as easily as water, and thus HTGRs create a far lower volume of radioactive products that could leak or expose workers to hazard. The coolant is a gas at all temperatures, never condensing or evaporating, and as mentioned it cannot create a pressurized explosion like steam.

Thus, pebble bed reactors are in principle meltdown-proof, providing no path for the sorts of cascading failures that have led to the most serious nuclear accidents in history. This means that in the case of a catastrophic failure, the plan is literally just to walk away. There's no need to do anything – the whole point of the pebble-bed design is that every single component can fail, and the worst outcome will be a loss of power generation. It will take a long time for the reactor to naturally cool down – but then again, Fukushima cleanup efforts haven't exactly been proceeding at a lightning pace, either.... However,

China has a unique advantage in that it simply has so many suitable reactors to change in this way. Much of the projected cost savings will come from mass production of parts and especially fuel pellets, and the team hopes that as they can bring the price down to around \$2,500 per kilowatt, comparable with other forms of green power. If that mass production industry ever gets to a point where it's running out of Chinese coal plants to feed, it could just try to sustain its model by turning its marketing outward, to other nations.

... These new reactors are supposed to serve three separate purposes for China, all at the same time: power the continuing process of bringing the entire population into the modern world; let China live up to its international climate obligations; and clean up the air. Right now, cost aside, nuclear is the one and only technology that can provide all three benefits at once. It's perhaps worrying that China has such a zippy timeline for these installations, since even a minor accident could tank the profile of HTGRs, worldwide. The technology has only been given a handful of chances in the US and Germany, and while the Chinese government is certainly capable of bulling forward on an unpopular plan, Western democracies are more subject to the whims of the public. China has a chance here to prove to the world that nuclear can be safe, practical, and forward-thinking – and it also has the chance to prove the opposite.

Source: <https://www.extremetech.com>, 23 November 2016.

SWITZERLAND

Swiss Reject Rapid Nuclear Phase Out

The proposal to force older nuclear power plants to close in Switzerland has been rejected in a referendum. The five reactors that provide over one-third of electricity can continue to operate according to their economic lives.

Nuclear power is Switzerland's second largest source of electricity, providing about 35% of electricity in 2015 and complementing 52% hydro to give the country one of the cleanest and most secure electricity systems in the world. In 2010 there were active plans to replace the five current reactors based on a supportive referendum and confirmation by regulators that the sites were suitable. This program was scrapped by a National Council vote in June 2011, just four months after the accident at Fukushima Daiichi, and Switzerland was put on a path to lose nuclear power when existing reactors retired in the 2030s and 2040s.

...Switzerland went to the polls on a further proposal that would have accelerated the retirements by forcing reactors to close at the age of 45. Because they are already over this age, Beznau 1 and 2 as well as Muehleberg would have closed in 2017. Gösgen would have followed in 2024, and Leibstadt in 2029. At the time of writing 56% of people have voted 'No' to the rapid phase out, recording a clear victory by winning both the popular vote and by taking majorities in the most cantons....

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Source: <http://www.world-nuclear-news.org/>, 27 November 2016.

SPAIN

Nuclear Power Set to Cost More

In Salamanca, located in Spain, miners started work in October on a \$100 million uranium mine. Uranium prices are expected to soar in the international market with nuclear power set to cost more. And Berkeley Energia, the mining company wants to benefit when that happens. Berkeley Energia is listed on the junior AIM in London and in Australia.

The Uranium Mine: The mine has created about 500 jobs. When it becomes functional, it intends to produce 4.5 million pounds of uranium by the

year 2018. According to reports in The Telegraph Berkeley raised nearly \$30 million from the fresh issue of shares. It also won funding from Blackrock and JP Morgan. The site has been in development for over 10 years. Then it came upon high-grade uranium near its surface back in 2014. And Berkeley was keen to tap its potential from the inception. The uranium is present in the pool's shallow part. This will keep the cost to about \$15 per pound.

The Prices are Down: The prices of spot uranium are as low as those at 2003. It costs \$18 per pound in the last fiscal, about half its previous price. CEO of Berkeley Paul Atherley will not mind the sagging prices as he is keen to get contracts for the long term. This is in order to get premium spot prices.

The Demand is All Set to Increase: Large nuclear reactors are going to go off-supply in 2018 in Europe and US. This incites Atherley's prediction that they will come back to the market. China is also building no less than 60 reactors. They too will have

to shop for uranium around the same time, resulting in nuclear power set to cost more. As per the estimates of Cameco, the next decade will witness a demand of uranium to touch the 500 million pound mark. Cameco incidentally is Canada's uranium producer. Tim Gitzel, Cameco's head has a similar opinion like Atherley that the current market prices will not stay. And the prices can only go up as demand increases and result in nuclear power set to cost more. Gizmodo further reports that two firms from China, China National Complete Engineering Corporation, and GGCL System Integration Technology will together construct a solar plant of 1-gigawatt at the Chernobyl Exclusion Zone site. This would be nearly 30 years since the accident took place.

Source: <http://www.sportsrageous.com/>, 23 November 2016.

VIETNAM

Vietnam Dumps Nuclear Power Plans Due to Costs Doubling

Vietnam has become the latest country to dump its nuclear power plans – and to rule nuclear out of its energy mix for the foreseeable future – after the the country's National Assembly voted on 24 November to abandon plans to build two new plants in partnership with Russia and Japan. The Vietnamese government said in a statement that the decision, made in a closed session of

parliament, was taken for economic reasons, after the price for the proposed plants – approved in 2009 – had doubled to nearly 400 trillion dong, or \$US18 billion.

The Vietnamese government's public debt issues, combined with decreasing local power demand, helped to seal the deal. According to Reuters, when the government first approved plans for the two plants, growth in Vietnam's annual power demand was projected at

17-20 percent. However, Duong Quang Thanh, chairman of state utility Vietnam Electricity group, was quoted by state-run Voice of Vietnam radio recently as saying that annual growth between 2016 and 2020 was now forecast at 11 per cent, and 7-8 per cent through 2030.

The two plants proposed for Vietnam's central Ninh Thuan province would have had a combined capacity of 4,000MW and were to be developed with assistance from Russian state company Rosatom and the Japanese consortium JINED.... As CNBC reported, the scare, which caused only a minor disruption at Tepco's Daini nuclear power plant, didn't last long but was enough to generate fear in a country still reeling from the 2011 disaster. "These events do reinforce the idea that there are issues with having nuclear power in

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Japan. So there could be another rise in the sentiment against nuclear power," said Takuji Okubo, principal and chief economist at Japan Macro Advisors. In Vietnam, meanwhile, Russia's Rosatom is not giving up all hope. ...

Source: <https://cleantechnica.com>, 24 November 2016.

NUCLEAR COOPERATION

JAPAN-INDIA

Japan-India Nuclear Cooperation Agreement Signed

The agreement between the two countries was signed during a visit by the Indian prime minister to Japan and has taken six years of negotiations. Its signature follows the signing of a memorandum on cooperation by the two leaders in December 2015. It will open the door for India to import Japanese nuclear technology. India has been largely excluded from international trade in nuclear plant and materials for over three decades because of its position outside the comprehensive safeguards regime of the NPT.

Modi said signing of the Agreement for Cooperation in the Peaceful Uses of Nuclear Energy marked a "historic step in our engagement to build a clean energy partnership", adding that their cooperation would help "combat the challenge of climate change". In a joint statement, the two prime ministers also reaffirmed their commitment to work together for India to become a full member of the international NSG, as well as of the Wassenaar Arrangement and the Australia Group, with the aim of strengthening international non-proliferation efforts. In a separate statement, Modi thanked Abe for his support for India's membership of the NSG. ...

Source: <http://www.world-nuclear-news.org/>, 11 November 2016.

URANIUM PRODUCTION

ARGENTINA

The National Government will Build an Uranium Production Plant in Chubut

It is a pilot project for the production of uranium in Cerro Solo, a deposit located in the center of Chubut, which according to the Mining Code belongs to the National Commission of Atomic Energy. This is one of the 39 projects listed by the national Government for the province of Chubut. According to the budget that is presently discussed through the chambers in Congress, the works are expected to be concluded in 2019.

In Chubut, though mining is expressly forbidden by the provincial Law 5,001, uranium is considered technically as a fuel. Moreover, while permits are usually granted as concessions approved by the provinces, the Mining

Code establishes that the deposit located in Cerro Solo is a property of the National Commission of Atomic Energy. This implies that the national government (of which the Commission is part) has the powers to decide to make use of it. The estimated reserves of the deposit are of 30 million pounds considering a production period of ten years. ...

Source: <http://www.mondaq.com/>, 21 November 2016.

NUCLEAR PROLIFERATION

NORTH KOREA

Obama, Xi Reaffirms Commitment to Nuclear-Free Korean Peninsula

US President Obama and Chinese President Jinping reaffirmed their commitment to a nuclear-free Korean Peninsula as they held their last meeting on the sidelines of a regional summit, the White House said. The bilateral meeting took

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place in Lima, Peru, on the margins of the annual summit of the APEC forum. It was Obama's last meeting with Xi before he leaves office in January (2017). "The two presidents addressed the threat presented by North Korea's efforts to advance its nuclear weapons and ballistic missile systems, and affirmed their firm commitment to achieving the denuclearization of the Korean Peninsula," the White House said in a statement....

Source: <https://www.koreatimes.co.kr>, 21 November 2016.

NUCLEAR NON-PROLIFERATION

IRAN

Iran Begins Exporting Excess Heavy Water to Comply with Nuclear Deal

Iran has started to send heavy water to Oman to comply with the terms of its international nuclear deal. It was the second time Tehran had surpassed the 130-metric-ton threshold for heavy water. "In view of the progress of talks with several foreign firms and countries to purchase heavy water, some quantities of Iran's surplus production has been transferred to Oman," said Behrouz Kamalvandi, spokesman for Iran's Atomic Energy Organization, according to the Iranian Students' News Agency (ISNA). The agency reported that Kamalvandi said more heavy water would be sent to Oman as talks with overseas buyers progressed. There has been no official confirmation of the report. A recent report from the UN's IAEA said that Tehran had 100 kilograms (220 pounds) more heavy water in storage than the 130 metric tons limit set under the terms of its agreement with six world powers: the US, Russia, China, Britain, France and Germany.

... While the violation of the terms of the nuclear deal may have involved only a small amount of

material, it is the second time that Iran has exceeded the limit since the agreement came into force in January. The IAEA, which is the world's central intergovernmental forum for scientific and technical co-operation on nuclear issues, had issued a confidential report saying Iran had 130.1 tons of heavy water. ...

Source: <http://www.dw.com/>, 21 November 2016.

NUCLEAR TERRORISM

IRAN

Arab Nations: Iran's Sponsorship of Terrorism has Only Worsened since Nuclear Deal

Eleven Arab nations warned outgoing UN Secretary-General Ban Ki-moon that "expansionist" and "sponsor of terrorism" Iran has only intensified its policy of "aggression in the region and the continuation of support for terrorist groups" since the nuclear deal. "It is with a deep sense of frustration that we note that the Islamic Republic of Iran, with its expansionist regional policies, flagrant violations of the principle of sovereignty and constant interference in the internal affairs of Arab States, continues to play a negative role in causing tension and instability

in our region," a letter to Ban – signed by the UN envoys of Bahrain, Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Sudan, United Arab Emirates and Yemen – said.

The Arab ambassadors further expressed "concerted alarm" at "the export of its revolution to other countries." "We stress that the Islamic Republic of Iran is a state sponsor of terrorism in our region, from Hezbollah in Lebanon and Syria, to Houthis in Yemen and terrorist groups and cells in the Kingdom of Bahrain, Iraq, the Kingdom of Saudi Arabia, Kuwait

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and elsewhere," the letter stated....

UN Watch, a Geneva-based monitoring NGO, praised the letter as "important." "Iran likes to dismiss all criticism of its human rights violations and brutality at home and abroad as part of a Western plot, but that's hard to sustain when the accusers are all Muslim governments, including recent allies of Iran like Sudan," UN Watch Executive Director Hillel Neuer said in a statement. For its part, Iran responded to the Arab nations' claims, calling them "unfounded," Iran's state-owned Press TV reported....

Saudi Arabia has condemned Iran's military support of Lebanese terror group Hezbollah which has joined the Assad regime in Syria. The Kingdom launched a coalition to support Yemen in its fight against the Iran-backed Houthi rebels who have taken control of the country's capital. In his UN General Assembly speech in September, Prime Minister Benjamin Netanyahu said that many states in the region are recognizing that Israel is not their enemy. Rather, he said, they realize "that Israel is their ally. Our common enemies are ISIS and Iran. Our common goals are security, prosperity and peace. I believe that in the years ahead we will work together to achieve these goals."

Source: <http://www.breitbart.com/>, 19 November 2016.

NUCLEAR SAFETY

IRAN

Iran wants to Work with India on Nuclear Safety, Accident Prevention

Iran, once an international outcast due to its controversial nuclear programme, has expressed

hope it can work in tandem with India to enhance nuclear safety and knowledge management in the region to prevent "accidents". The country also plans to invite India to participate in the annual VVER Technology Forum next year. "We have common issues. Both countries use VVER technologies. Both have developed research activities and they could follow that. We have similar interests in the nuclear programme from the safety point of view.

Things could be done very easily. We hope things could be extended in a more tangible manner in the future," Naser Rastkhah, who heads the Iran Nuclear Regulatory Authority, told media.

Rastkhah is participating in the 11th International Public Forum-Dialogue "Nuclear Energy, Environment, Safety". "Next year we are going to host the VVER Forum and we will invite the (nuclear) regulatory body of India," Rastkhah said.

Banking on India's long-standing experience in nuclear safety, Rastkhah raised concerns over the dearth of knowledge among countries that are foraying into the nuclear energy sector in the region. "From the regulatory point of view, we belong to the same region and any accident anywhere is an accident everywhere. India has a very good experience long before Iran in this regard and they could probably cooperate with our nuclear regulatory authority to increase safety in the region...to of course prevent accidents." "Most of the newcomers in the region have least knowledge in safety of (using) nuclear energy. If people are aware, safety is there. Usually we are influenced by lack of information. If we could extend our collaboration with the Indian regulatory body, we are on the safe side", he noted. ...

Source: *The Indian Express*, 24 November 2016.

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SOUTH AFRICA

Safety Concerns Over South African Nuclear Power Plant Proposal

A new study has raised safety concerns over the site of a proposed new nuclear power plant in South Africa. The study adds to controversy over transparency, economics and environmental issues. The site where South Africa's state-owned Eskom proposes to build a controversial nuclear power plant may be at risk of storm surges, sea level rises, tsunamis and submarine landsides, according to a geological report, but the power provider disputes the findings. South Africa has the continent's only nuclear power plant and is considering expanding nuclear power alongside coal and renewable energy to meet growing demand. Much of the debate over expanding nuclear power has centered around economics, the trade-off with renewable energy and concerns over transparency and potential corruption.

Site Suitability Questions: A study published by Nelson Mandela Metropolitan University and the Africa Earth Observatory Network now adds additional concern over the suitability of Eskom's proposed nuclear reactor site at Thyspunt, near Port Elizabeth, on the Indian Ocean coastline. The study says a large earthquake along an existing dormant fault line "is likely to generate a large submarine slump, and possible significant local tsunami that would affect the coastal region." It also warns of geological structures around the

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Eskom is pushing for the South African government to bring a new nuclear power plant online by 2025 as part of a larger roll out of several nuclear plants to meet energy demand. However, a draft blueprint of the government's integrated energy plans signals the country may slow its build up to just 1,359 MW by 2037, compared with a previous target of adding 9,600 MW of new nuclear power by 2030.

area of the proposed site make it subject to possible sea level rises and storm surges. The aquifer system at Thyspunt and potential seawater penetration into buried canyons and valleys beneath sand dunes may not prevent flooding from tidal swamps and a tsunami, it said. "It could literally become a Fukushima prone to flooding from below," the report said, referring to the 2011 nuclear disaster in Japan.

In a statement issue on 25 November, Eskom said they have been transparent, conducted some 20 peer-reviewed studies and taken into consideration various rare extreme events. The utility said it has used the same "comprehensive and rigorous" seismic hazard analysis as required in the United States for the construction of new nuclear power plants. The results of the studies will be used to provide input into the design of the plant, Eskom said.

Change of Energy Plans: Eskom is pushing for the South African government to bring a new nuclear power plant online by 2025 as part of a larger roll out of several nuclear plants to meet energy demand. However, a draft blueprint of the government's integrated energy plans signals the country may slow its build up to just 1,359 MW by 2037, compared with a previous target of adding 9,600 MW of new nuclear power by 2030. Under the draft plan, nuclear energy would expand by 20,385 MW between 2037 and 2050. In the short-term, resources would be devoted to initial capacity investments in gas, solar, wind and hydro power.

Opponents of nuclear power have also raised concerns about transparency and corruption under President Jacob Zuma. South Africa's nuclear plans could cost up to \$80 billion (75.5 billion euros) and Eskom is expected to procure, own and operate the new nuclear plants. The head of Eskom and a board member resigned this month (November) after being implicated in a report by the Public Protector over questionable coal deals between the utility and the wealthy Gupta family, who are close to Zuma. The constitutionally-mandated, anti-graft watchdog this month (November) called for an investigation into Zuma for alleged, widespread graft and influence peddling as part of the Gupta probe.

Source: <http://www.dw.com/>, 26 November 2016.

NUCLEAR WASTE MANAGEMENT

GENERAL

'Diamond-Age' of Power Generation as Nuclear Batteries Developed

New technology has been developed that uses nuclear waste to generate electricity in a nuclear-powered battery. A team of physicists and chemists from the University of Bristol have grown a man-made diamond that, when placed in a radioactive field, is able to generate a small electrical current. New technology has been developed that uses nuclear waste to generate electricity in a nuclear-powered battery. A team of physicists and chemists from the University of Bristol have grown a man-made diamond that, when placed in a radioactive field, is able to generate a small electrical current. The development could solve some of the problems of nuclear waste, clean electricity generation and battery life.

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This innovative method for radioactive energy was presented at the Cabot Institute's sold-out annual lecture – 'Ideas to change the world' – on 25 November. Unlike the majority of electricity-generation technologies, which use energy to move a magnet through a coil of wire to generate a current, the man-made diamond is able to produce a charge simply by being placed in close proximity to a radioactive source.... The UK currently holds almost 95,000 tonnes of graphite blocks and by extracting carbon-14 from them, their radioactivity decreases, reducing the cost and challenge of safely storing this nuclear waste.

Dr Fox from the School of Chemistry explained: "Carbon-14 was chosen as a source material because it emits a short-range radiation, which is quickly absorbed by any solid material. This would make it dangerous to ingest or touch with your naked skin, but safely held within diamond, no short-range radiation can escape. In fact, diamond is the hardest substance known to man, there is literally nothing we could use that could offer more protection." Despite their low-power, relative to current battery technologies, the life-time of these diamond batteries could revolutionise the powering of devices over long timescales. Using carbon-14 the battery would take 5,730 years to reach 50 per cent power, which is about as long as human civilization has existed.

Professor Scott added: "We envision these batteries to be used in situations where it is not feasible to charge or replace conventional batteries. Obvious applications would be in low-power electrical devices where long life of the energy source is needed, such as pacemakers, satellites, high-altitude drones or even spacecraft."

Source: <http://phys.org/>, 27 November 2016.

UK

Breakthrough Offers Greater Understanding of Safe Radioactive Waste Disposal

A group of scientists from The University of Manchester, the National Nuclear Laboratory (NNL) and the UK's synchrotron science facility, Diamond Light Source, has completed research into radioactively contaminated material to gain further understanding around the issue, crucial for the safe and more efficient completion of future decommissioning projects.

Safely decommissioning the legacy of radioactively contaminated facilities from nuclear energy and weapons production is one of the greatest challenges of the 21st Century. Current estimates suggest clean-up of the UK's nuclear legacy will cost around £117bn and take decades to complete. The team identified a concrete core taken from the structure of a nuclear fuel cooling pond contaminated with radioactive isotopes of caesium and strontium, located at the former Hunterston A, Magnox nuclear power station in Ayrshire. The core, which was coated

and painted, was taken to the Diamond synchrotron for further analysis.

Strontium is a high yield nuclear fission product in nuclear reactors and tests showed that it was bonded to the titanium oxide found in the white pigment of the paint on the concrete core's coating. By identifying the specific location of the radioactive isotopes, the research makes future investigation easier and could potentially lead to more efficient decontamination, saving millions of pounds by reducing the volume of our radioactive waste. The work also found that the painted and rubberised under layers were intact and the paint had acted as a sealant for

A group of scientists from The University of Manchester, the National Nuclear Laboratory (NNL) and the UK's synchrotron science facility, Diamond Light Source, has completed research into radioactively contaminated material to gain further understanding around the issue, crucial for the safe and more efficient completion of future decommissioning projects.

60 years. However, experiments were conducted to examine what would happen if the contaminated pond water had breached the coating. It showed that the strontium would be bound strongly to the materials in the cement but the caesium was absorbed by clays and iron oxides forming part of the rock fragments in the concrete. ...

Source: www.sciencedaily.com, 18 November 2016.



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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