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## OPINION – Manpreet Sethi

### Nuclear India at 19: Keep Focus Right on Deterrence

India completes 19 years as a nuclear armed state this month. This period is no more than an eye blink in the life of a nation, but India has made significant progress towards operationalisation of its deterrence capability (it was on May 11 and 13, 1998 that India conducted nuclear tests at the Pokhran range in Rajasthan. India has since declared a moratorium on testing).

It has worked according to a plan in the form of a nuclear doctrine that it gave to itself in August 1999, and which was formalised, with largely the same attributes as mentioned in the draft, by the government of the day in January 2003.

The doctrine defined a narrow role for India's nuclear weapons — only for deterrence against nuclear weapons of the adversary. It also provided pointers on the kind of capability that the country would build to fulfil its mandate of credible minimum deterrence in such a way as to promise unacceptable damage as retaliation in case of nuclear use against the country or its people.

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But it seeks to deter the adversary from making this move by holding up for him the prospect of massive retaliation which would negate any benefit of his action. This is a purely deterrence doctrine, and that really is the only purpose of nuclear weapons. Establishing deterrence, however, demands two kinds of requirements.

The first set, which is more tangible, may be referred to as the nuclear hardware that consists of nuclear warheads and delivery systems to impose punishment. According to widely known guesstimates, India now has about 110 nuclear warheads and it has deployed small and medium range ballistic missiles.

Agni V, which is the long range missile of 5,000 km, is still undergoing testing and a few years from operational induction. INS Arihant, the first indigenous nuclear powered submarine, has reportedly become operational with 750 km range of SLBM.

Testing for longer range SLBMs continues. Longer range land-based and sea-launched missiles are critical for furthering the credibility of deterrence. And this remains a work in progress.

Beyond these capabilities, India should prudently choose what more it needs in terms of nuclear hardware to buttress the kind of deterrent role that it has accorded to its nuclear weapons. The wish list of the military and the scientific establishment may be a long one, especially as one cannot ignore the ongoing modernisation across other nuclear weapon states.

But the choice of new capability inductions need not mirror these developments. As nuclear decision makers consider new requirements, they must keep the principles of nuclear doctrine as their guide to assess whether the capability would add to deterrence or encourage the idea of nuclear war-fighting, which is not the purpose of our nuclear weapons.

In fact, common sense and logic well establish the futility of nuclear weapons use for any political objectives. Yes, nuclear brinkmanship makes for a good strategy, as we have seen in the case of Pakistan. But even that country realises that any real use of the weapon would result in retaliation of the kind that would severely damage the society and polity as a functioning entity. This is where the second prerequisite of deterrence assumes significance.

The second set of requirements necessary to indicate credibility of deterrence is the indication of resolve to use the capability that has been built up. This is the more intangible part of deterrence and the one that is constantly under question at home and beyond.

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Since exhibiting resolve by indulging in nuclear use would be a foolish way of showcasing it, its demonstration and assessment has always been a subjective issue. It may be recalled that during several of the tense episodes of the Cold War period, the US and USSR

were constantly gauging the resolve of the other.

**Nuclear Forces:** In fact, the handling of each crisis rested on each side convincing the other that it was willing to use nuclear weapons to defend its position. Even more important than the balance of nuclear forces was the balance of firmness of purpose and it was never clear who demonstrated greater resolve. However, two empirical dimensions can be identified to demystify this a bit.

One of this is the nuclear command and control structure and its political and military dimensions.

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The knowledge of its existence with a clear mandate and primary, secondary and tertiary chains of command, as well as occasional references to its implementation of necessary tasks or even sporadic glimpses of the

prime minister with the nuclear suitcase, should suffice.

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India has spent the last two decades with its focus on nuclear capability build-up. This was necessary and it now has the basic building blocks in place even as some more are on the anvil. It is now crucial that the second dimension of deterrence credibility be focussed on.

As it stands, India faces a unique set of nuclear challenges in two adversaries – both with different nuclear doctrines and capabilities. If deterrence to China must showcase capability, deterrence for Pakistan must highlight resolve. Communication of both is the key to nuclear deterrence. As India steps out of its nuclear teens into adulthood, it must keep its focus correct.

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Source: Deccan Herald, 25 May 2017.

#### OPINION – M.R. Srinivasan

### Ending India's Nuclear Dependency

India now has 22 nuclear power units. The first pair, located in Tarapur, Maharashtra, uses enriched uranium and incorporates US nuclear technology. These two reactors have operated safely and reliably for the past 47 years and supply the lowest cost non-hydro power. The second pair, located in Rajasthan, uses natural uranium and is based on Canadian technology. The first unit of this pair has been out of service for some years due to deficiencies in some key equipment; the second unit has been operating satisfactorily. Commencing from 1983 and over a span of two and a half decades, India built 16 nuclear power units using its own technology, materials and equipment. These reactors use natural uranium as fuel. Fourteen of them have a size of 220 MW and two are of 540 MW.

**Nuclear Push in the 2000s:** During the period 2000-2010, India designed a nuclear power unit of 700 MW capacity, using natural uranium. Construction work on two such units in Kakrapar (in Gujarat) and two in Rajasthan was taken up. These four units will go into operation in the next

three years. Work on two similar units has been taken up at a site in Haryana. All equipment and materials for these larger units will come from Indian suppliers. In recent years, two 1000 MW VVER power units have come up in Kudankulam, Tamil Nadu, using Russian technology. They use enriched uranium supplied by Russia. In 2016, work on two more such units was commenced. When all these units go into operation, India will have 30 reactors with a capacity of 13,000 MW. By then some of the earlier units will be reaching their retirement age.

In the period 2005-2008, the Indian nuclear establishment was focussed on concluding the civil nuclear cooperation agreement with the US. India then agreed to build about 10,000 MW of nuclear capacity using US technology. A similar assurance was given to France. Russia and India agreed to install additional units at Kudankulam. The expectation in 2008 was that a rapid increase in Indian nuclear capacity would take place. During 2010-2011, India passed the civil nuclear liability legislation which made a supplier liable for claims under certain circumstances. The US nuclear industry was not prepared to consider any cooperation with India under this condition. In 2016, India came up with the mechanism of an Indian insurance pool that could extend protection to the supplier.

The Fukushima accident of 2011 jolted the nuclear industry globally and the first priority was assessment of safety of nuclear plants in operation all over the world under what was termed as 'Beyond Design Basis' natural events. An unconnected development in the US impacted a nuclear revival there: the availability of shale gas at low prices, in the range of \$2.50 to \$3 per million BTU. In consequence, General Electric de-emphasised the prospects of nuclear energy. Westinghouse designed a 1400 MW enriched uranium reactor (AP1000) complying with the current safety requirements. It managed to get Chinese utilities to build four such units at two

sites and they are in an advanced stage of execution. Westinghouse also secured orders to build four AP1000 reactors in the southern US, at two utilities. Unfortunately, these projects suffered great delays and huge cost overruns. Toshiba of Japan, a major owner of Westinghouse, incurred \$7-8 billion in losses due to the nuclear business in the US and is considering selling its successful chip business to accommodate this loss.

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**Project Delays Aplenty:** Westinghouse representatives discussing their proposal with NPCIL for setting up six AP1000 reactors in Kovvada, Andhra Pradesh, have said that the new ownership would get sorted out, perhaps within a year or so, and they would continue to be seriously interested in the India project. The US government might facilitate a new owner acceptable to it, and the nuclear business may resume in some modified manner. From an Indian perspective, delays in this project are inevitable and the outcome would be uncertain.

India has been in discussions with Areva of France on building six EPR reactors of 1600 MW at Jaitapur, Maharashtra. The first such reactor in Finland has been greatly delayed and may go into operation in 2018. There is a pending arbitration case between Finland and France regarding who is to bear the resulting cost increases. A second EPR is under construction in Flammanville, France and that has also suffered delays due to questions regarding the quality of important forgings. Two EPRs in China were making good progress earlier but they

also have to address the question of quality of some forgings made in France. Quite independently of these problems, Areva suffered heavy losses post-Fukushima when the uranium market bottomed. Japan, a big buyer of uranium, went out of the market as most of their reactors were shut down in 2011. Only a few have been allowed to restart. The French government has restructured the nuclear business and asked the Electricite de France to take over the nuclear power plant business and let only the fuel and associated activities to be with Areva.

**Make in India:** Anticipating some of these difficulties, the nuclear community in India has been looking at other options to expand the nuclear capacity. The fleet of PHWR, of our own design and construction, have performed well. During the last five years, the cumulative capacity factor has been 78%. The reactors have operated continuously for periods exceeding 300 days quite regularly and one of our reactors was on line for

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765 days, the second-longest run in the world. The cost of power has been less than from coal in the same region. Given the context, the Union Cabinet's nod on 17 May, 2017 for 10 700 MW PHWRs is timely. Indian industry is well placed to supply all the components and materials required for these reactors. Russia is willing to supply two more 1000 MW VVER units for

Kudankulam and continue the cooperation to build six 1200 MW VVERs at a second site, to be identified by India.

Our reactor designers at BARC and NPCIL have completed the design of a 900 MW reactor using

enriched uranium as fuel, designated as the IPWR. Our industry is keen to mobilise and build up the capacity to make components for this design. Enriched uranium fuel can be sourced from international suppliers, as such reactors can be placed under International Atomic Energy Agency safeguards. By about 2025 or so, India may itself supply enriched uranium from its own enrichment facilities. The government's push for 10 IPWRs will secure India a position of nuclear power plant supplier not only for application in India, but also as a potential exporter. While our earlier plans on expanding nuclear power have not materialised, the alternative plan suggested now, which envisages building 28 units with a total capacity of about 25,000 MW in 15 years from now, can still ensure that nuclear power remains an important part of our strategy to minimise carbon emissions in the long run.

Source: <http://www.thehindu.com>, 19 May 2017.

**OPINION – Manpreet Sethi**

**India's N-Doctrine: Still Credible, Still Minimum**

On the 19th anniversary of India's nuclear tests, the Joint Doctrine of the Indian Armed Forces is being critiqued for many issues but over-analysing its nuclear section is unnecessary.

India was only 18 months old as a state with nuclear weapons when it first put out a draft nuclear doctrine into the public domain. This document clearly established guiding principles for what its nuclear capability meant for India. The country defined a narrow role of nuclear deterrence for itself. It eschewed the idea of nuclear war fighting. It mandated a credible minimum deterrence capability that would ensure unacceptable damage to the adversary. The doctrine also laid down the peacetime deployment

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posture of the arsenal, besides identifying circumstances for the use of the weapon. In 2003, these major attributes of the draft doctrine were granted official endorsement when the government of the day issued a Press note on the Operationalisation of India's nuclear doctrine. Since 2003, the government has not brought out another document to either revise or further explain the nuclear doctrine in any way.

However, it has become fashionable to parse every single nuclear word spoken or written by a serving/retired government official, or in a government document. Umpteen nuclear experts immediately take out their microscopes to read hidden meanings behind words. Profound signals are read in between the lines. In this process of hair splitting, however, the big picture is lost. A new storm brews in the nuclear teacup in the context of the nuclear issues mentioned in the just-released "Joint Doctrine of the Indian Armed Forces (JD-2017)". Chapter four of the doctrine that deals with higher defence organisation has a section on Nuclear Command Authority. Some analysts have been quick to point out that the Joint Doctrine uses the terminology "credible deterrence" instead of

**The change being hinted at in the Joint Doctrine 2017, however, is a misreading of the sentence. Para 20 of Chapter four actually reads, "The defining issues for Nuclear C2 (command and control) is to maintain a credible deterrence; no first use; civilian authorisation; and dispersed arsenal structure to ensure option to retaliate is available.**

"credible minimum deterrence" as has been originally used in India's nuclear doctrine. The change being hinted at in the Joint Doctrine 2017, however, is a misreading of the sentence. Para 20 of Chapter four actually reads, "The defining issues for Nuclear C2 (command and

control) is to maintain a credible deterrence; no first use; civilian authorisation; and dispersed arsenal structure to ensure option to retaliate is available".

As is evident, the sentence is defining the characteristics of nuclear command and control, not of the doctrine. Obviously, the nuclear

command and control should maintain credible deterrence, not credible minimum deterrence. The latter applies to the nuclear arsenal or the numbers of warheads and delivery systems that India intends to build. The Indian nuclear doctrine defines arsenal requirements as minimum, as distinct from the maximalist nuclear build up that the Superpowers indulged in during the Cold War period. India believes that it needs just enough a nuclear force to ensure unacceptable damage to the adversary. Credibility as it applies to the nuclear force structure is quite different from the credibility as applicable to the nuclear command and control structure. The first can be credible minimum; but the second must be nothing less than credible.

In this context then, the words as used in the JD-2017 are appropriate. The document, in fact, makes no mention of the kind of arsenal or the force posture that India will have. It only refers to the nuclear issue in the context of the command and control structure as it fits into the higher defence organisation. It is true that governments use doctrines to signal. The JD 2017 does so too on some issues. Most pertinent amongst these is the recognition of surgical strikes as a means of dealing with terror provocations, the mention of expeditionary and overseas operations, or the call for increased interoperability with other countries. But on the nuclear issue, the doctrine signals nothing except describing the nuclear C2 structure, the contours of which have been known in the public domain since 2003. It draws attention to the fact that an "effective and survivable C2 with requisite flexibility and responsiveness is in place" and that it ensures "an effective interface between civilian and military leaders." It also reassures that "alternative chains of command for retaliatory strike exist for all eventualities." The JD-2017 also mentions that the SFC is the operational arm of nuclear command and control, and is the controller of all nuclear warheads and delivery systems.

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None of this information is new. And there really is no signal to be read here except to be reassured by the knowledge that India has a robust command and control system to manage its nuclear forces and to uphold deterrence against any nuclear misadventure. India's declared nuclear doctrine has enunciated sound guiding principles for deterrence. The country should have no reason to abandon "minimum", since credible nuclear deterrence is not dependent on large numbers of warheads and delivery systems. Software requirements such as indication of resolve of the leadership to take hard decisions are as critical. Nuclear C2 is the bridge that brings the two together. The knowledge of its robust existence makes for credible deterrence even more than the knowledge of large stockpiles. JD- 17 has only highlighted the existence of this important dimension.

Source: <http://epaper.tribuneindia.com>, 16 May 2017.

#### OPINION – James Conca

### The GeoPolitics of the Global Nuclear Landscape

The USA was the dominant force in the global civilian nuclear trade for decades, enjoying both the rewards and responsibilities that come along with that position. As pioneers in nuclear energy, the USA was able to develop world-class products and establish a successful export regime in the 1970's and 1980's. It is still making profits off of some of those earlier deals. Presently, America has a multi-billion dollar nuclear energy industry that employs a domestic workforce of more than 100,000 people. At the same time, it has used its commercial leadership to establish global security standards and long been the largest contributor to the IAEA, the United Nations nuclear non-proliferation watchdog. The USA government also helps other nations with regulatory, safety, security, and innovation needs - even when there

is no commercial benefit. it consistently put the safety and security interests of the global community first. This is what it means to be a responsible world leader.

In recent decades, however, the US has lost its edge as a global exporter. Its products have a harder time competing with all-inclusive deals offered by Russia's state-supported industry and now face additional challenges from lower-cost Chinese clones. The US needs a new policy strategy. Russia offers all-inclusive packages for new nuclear plants—covering the cost of constructing the reactor, training employees, operating the facility and even taking back used fuel. It's hard to compete with that without direct support from one's government. Russian and China have another advantage in the competition for market share—they choose not to adhere to the same standards as the USA and other top producers. Neither Russia nor China are members of the Organization for Economic Co-Operation and Development (OECD), which sets guidelines that discourage larger, richer countries from taking unfair advantage of emerging nations in trade and business dealings.

This puts the USA at a structural disadvantage in the global marketplace. Furthermore, Russian explicitly views the export of all energy resources and technologies as geostrategic tools. A good way to understand Russia's civilian nuclear strategy is to look at the history of their oil and natural gas exports to Ukraine and the European Union via the Trans-Siberian and subsequent pipelines. Once these pipelines were established as a major source of energy for the region in the 1980's, Russia's influence grew exponentially. It has regularly used this influence to achieve diplomatic and economic goals, threatening to disrupt energy supplies and prices across much of Europe and Eurasia. Russia's 2014 annexation of Crimea from Ukraine was mostly driven by its

desire to maintain this control and regional influence. Right now, it is locking-in relationships with other countries of regional importance, including Turkey and Vietnam, cutting into USA diplomatic efforts.

China is in an even more competitive position than Russia, because it has the cash on hand to make equity investments in large nuclear projects anywhere in the world. China is the new investor in the United Kingdom's Hinkley Point nuclear project and may become a leading partner in the UK's Essex nuclear project. It has even designed a reactor specifically for export, their CAP1400 reactor, based on the design of Westinghouse's popular AP1000, paralleling the way China quickly overtook the global manufacture of solar panels a decade ago. Leveraging USA intellectual property from companies seeking access to Chinese markets, undercutting competitors with low manufacturing costs, and later pushing US producers out of the market, is the way China comes to dominate any market.

Make no mistake China's emergence on the nuclear scene will be swift and

dominating. The US must decide to make civilian nuclear trade a national priority, and provide clear leadership across the many programs, offices, and agencies that will need to cooperate if we are to succeed. It is essential that we adhere to our safety principles, but we must also be nimble and efficient in order to thrive in an increasingly competitive market. Several steps we can do to address this problem include:

- accelerate nuclear research, development and demonstration, and help to deploy small modular reactors
- designate a senior level coordinating position within the White House
- fix its Export-Import Bank that finances the export of American goods and services and makes it more competitive in the global market, like every other

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- give US vendors a variety of financing options to meet the various needs of global purchasers
- allow Congress and the Administration to consider creative ways to use existing programs, like including nuclear financing in global development efforts at US AID and OPIC, and extending Department of Energy loan programs to international customers
- define nuclear as a clean energy source and ensure its eligibility for as many funding mechanisms as possible to help more countries meet their climate goals, while giving US nuclear vendors a fair opportunity to compete
- look to our fellow OECD member nations for partnership and collaboration since France, the UK, Korea, Japan, and Canada are all nuclear exporters who share our safety, security and democratic values
- encourage Russia and China to comply with OECD rules

From cell phones to solar panels, US industries have pioneered countless high-value technologies that were ultimately replicated by foreign manufacturers who could undercut the cost and overtake the market with their government's support. The good news is, the US is well positioned to deliver these new nuclear technologies and is further along than China and Russia in developing most of them, though both countries can overtake it pretty quickly if it fail to act. Since becoming the undisputed greatest, richest and most powerful nation on Earth in the 1980's, the US seems to have become complacent, almost willfully ignorant, of what it takes to remain the greatest nation on Earth. We need to be smart again. And no other area requires smart like nuclear.

Source: <https://www.forbes.com>, 20 May 2017.

OPINION – Fred Pearce

**Industry Meltdown: Is the Era of Nuclear Power Coming to an End?**

From Europe to Japan to the USA, nuclear power is in retreat, as plants are being shuttered, governments move toward renewables, and key companies face financial troubles. Even some of the industry's biggest boosters believe nuclear is on the way out.

Is the nuclear power industry in its death throes? Even some nuclear enthusiasts believe so. With the exception of China, most nations are moving away from nuclear — existing power plants across the USA are being shut early; new reactor designs are

falling foul of regulators, and public support remains in free fall. Now come the bankruptcies. In an astonishing hammer blow to a global industry in late March, Pittsburgh-based Westinghouse — the original developer of the workhorse of the global nuclear

industry, the PWR, and for many decades the world's largest provider of nuclear technology — filed for bankruptcy after hitting big problems with its latest reactor design, the AP1000.

Largely as a result, its parent company, the Japanese nuclear engineering giant Toshiba, is also in dire financial straits and admits there is "substantial doubt" about its ability to continue as a going concern. Meanwhile, France's state-owned Électricité de France (EDF), Europe's biggest builder and operator of nuclear power plants, is deep in debt thanks to its own technical missteps and could become a victim of the economic and energy policies of incoming President Emmanuel Macron. These three companies account for more than half of all nuclear power generation worldwide. Their "looming insolvency ... has set off a chain reaction of events that threatens the existence of nuclear power in the West," says Michael Shellenberger, president of the pro-nuclear NGO, Environmental Progress.

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"The nuclear industry as we have known it is coming to an end," says Ted Nordhaus of the Breakthrough Institute, a California eco-modernist think tank that advocates for nuclear power.

**Can this be True?:** The US remains the world's largest producer of nuclear power, with about 100 commercial reactors in operation. New construction virtually shut down after the near-meltdown at Three Mile Island in Pennsylvania in 1979. Recently, a stuttering renaissance has been under way. Westinghouse has been building four new reactors at Waynesboro, Georgia, and Jenkinsville, South Carolina. But those reactors have hit regulatory holdups and technical problems that have pushed cost overruns to an estimated \$13 billion. And with Westinghouse in financial meltdown, it is now far from clear that they ever will be finished. This is no short-term trend. While gas and renewables get cheaper, the price of nuclear power only rises. Meanwhile across the country, utilities are shutting existing plants from California to Wisconsin to Vermont, often long before the end of their design life, because they cannot compete with cheap fracked gas or, increasingly, with wind and solar power. Fourteen power reactors have shut since 2012.

This is no short-term trend. While gas and renewables get cheaper, the price of nuclear power only rises. This is in large part to meet safety concerns linked to past reactor disasters like Chernobyl and Fukushima and to post-9/11 security worries, and also a result of utilities factoring in the costs of decommissioning their aging reactors. Westinghouse's downfall was partly caused by the US Nuclear Regulatory Commission wanting, as Gregory Jaczko, its chairman from 2009 to 2012, put it, "to ensure [the AP1000 design] could withstand damage from an aircraft impact without significant release of radioactive materials." A 9/11 clause, in other words. The fallout from the meltdowns at Japan's Fukushima plant following the 2011 tsunami has had an even more chilling effect than regulatory actions. The plant's operator, TEPCO, has no way of paying the cleanup bill, now put at \$180 billion. Only the financial support of the Japanese government props TEPCO up.

After the accident, Japan — which at the time relied on nuclear power for 30 percent of its electricity — shut all its 48 operational nuclear reactors for safety checks. Six years on, only five are back online. In many parts of the country, local politicians are refusing point-blank to allow resumption. An industry summit last month concluded that only a full-on drive to regain public trust would enable the plants to reopen. That may be never. Fukushima also proved to be the tipping point in Germany's long-running and bitter nuclear debate. The accident persuaded the conservative and previously pro-nuclear Chancellor Angela Merkel to call time. Within weeks of the accident, she set a deadline of 2022 for shutting down the country's reactors, which at the time generated 22 percent of German electricity. The finality of Germany's decision was confirmed when engineering giants such as Siemens announced their exit from the reactor-building business.

France has long been Europe's most enthusiastic nuclear nation. But it too is getting cold feet. In the wake of Fukushima, President Francois Hollande committed to cutting nuclear's share of energy generation from 75 percent to 50 percent by 2025, with the gap to be filled by renewables. Before his election victory in May, 2017, the Macron pledged to stick with the plan. Presidential politics is only giving a Gallic nudge to what is happening anyway. The majority of France's power reactors — mostly of Westinghouse PWR design, and built by EDF — were commissioned in the 1970s. Their average age is now well past 30 years. Their 40-year design lives could be extended if a safety review due next year finds in their favor. But large-scale construction to replace them seems increasingly unlikely. EDF's latest power-plant design — a safer variant of the old PWRs, known as an EPR — has been beset by teething troubles. The prototype, being built at Flamanville in northern France, is six years behind schedule, and its cost has tripled to more than \$10 billion. Macron's reformist economic policies are unlikely to favor continued massive subsidies to the French nuclear industry. From now on, nuclear must pay its way or die in France.

Attention is turning, as in Germany, to the cost of decommissioning the flood of power plants likely to come off-line by 2025. In February, a French parliamentary report dismissed an EDF claim that this could be done for \$370 million per reactor, noting that this was about a third of the estimates made by operators of similar plants in the USA and Germany. The last surviving enthusiast for nuclear power in the West is Britain. The government there is intent on ending all burning of coal for power generation by 2025 and believes that to do that requires replacing its aging, domestically designed, gas-cooled reactors, most of which are now shut. Ministers want to construct up to ten new nuclear plants. But the winds buffeting the global industry are making it hard to find anyone to build them. There are no homegrown builders anymore, and a generation of nuclear scientists and engineers has retired. So Britain has been seeking out foreign builders. The first is EDF, which already operates some existing British nuclear reactors. Early in 2017, the company broke ground at Hinkley Point in southwest England, where it will build two of its troubled EPRs. It plans two more at Sizewell on the east coast. But to entice the French company across the English Channel, the British controversially offered a very high price guarantee for buying Hinkley power. And the holdups at Flamanville suggest that on-time delivery of a finished plant is far from certain.

The last surviving enthusiast for nuclear power in the West is Britain, where the government is intent on ending all burning of coal. Meanwhile, British plans to pay Toshiba to build a giant complex of three Westinghouse AP1000 reactors at Moorside in the northwest of England look doomed because of the financial implosion of the company. The government recently asked South Korea's nuclear giant KEPCO to take over the project, perhaps using its own design, the APR 1400.

**An Asian takeover might be a good thing for the West. A beaten and bankrupt industry built on high-cost, bespoke construction could be ripe for annexation by companies that have learned to mass-produce reactors based on old Westinghouse PWR designs and that have replaced nuclear scientists with engineers and experimentation with replication. "What makes nuclear plants safer and cheaper to build and operate is experience, not new designs."**

Also keen to break into one of the few markets for new nuclear power plants is China General Nuclear, a state-owned enterprise. It already has a one-third financial stake in EDF's Hinkley plant and wants to use that to help secure good terms to build its own Hualong One reactor design, starting at Bradwell, east of London. It believes that British regulatory approval for its reactor design could open up world markets. Late in 2016, the IAEA, a UN body, said Asia had become the "driver" of global nuclear development. And it may be a sign of the times that Britain, which 61 years ago opened the world's first civil nuclear power plant, could soon either have no nuclear power or be largely reliant on Korean and Chinese manufacturers. South Korea has 25 working reactors delivering power. China is constructing new reactors at the rate of eight a year. And both countries are increasingly eyeing the export opportunities created by the collapse of the old order in the US, France and Japan.

Shellenberger suggests that an Asian takeover might be a good thing for

the West. A beaten and bankrupt industry built on high-cost, bespoke construction could be ripe for annexation by companies that have learned to mass-produce reactors based on old Westinghouse PWR designs and that have replaced nuclear scientists with engineers and experimentation with replication. "What makes nuclear plants safer and cheaper to build and operate is experience, not new designs," He says.

But the invasion still may not come. Even in South Korea, nuclear companies are operating in the face of a political headwind, blowing from across the Sea of Japan. Wary of public concerns after Fukushima, South Korea's newly elected president Moon Jae-in called during campaigning for a switch in the country's energy mix from nuclear to renewables. Where does this leave greenhouse gas emissions? Can countries both abandon

nuclear power and slash their emissions? In the short term, the answer looks like no. Japan's emissions have risen to record levels since the post-Fukushima shutdowns, and the government has abandoned targets to cut them by 2020. In Germany, much of the slack from nuclear closures has been taken up by burning more brown coal, leaving the country that likes to boast about its solar and wind power with among the highest CO2 emissions in Europe.

France's emissions are lower, thanks to its current reliance on nuclear power. But the French Academy of Sciences in April, 2017 warned that reducing nuclear's share of the energy mix was incompatible with further reductions in CO2 emissions. Nuclear looks ever more like a 20th-century dinosaur, unloved by investors, the public, and policymakers alike. Most environmentalists are nonetheless ardent opponents of the nuclear industry. For many the prime concern is its poor safety record. Others recoil at the inescapable technological link to nuclear weapons production and at nuclear's many unresolved problems with waste disposal and decommissioning; they also see nuclear as a rival for investment in renewables, their preferred choice for a low-carbon future. They would happily consign nuclear power to the dustbin of history.

Not all take this line, however. Those who brand themselves eco-modernists, including Shellenberger, declare nuclear power's unique virtues. Done right, they say, it can deliver low-carbon energy on a large scale from power plants that — unlike wind and solar power — do not require large amounts of land. It is, moreover, an established worldwide industry, and already generates around a tenth of global electricity. They argue that its costs, particularly for waste disposal, have been artificially raised by unreasonable safety demands made by

radiation-phobic environmentalists. Some mainstream environment groups more cautiously take a similar line. The Environmental Defense Fund's John Finnigan made the case for "why we still need America's nuclear power plants — at least for now." He argued that nuclear power should remain a vital low-carbon energy source in the USA, especially when the early shutdown of a nuclear plant would boost the burning of natural gas. He called for retirement dates for nuclear plants to be postponed until they were "more likely to be replaced by renewables."

But in the longer run, nuclear's virtues in a low-carbon world are less clear. Some have argued that

**Now should be the moment when nuclear power fulfills the extravagant promises made for it half a century ago. In an age when there is no higher priority than delivering low-carbon energy, the biggest source of that energy in the rich, developed world should be ready to thrive. Yet the industry is in crisis.**

nuclear power would be a good and reliable backup to intermittent renewables like wind and solar power. But they could not be more wrong, says Jochen Flasbarth, state secretary at the German federal environment ministry. Germany, he says, intends its primary source of electricity for the future

to be wind and solar. Yet even if energy storage technologies dramatically improve, Flasbarth acknowledges that the country will need a backup source of power for when the sun is not shining and the winds drop. That backup will need to be able to switch on and off at short notice. But nuclear, whose forte is delivering baseload power 24/7, could never do that, he says.

On the face of it, now should be the moment when nuclear power fulfills the extravagant promises made for it half a century ago. In an age when there is no higher priority than delivering low-carbon energy, the biggest source of that energy in the rich, developed world should be ready to thrive. Yet the industry is in crisis. It looks ever more like a 20<sup>th</sup> century industrial dinosaur, unloved by investors, the public, and policymakers alike. The crisis could prove terminal.

*Source: <http://e360.yale.edu>, 15 May 2017.*

OPINION – Arun Mohan Sukumar

**WannaCry: How Did the US's Non-Proliferation Failure become a "Global" Cyber Security Threat?**

Picture this scenario – a nuclear weapon developed by Pakistan for a limited purpose and a preordained destination is captured by a terrorist group. Neither Islamabad nor other powers in the region are able to gauge the intention of this group, or predict where the 'tactical' weapon will be deployed. Leaders of the G7 nations, agitated by the development, issue a strong statement condemning Pakistan for its lax nuclear security and reiterate their call for all countries to sign the NPT. Pakistan is placed under sanctions that curtail, among other things, its ability to trade in dual-use technologies.

Were such a scenario to materialise, it is likely the 'proliferator' in question will be named and shamed. The international community should wonder, then, why the same G7 issued a tepid declaration about the "growing threat of cyber incidents" in the wake of destruction by a weapon created in the US. Into its fifth day, "WannaCry" – a ransomware that takes advantage of a zero-day developed by the US National Security Agency (NSA) and leaked into the wild by a group calling itself the Shadow Brokers – has crippled "mission-critical" systems across the world. It has slowed down or altogether stopped the working of traffic systems in Xi'an (China), fuel filling stations run by the China National Petroleum Corporation, emergency health services of the UK National Health Services, and the state electricity department's operations in West Bengal. Far from being a pandemic with no known origins, WannaCry's effects are directly attributable to the failure of the US government to prevent the proliferation of malicious cyber instruments. Its actions may well be in breach of

**The international community should wonder, then, why the same G7 issued a tepid declaration about the "growing threat of cyber incidents" in the wake of destruction by a weapon created in the US. Into its fifth day, "WannaCry" – a ransomware that takes advantage of a zero-day developed by the US National Security Agency (NSA) and leaked into the wild by a group calling itself the Shadow Brokers – has crippled "mission-critical" systems across the world.**

several international non-proliferation norms and obligations.

Most non-proliferation regimes like the NPT or the Wassenaar Arrangement on Dual-Use Goods and Technologies were crafted at a time where states were the sole custodians of WMDs. As a result, they focused on the wilful transfer of sensitive technologies or lethal ammunitions between governments. In recent times, the risk of non-state actors getting their hands on a nuclear or biological weapon has grown manifold: acknowledging this threat, the UN Security Council in 2004 enacted Resolution 1540 that called on states to take "effective measures to establish domestic controls to prevent the proliferation of nuclear, chemical, or biological weapons." UNSCR

1540 was a candid admission by states that good intentions to prevent the proliferation of WMDs alone were not enough, and had to be supplemented by a binding, positive obligation to prevent their acquisition by non-state actors. In announcing the Proliferation Security Initiative, the Bush administration in 2004 went one step further, putting together a coalition

of countries to interdict vessels suspected of ferrying materials to non-state actors in "areas beyond the territorial seas" of third parties. Subsequently, Wassenaar member states too have voiced their support for expanding the ambit of the arrangement to include non-state actors.

The threat of WMDs falling into the hands of non-state actors has also resulted in a significant expansion of monitoring and oversight powers of organisations like the IAEA. There is, however, no regime or oversight mechanism to check the proliferation of malicious tools in cyberspace, an arena where its threat is most acute. The US could still fall foul of whatever limited regulations that currently exist. In 2015, the UN adopted by consensus the recommendations of a group of

governmental experts on “cyber norms” against threats to international peace and security. By allowing for the leak of a zero day exploit that found its way to the WannaCry program, the US finds itself in violation of the norms to: prevent “the proliferation of malicious ICT tools and techniques and the use of harmful hidden functions”; and share “information on available remedies to ICT vulnerabilities to limit and possibly eliminate potential threats to ICTs and ICT-dependent infrastructure”.

However, current UN cyber norms are far too weak to hold any international actor – let alone the US – responsible for a devastating attack such as the current one. States are only prohibited from “knowingly” conducting or supporting ICT activity “contrary to their obligations under international law” that damages critical infrastructure. Given that the WannaCry attack was not perpetrated by the US and the fact that the NSA is an intelligence agency – espionage is not prohibited by international law – this norm is insufficient to seek accountability from Washington DC. None of this is to claim that the US is the only actor developing malicious ICT tools or “weaponising” cyberspace. The “WannaCry” affair is neither going to stop countries from developing surveillance software nor exploiting zero-day vulnerabilities in major digital platforms.

But the US is singularly responsible for filibustering the recent progress of international norm and law creation on cyberspace. At the G20 finance ministers meeting in March, the US opposed and successfully vetoed a norm to prohibit malicious cyber attacks on financial instruments. There is an appetite among several members of the UN Group of Governmental Experts to explore the formation of an inter-governmental task force that

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can carry forward the group’s recommendations and “elevate” them into something stronger than norms. The Wassenaar Arrangement, which restricts the transfer of “intrusion software” to non-members, is not the appropriate platform to enact export control regulations on this subject given that major digital economies like India, China and the UAE are excluded from the group. The US unfortunately continues to oppose the creation of a binding, legal instrument to check the use of force in cyberspace. Such an instrument will not discourage governments from stockpiling zero days like ETERNALBLUE, which the WannaCry program exploited.

But a clear and predictable legal regime will force the hands of governments to streamline their vulnerabilities acquisition and disclosure process, raise the costs of deploying zero days without political oversight and trigger information sharing and assistance arrangements to mitigate the damage caused by leaks. Strict rules on state responsibility will also dissuade governments from freely deploying non-state agents for disruptive cyber attacks. Without a multilateral legal instrument, emerging economies will continue to underwrite the costs of major cyber attacks like the WannaCry affair, without any legal or political recourse to strengthen their digital ecosystems.

Patience is wearing thin in New Delhi and other capitals as the world suffers one debilitating cyber attack after another, even as the US government continues to exploit the vulnerabilities of its own private sector, depleting consumers’ and markets’ trust in them. India should exert pressure at the bilateral level with the US government to kickstart negotiations on a cyberspace treaty. New Delhi would have no

dearth of strategic levers to bring both the US government and the private sector to the table: it could enforce a trade ban on digital products from the US citing Article XXI of the General Agreement on Tariffs and Trade; the Indian government could refuse to procure US-based software for public services unless legacy systems are “patched” by their companies; and finally, it could signal that the political commitment to ‘multistakeholder’ internet governance is at risk if the US does not address its core security concerns. New Delhi must be bold in placing all these policy options on the table.

Source: <https://thewire.in>, 18 May 2017.

**OPINION – Nishant Rajeev**

**A Holistic Approach to India’s Nuclear Doctrine**

The Indian Armed Forces released a new war-fighting doctrine in April 2017, called “The Joint Doctrine of the Indian Armed Forces 2017.” The doctrine underlines the need for enhanced capabilities in space and cyberspace as well as a special emphasis on conducting special operations along the lines of surgical strikes (like the one conducted in September 2016) to combat cross-border terrorism. However, there was one tenet of the new doctrine that may have been overlooked. It is the paragraph that refers to the defining issues of India’s Nuclear Command Authority. While it reiterated India’s commitment to a no first use policy, it also called for a need to maintain “credible deterrence” as opposed to the “credible minimum deterrence” envisioned by the draft nuclear doctrine. If this statement is truly indicative of a shift in India’s nuclear posture, it may have far greater implications than the strictly military standpoint.

Recently, there has been much speculation about a shift in India’s nuclear doctrine. In March 2017, Vipin Narang, an associate professor at MIT, had, after a close reading of Shivshankar Menon’s book, indicated that India might be inching toward

a counter-force doctrine from its current counter-value-based doctrine. This assessment followed remarks a couple of months earlier by then-Defense Minister Manohar Parrikar, who said, “Why should I bind myself [to no first use]? I should say I am a responsible nuclear power and I will not use it [nuclear weapons] irresponsibly.” The recent omission of the word “minimum” from the nuclear posture, could be a clear indication of such a shift, as this document is the official doctrine of the Indian military.

Minimal deterrence is the status wherein a nation maintains the minimum number of nuclear weapons to inflict unacceptable damage on an adversary even after suffering a nuclear attack. The main logic driving minimal deterrence is not how large of a nuclear attack one’s own country can suffer, but rather how much the adversary is willing to suffer. Hence an arsenal of this size would be maintained to deter nuclear conflict mainly through the threat of retaliation or punishment. While this would certainly cap India’s arsenal size and keep such

**Manohar Parrikar, who said, “Why should I bind myself [to no first use]? I should say I am a responsible nuclear power and I will not use it [nuclear weapons] irresponsibly.”**

an arsenal “minimal,” it is important to note that the arsenal size would also depend on an adversary’s ability to carry out a so-called decapitating first strike. Even under credible minimum deterrence, there is always a need to ensure the survivability of one’s arsenal in order to keep the ability to carry out counter strikes. Hence there have been calls for keeping India’s nuclear arsenal open-ended so as to properly address future scenarios. In light of this argument, one must note recent technological developments such as MIRV technology, Pakistan’s Babur III submarine-launched missile, and growing concern over Pakistan’s expanding nuclear arsenal to achieve full-spectrum deterrence.

All this is likely to pray on the minds of policymakers and may even force them to drop the idea of maintaining a minimum force size. But does this indeed point to shift in India’s nuclear posture, from counter-value targeting to counter-force targeting? A counter-force doctrine would certainly require a greater force structure. Assuming that

most Pakistani nuclear weapons are kept in hardened underground bunkers (and taking into account the inverse square law), accuracy would indeed have to be very high to adopt a credible first strike doctrine. The number of warheads required would depend directly on the accuracy of each individual warhead. ...

While the recent developments in the neighborhood are of genuine concern, India's nuclear posture cannot be seen in isolation – it has a direct bearing on both India's economy and foreign policy. A minimum deterrent posture has the distinct advantage of avoiding large stockpiles of nuclear weapons, which can in turn lead to an arms race, imposing steep costs on a country that is barely able to find enough funds to procure modern weaponry for its conventional forces. By way of comparison, the USA nuclear program cost an estimated \$5.821 trillion from 1940-1996. Of this, only 7 percent was spent on building the bomb while 70 percent was spent on deploying, targeting, controlling, and defending against the bomb. The estimated cost for an Indian nuclear program is anywhere between \$2.5 billion to \$40 billion. To put this in perspective, India's total defense allocation in the Union Budget was around \$53.5 billion for the fiscal year 2017-18.

However, the impact of a nuclear posture change on Indian foreign policy could be even worse. India has long been projecting itself as a responsible nuclear power and India's current doctrine has a major role to play in this. It has helped India secure crucial international deals, such the NSG waiver as part of the Indo-US nuclear deal in 2008. More recently, India signed a nuclear cooperation agreement with Japan, which is quite surprising as Japan is known for its staunch anti-nuclear stance and India is not

a signatory of the NPT. India is currently also seeking to join the NSG as a permanent member; a doctrinal shift is only going to give China more reason to delay India's entry. This posture would also play into the hands of Pakistan, which has long accused India of duplicity over its no first use policy and called India's expanding arsenal a threat to the region's

stability. An assessment must be carried out as to whether India does indeed possess the capability to truly adopt a counter-force doctrine. If tall claims that are made can't be backed up by actions, this would only undermine Indian deterrence rather than enhance it.

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Ever since the Pakistani establishment embraced tactical nuclear weapons, there has been a growing consensus that Islamabad has achieved escalation dominance. Possession of tactical nuclear weapons has given Pakistan the ability and freedom to conduct sub-conventional warfare without fear of escalation. A shift in India's nuclear doctrine may be part of an overall strategy to deal with the threat of sub-

conventional conflict in a nuclear environment. The doctrine does predict that future wars will be ambiguous, uncertain, short, swift, lethal, intense, precise, non-linear, unrestricted, unpredictable, and hybrid. From a military standpoint,

**From a military standpoint, the adoption of a counter-force doctrine may be an attempt to create space for conventional operations by integrated battle groups. This is backed by the decision earlier this year to reduce the War Wastage Reserves to a level of only 10 days of intense fighting.**

the adoption of a counter-force doctrine may be an attempt to create space for conventional operations by integrated battle groups. This is backed by the decision earlier this year to reduce the War Wastage Reserves to a level of only 10 days of intense fighting. Hence while India is seeing the space for large-scale conventional wars receding, the Indian Army may be making a new push for limited conventional operations

in a nuclear environment. But it will be crucial to understand what economic constraints and international fallout such a doctrinal shift will face. Hence the government must undertake a holistic approach to any change in India's nuclear posture, and not solely a military one.

Source: <http://thediplomat.com>, 24 May 2017.

## NUCLEAR STRATEGY

### UK

#### Corbyn Preserves Ambivalent Stance on Nuclear Weapons and NATO

Labour leader Jeremy Corbyn held back from declaring support for Britain's nuclear weapons program and for the NATO as his security credentials came under examination in a BBC television interview, two weeks before the general election. Corbyn was asked repeatedly whether he supported the renewal of Britain's nuclear weapons system, known as Trident, and nine times he avoided giving a yes or no answer. He voted against upgrading Trident when his party took a ballot on the issue, with the majority overruling him.

"We're going ahead with the program which has been agreed by Parliament and voted on by the Labour Party," Corbyn said. "My views on nuclear weapons are well-known. I want to achieve a nuclear-free world through multilateral disarmament through the Nuclear Non-Proliferation Treaty."

Corbyn's views matter because if he wins the June 8 general election, he would have responsibility for deciding whether Britain would use its nuclear weapons. A YouGov poll Friday showed the lead held by rival Conservative Party has slipped to 5 percentage points, the narrowest since Theresa May became prime minister last July, and down from as high as 24 points earlier in the month. But on national security, Corbyn still fares far

worse with the electorate than May. A longtime opponent of nuclear weapons, Corbyn said on becoming Labour leader in 2015 that he'd never deploy them, raising questions about the point in even having a deterrent.

**'Dangerous Frankenstein':** An ICM poll this month showed 44 percent of voters trust May the most to "protect people from threats at home and abroad" compared with just 14 percent for Corbyn, while Friday's YouGov poll showed the prime minister is 22 percentage points ahead of Corbyn on the issue of keeping Britain safe from terrorism.

The BBC broadcaster also asked Corbyn whether he still believed NATO to be a "very dangerous Frankenstein of an organization," dredging up past remarks by the Labour leader. Again Corbyn ducked answering whether he thought the postwar alliance should be wound up. ... His past support for Irish republicanism and the reunification of Ireland also came up. Corbyn said, "I didn't support the IRA. I don't support the IRA," in reference to the Irish Republican Army, a terrorist group.

He denied ever meeting with the IRA, saying he had met with people from Sinn Fein, the political party associated with the IRA. "I always wanted and always do want peace, always want a dialogue between people of vastly different backgrounds," he said.

The Conservatives hit back with a statement from International Development Secretary Priti Patel in which she said Corbyn "backed the IRA, doesn't support NATO" and "wouldn't renew Trident." The Labour leader "didn't answer a single question in that interview," she said. "He spent half an hour trying to escape from everything he had said and done in his 30 years in politics."

Source: Alex Morales, <https://www.bloomberg.com>, 27 May 2017.

**USA**

**Nuclear Weapons Agency Gets 11 % Funding Increase in FY18 Budget Request**

The government agency in charge of upkeep and modernization of America's nuclear warheads is in line for a big funding boost, thanks to US President Donald Trump's fiscal 2018 budget request. The NNSA is marked for \$13.9 billion, an increase of \$1 billion — or 7.8 percent — above the FY17 Omnibus level.

The vast majority of that funding will be going towards NNSA's nuclear weapons programs, which was certainly welcomed by Frank Klotz, the retired US Air Force general who now heads the nuclear agency.

NNSA is engaged in a quintet of major warhead programs, including the W76-1 Life Extension Program, which will extend the life on the US Navy's Trident II D5 submarine-launched ballistic missile; the B61-12 Life Extension Program, which seeks to combine a number of B61 bomb variants into a more modernized nuclear gravity bomb; the W80-4 Life Extension Program, whose goal is to provide a warhead for a future long-range standoff missile that will replace the US Air Force's current air-launched cruise missile; the IW-1 Life Extension Program, which is meant to create an interoperable warhead for various systems; and the W88 Alteration 370, which will replace the arming, fuzing and firing subsystem for the W88 warhead for the Trident II.

A recent report by the Government Accountability Office warned that NNSA has understated how much money it will need to complete those warhead modernization programs, in some cases by billions of dollars. Klotz did not address that report directly, but noted that as the weapon programs move forward from early research into higher-level stages of development, they will naturally require more funding.

The budget growth is "a recognition of where we are in several of our major weapons programs," as well as the need to revitalize NNSA's

infrastructure, Klotz said. The retired general has spent much of the last year campaigning for congressional aid to deal with what he says is \$3.7 billion in deferred maintenance costs.

... While the weapons programs are getting a boost, nonproliferation programs are not so lucky, which raised concerns within the nonproliferation community. ...One interesting program in the budget highlighted by Klotz is the fact NNSA is kicking in \$183 million to a partnership led by Office of Science's Advanced Scientific Computing Research to develop exscale computing power that will allow higher-level research capabilities.

**Pentagon Nuclear Programs:** More broadly, nuclear weapons programs from the Pentagon remained on track in the FY18 request. That includes continued funding for the start of the Long Range Stand-Off weapon (LRSO), the new nuclear cruise missile in the early stages of design. Congressional Democrats and members of the

nonproliferation community have taken aim at the weapon as destabilizing, but there does not seem to be much interest from the Trump administration to rethink its requirement.

Also of note, Pentagon budget documents show that the F-35A is scheduled

to become certified to carry nuclear weapons in fiscal year 2025. While the goal of carrying the B61-12 nuclear gravity bomb has long been planned, this is the firmest date for when that capability will be online.

Meanwhile, the B-21 Raider, the Air Force's new bomber, increases its publicly acknowledged funding from \$1.3 billion to \$2 billion, although the program remains largely shrouded in secrecy. Budget documents continue to show an operational date of "mid-2020s" for the stealth plane, which will be used for both nuclear and conventional missions.

A recent estimate from the Congressional Budget Office put the cost of modernizing the nuclear enterprise over the next decade at \$400 billion, with other estimates putting the overall nuclear modernization at over \$1 trillion when all is said and done.

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One quirk in how NNSA's budget worked in recent years involved a Program Support account inside DoD, which would hold onto out-year funding that OMB would then reallocate to NNSA in one-year increments. However, starting this year, that fund disappears. Instead, NNSA will house all that funding internally in what Klotz called a "return to regular order." That money was always part of NNSA's budgeting plan and so will not impact the agency's budget.

Source: Article by Aaron Mehta, <http://www.defensenews.com>, 24 May 2017.

## **BALLISTIC MISSILE DEFENCE**

### **IRAN**

#### **Iran Denounces New US Sanctions on Ballistic Missile Programme**

The Iranian Foreign Ministry on 18 May 2017 denounced the new series of sanctions imposed by the USA on its ballistic missile programme, calling them illegal and unacceptable. The ministry in a statement said Iran's right to strengthen its military capabilities is not a violation of the country's nuclear agreement with world powers. Iran conducts military exercise in response to Trump's comments on enemies. On 17 May 2017, the USA Treasury Department placed sanctions on Iran over concerns about its ballistic missile programme.

The new sanctions designate seven entities, including two top Iranian defence officials and a China-based network supplying material to Iran's missile programme. One of the Iranian defence officials was involved in explosives sales to Syria. Iran contends the sanctions are a breach of a deal it reached in July 2015 with the five permanent members of the UN Security Council plus Germany, which permits Iran to use nuclear power for civilian purposes in return for dropping sanctions. Iran is prohibited from undertaking any activity related to ballistic missiles designed to be capable of delivering a nuclear weapon, under

UN Security Council Resolution 2231. The USA State Department said on 17 May 2017 that Trump's administration is re-evaluating its relationship with Iran, including whether to remain in the nuclear deal, but is meanwhile taking action against Iran over human rights abuses, its missile programme and other areas of concern.

Source: <http://www.vanguardngr.com>, 18 May 2017.

### **NORTH KOREA**

#### **North Korea Launches Ballistic Missile Despite South Korea's Offer of Talks**

North Korea fired a ballistic missile on 11 May, 2017 in an apparent test of the South's new President who backs engagement with Pyongyang. The missile flew about 700 km (435 miles) before landing in the Sea of Japan, South Korea's Joint Chiefs of Staff said. The US Pacific Command said it did not appear to be an intercontinental ballistic missile.

New South Korean president Moon Jae-In, who was inaugurated on 10 May, 2017, slammed the test as a "reckless provocation" after holding an emergency meeting with national security advisors. He said the government strongly condemned this "grave challenge to the peace and security of the Korean peninsula and the international community,"... Moon, unlike his conservative predecessors, advocates reconciliation with Pyongyang but warned...that dialogue would be possible "only if the North changes its behaviour". Moon had said in his inauguration speech that he was willing to visit Pyongyang "in the right circumstances" to defuse tensions on the Korean peninsula, with Pyongyang and Washington exchanging hostile rhetoric.

US President Trump has threatened military action against the North but recently appears to have softened his stance, saying he would be "honoured" to meet the North's leader Kim Jong-

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Un under the right conditions. A senior Pyongyang diplomat said...the North would be willing to hold talks with the US if the conditions are right.

Washington has been looking to China for help in reining in Kim and the missile test is likely to embarrass Beijing, which is hosting a summit ... to promote its ambitious global trade infrastructure project. It was also North Korea's first launch since a controversial US missile defence system deployed in South Korea became operational on May 2 and follows a failed April 29 ballistic missile test. Japanese PM Shinzo Abe slammed the latest missile launch as "totally unacceptable" and a "grave threat" to Tokyo. "We strongly protest against North Korea," he said.

The missile was launched from a site near the northwestern city of Kusong, according to the South's Joint Chiefs of Staff. North Korea test-fired a missile from the same city, in February, with the missile flying more than 500 kilometres. The North has staged two atomic tests and

dozens of missile launches since the start of 2016 in its quest to develop a missile capable of delivering a nuclear warhead to the US mainland. Most experts have doubted that the North has developed an ICBM with that range. But many say the isolated nation has made a great progress in its nuclear and missile capabilities since Kim took power after the death of his father and long time ruler, Kim Jong-Il, in 2011.

Source: <http://www.deccanchronicle.com>, 14 May 2017.

## **US-JAPAN**

### **US, Japanese Firms Collaborating on New Missile Defence Radars**

The intent is to extend the range of Japan's detection and targeting radars multiple times beyond range of models currently deployed at sea, the five government and industry sources

said.

Raytheon Co and Lockheed Martin Corp are working with Japanese partners on rival projects to develop new radars that will enhance Japan's shield against any North Korean missile strike, government and defence industry sources in Tokyo told Reuters. As nuclear-armed Pyongyang builds ever more advanced missiles with the ability to strike anywhere in Japan, Tokyo is likely to fund a ground version of the ship-based Aegis defence system deployed on warships in the Sea of Japan, other sources had said earlier. Raytheon is allied with Mitsubishi Electric Corp on the project while Lockheed is working with Fujitsu Ltd.

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"Japan's government is very interested in acquiring this capability," said one of the sources with knowledge of the radar

plans. The sources asked not to be identified because they were not authorised to speak to the media. "Japan wants to have Aegis Ashore operational by 2023 at the latest," said another of the sources. Lockheed Martin, Raytheon and Mitsubishi Electric declined comment, while Fujitsu did not respond to requests for comment. A spokesman for Japan's Ministry of Defence said Tokyo did not currently have any concrete plans to collaborate with the USA on Aegis radars. "It is not our place to discuss the activities of corporations," the spokesman added. The proposed Aegis Ashore radars would be variants of models already developed by Raytheon and Lockheed, the sources said. They would include components using gallium nitride, an advanced material fabricated separately by Mitsubishi Electric and Fujitsu that can amplify power far more efficiently than conventional silicon-based semiconductors. ...

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**Export:** The idea is that such systems could eventually be sold to the US or other militaries, representing a second chance for Japan to break into global arms markets after a failed bid last year to sell Australia a fleet of submarines in what Tokyo had hoped would spur military exports. PM Abe ended a decades-old ban on arms exports in 2014 to help beef up the nation's military and lower the unit cost of home-built military equipment but Japan's long-isolated defence companies have so far had scant success winning business overseas. "Rather than a fully engineered submarine or other platform, the best way Japan can win export deals is to get Japanese components and technology integrated into US equipment," another of the sources said.

**There was still a lot of room for China's nuclear capacity to grow and the company was ready to put the home-grown reactor design into mass production. "As the Hualong One demonstration project makes smooth progress, we have already made preparations to go into bulk construction."**

Japan is expected to make a final decision to acquire a ground-based Aegis system this year. It has also looked at buying THAAD, which would add a third layer of defence between Aegis and Japan's last line of defence PAC-3 Patriot missiles, to counter the North Korean threat. Each THAAD battery, which come with missiles already loaded, costs around \$1 billion. Using either THAAD or beefed up Aegis radars could, however, anger China, which is already upset that THAAD batteries recently deployed in South Korea can peer deep beyond its border.

Source: <http://indianexpress.com>, 23 May 2017.

## NUCLEAR ENERGY

### CHINA

#### **China National Nuclear Ready to Mass Produce Gen-3 Reactors**

Government-run China National Nuclear Corporation (CNNC) is ready to put its new third-generation reactor known as the Hualong One into "bulk construction", the company's vice-president Yu Peigen said on 24 May 2017. Speaking at a briefing to mark the installation of the dome at the world's first Hualong One unit at Fuqing in

southeastern coastal Fujian province, Yu said there was still a lot of room for China's nuclear capacity to grow and the company was ready to put the home-grown reactor design into mass production. "As the Hualong One demonstration project makes smooth progress, we have already made preparations to go into bulk construction," he said. Officials with the company's listed unit, China National Nuclear Power, said earlier this year that more reactors had to be approved and built to create economies of scale for the sector, which had lost its competitive edge in recent years as a result of lower coal prices.

Third-generation reactors are larger and considered safer than their predecessors, but the new designs have been subject to lengthy delays in China

and elsewhere. The European Pressurised Reactor (EPR), a third-generation unit designed by Areva, has been beset with technological problems and cost overruns, but the world's first is now expected to be completed early next year in Taishan in southeast China. The world's first Westinghouse AP1000 unit, another third-generation reactor being built at Sanmen on China's eastern coast, is expected to go into full commercial operation in the first quarter of 2018, nearly four years behind the original schedule. Yu said China hoped to break what he called the "curse" of delays facing third-generation designs. "We fully understand the delays on the EPR and the AP1000," he said. "We have analysed the reasons that led to the delays and are taking measures to fix them."

The Hualong One was conceived as a flagship Chinese brand to promote overseas, and was based on separate designs by CNNC and its rival, China General Nuclear Power (CGN). CGN is building its own version of the Hualong One at Fangchenggang in China's southwest, the design of which will be used as a "reference" for a future project in Bradwell in southeast England. The technology is currently undergoing a five-year

approval process by British regulators. CNNC is also building a Hualong One reactor in Pakistan, and the state firm signed a deal with Argentina earlier this month to build another in the South American nation starting in 2020. Yu said details of the Argentina deal were still being discussed and a final contract was expected to be completed by the end of this year. He said China was also in talks to discuss cooperation on building a Hualong One reactor in Russia.

Source: <http://www.nasdaq.com>, 24 May 2017.

## **INDIA**

### **India to Build 10 Heavy Water Reactors to Boost Nuclear Power**

In a major decision to fast-track India's domestic nuclear power programme, the union cabinet on 17 May, 2017 approved construction of 10 units of indigenous PHWR. "The cabinet has approved installation of 10 indigenously built PWHRs of 700 MW each," Union Minister Piyush Goyal said at a media briefing after meeting of the Cabinet presided over by PM Modi. Goyal, who is union Minister for Power and Coal, said the decision will result in significant augmentation of the country's nuclear power generation capacity. He said India's installed nuclear power capacity is 6,780 MW from 22 operational plants, and another 6,700 MW is expected to be generated by 2021-22 through projects under construction.

The government had in July 2014 set a target of taking nuclear power capacity to over 14,000 MW by 2024. The decision on construction 10 PHWRs comes days before the Modi government completes three years in office. Goyal said the

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move will give manufacturing orders to domestic industry to the tune of nearly Rs 70,000 crore and is expected to generate more than 33,400 jobs in direct and indirect employment. "As the government marks three years of its people centric-governance, in a first of its kind project for India's nuclear power sector, the 10 new units will come up as a fully home grown initiative," he added.

The Minister said the project will help transform the Indian nuclear industry by linking the goal of a strong nuclear power sector with the country's indigenous industrial capacities in high-end technologies. "With manufacturing orders to domestic industry, it will be a major step towards strengthening India's credentials as a major nuclear manufacturing powerhouse," Goyal said. He also linked the decision to the government's clean energy goals and low-carbon growth strategy. "It supports India's commitment to sustainable development, energy self-sufficiency

**The 10 reactors will be part of India's latest design of 700 MW PHWR fleet and will have state-of-art technology that will meet the highest standards of safety the approval marks a statement of strong belief in the capability of "India's scientific community to build our technological capacities". "It underscores the mastery our nuclear scientists have attained over all aspects of indigenous PHWR technology.**

and bolsters global efforts to combat climate change," he said. An official release later said that the project will bring about substantial economies of scale and maximise cost and time efficiencies by adopting fleet mode for execution. It said the 10 reactors will be part of India's latest design of 700 MW PHWR fleet and will have state-of-art technology that will meet the highest standards of safety.

The release said the approval marks a statement of strong belief in the capability of "India's scientific community to build our technological capacities". "It underscores the mastery our nuclear scientists have attained over all aspects of indigenous PHWR technology. India's record of building and operating PHWR reactors over the last nearly 40 years is globally acclaimed," the

release said.

Source: <http://www.hindustantimes.com>, 17 May 2017.

## **NUCLEAR COOPERATION**

### **INDIA–JAPAN**

#### **Japan-India Nuclear Pact Clears Lower House Despite Opposition Concerns**

A civilian nuclear cooperation pact between Japan and India cleared the Lower House on 16 May, 2017, paving the way for Tokyo to export nuclear power equipment and technology to the fast-growing economy not part of the NPT. As the Lower House takes precedence in approving treaties, the bill is set to gain Diet approval despite fears expressed by the opposition bloc that the South Asian nation could make military use of the technology. The pact, signed in November when Indian PM Modi visited Tokyo, prohibits New Delhi from using nuclear materials and technologies for developing atomic bombs and requires the country to accept inspections by the IAEA.

Under the accord, India may reprocess nuclear materials and by-products, but cannot make highly enriched uranium without approval from Japan. Highly enriched uranium has the potential for use in nuclear weaponry. A separate document confirmed that Japan will halt the nuclear deal if India breaks its 2008 promise to maintain a moratorium on nuclear testing. The main opposition Democratic Party has spoken out against the bill, pointing out that since the provision to suspend the treaty was not included in the pact, there is no explicit guarantee to limit the use of nuclear technology. Tokyo has insisted that the treaty enables a strong response — by suspending cooperation — if India were to conduct nuclear tests. Unlike nuclear deals with Jordan and Vietnam, however, the India-Japan accord does not specify nuclear testing as a condition for terminating the agreement. Opposition parties have asked the government why there is no mention of “nuclear test” as a condition to halt the pact. During negotiations, India had firmly rejected adoption of the wording.

Adding to concerns is a provision that gives special consideration in cases where a third-party state acts in a way that threatens India’s national security. This has sparked controversy because the language is vague as to Japan’s response under the scenario. Referring to the provision, Democratic Party Lower House member Rintaro Ogata cautioned...that if India conducts a nuclear test as a countermeasure to any similar experiment by Pakistan, Japan may not be able to terminate the agreement. Whether a subcritical nuclear experiment would constitute a deal-breaker under the accord also remains unclear. FM Kishida said Tokyo will “respond appropriately” if it confirms such tests have taken place, but he stopped short of saying whether Japan will suspend cooperation under the deal. ...

Source: <http://www.japantimes.co.jp>, 16 May 2017.

### **PHILIPPINES–RUSSIA**

#### **PHL, Russia Ink Deals on Defense, Nuclear Energy**

The agreements between the Philippines and Russia, that were supposed to be signed in the presence of Presidents Rodrigo Duterte and Vladimir Putin, were inked by key officials from both countries on 25 May 2017.

Even though Duterte was unable to complete the supposed four-day official visit, Foreign Minister Sergey Lavrov said the trip was still successful. “So, we can surely say that the visit of President Duterte to the Russian Federation indeed provide an important impetus in development of stable relationships between our countries,” he said. Foreign Affairs Secretary Alan Cayetano and his Russian counterpart Lavrov led the signing of agreements on defense cooperation, nuclear energy, tourism, agriculture, trade and industry, foreign affairs, transportation, as well as culture and the arts in Moscow.

“In fact, I think we covered everything that should have been covered in their bilateral meeting plus other matters that came up because of the terror threats not only in the Philippines or the threat of terrorism but also because of the extensive experience, expertise and knowledge and best

practices of the Russian Federation in dealing with ISIS and terrorism," Cayetano said in a press conference .... Cayetano signed the defense cooperation to expand exchanges in terms of training, seminars, and best practices between the two countries to develop relations in the field of military education, including military medicine, military history, sports, and culture as well as experiences in consultation, observer participation in military training exercises, and military port calls. Secretary Fortunato Dela Peña of the Department of Science and Technology, meanwhile, signed a MoU of between the DOST and the State Atomic Energy Corporation also known as ROSATOM on Cooperation on the Use of Nuclear Energy for Peaceful Purposes.

"The general purpose of this agreement is to develop cooperation in the area of peaceful use of atomic energy in accordance with domestic laws, rules and regulations and, of course, international agreements that govern the peaceful use of atomic energy," Philippine Ambassador to Russia Carlos Sorreta said. ...

Source: <http://www.gmanetwork.com>, 26 May 2017.

## URANIUM PRODUCTION

### GENERAL

#### Uranium Prices: Fragile Recovery in the Hands of Suppliers

Uranium prices steadied in late 2017 after spot prices collapsed to a 17-year low. The price recovery picked up steam in early 2017, with the catalyst behind uranium's turn higher Kazakhstan's production cuts. Uranium producers have been reducing output since the Fukushima disaster, which dented immediate demand for uranium and put the future of nuclear power in question. With healthy stockpiles of uranium sitting around the globe, the commodity's collapse put most production into loss-making territory. Even as miners cut production prices still slumped as there was already plenty of uranium to go around. Market participants took notice of Kazakhstan's

cuts due to their magnitude. In January 2017, Kazakhstan made a decision to reduce uranium production by 10%, equivalent to 3% of world production.

Speaking at a government hour in Majilis...Kazakhstan's Energy Minister Kanat Bozumbayev said: "Today, there is an increase in supply in the world uranium market. This trend arose after the Fukushima incident in 2011 and it continues. Last year, the price of natural uranium dropped significantly. It fell 40 percent over the year." The minister added that by the end of the year the Ministry will reassess the situation in the world market and decide on further actions. According to him, currently, there is no possibility or necessity for dumping and increase in mining.

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demand. Until this new demand is here, the price recovery is based largely on supply-side changes. Uranium prices rose about 20% after Kazakhstan cut production. If they decide to ramp up production before demand picks up, it could get ugly for uranium prices. Right now, suppliers must remain diligent. Although they are likely eager earn money after years of losses they should not increase production at the first sign of higher prices or they could derail the entire recovery.

Source: <http://www.economiccalendar.com/>, 16 May 2017.

## NUCLEAR NON-PROLIFERATION

### KAZAKHSTAN

#### IAEA Nuclear Fuel Bank to Open in Kazakhstan in Mid-August

A low-enriched uranium bank (LEU) authorized by the IAEA will open in Kazakhstan on Aug. 17, under the witness of IAEA chief Yukiya Amano, the country's energy minister said 15 May, 2017. More than 70 percent of the construction work of the IAEA-sponsored nuclear fuel bank has been

finished, and it is expected to be completed and put into operation in July, Kanat Bozumbaev said in the Majilis, the lower house of the parliament. The reserve of uranium in the bank will be "inviolable," which will be used only in case of a crisis situation, he said.

In 2009, Kazakhstan initiated the establishment of an international nuclear fuel bank in its territory under the auspices of the IAEA. It signed an agreement with the IAEA on the matter on Aug. 27, 2015. The bank will host up to 90 tons of low-enriched uranium, sufficient to run a 1,000 MW light water reactor. The bank is fully funded by voluntary contributions and has no impact on the IAEA budget. The amount of donor contributions is about 150 million USA dollars to operate the bank for at least 10 years. The donors are the Nuclear Threat Initiative (50 million US dollars), the United States, (49.54 million dollars), the United Arab Emirates (10 million dollars), Kuwait (10 million dollars), Norway (5 million dollars) and the EU (up to 27.4 million dollars). Kazakhstan is a leading producer of uranium, boasting more than 15 percent of global uranium reserves.

Source: <http://www.china.org.cn>. 15 May 2015.

## **NUCLEAR DISARMAMENT**

### **NORTH KOREA**

#### **China Must Use Ties with North Korea to Prevent More Dangerous Acts**

A ranking American diplomat is urging China to use its close ties to North Korea and convince it to halt its "provocations" in the wake of another launching of a missile over the weekend. Robert Wood, US Ambassador to the Conference on Disarmament, told...that there is no bigger challenge to peace and security than the DPRK. "So we are going to be raising the level of engagement with China on this issue. China really is the key to dealing with the North Korean issue. Ninety percent of the DPRK's trade is with China, so clearly there is a lot more leverage that China has, and we would like China to use in trying to deal with this issue," Wood said.

Wood has been taking part in the First Session of

the Preparatory Committee for the 2020 Review Conference of the Parties to the NPT. The NPT entered into force in 1970. According to the UN Office for Disarmament Affairs, the NPT was designed "to prevent the spread of nuclear weapons, to further the goals of nuclear disarmament and general and complete disarmament, and to promote cooperation in the peaceful uses of nuclear energy." Wood said he was "heartened by the chorus of condemnation" of the DPRK's actions, and added that majority of states, led by the Republic of Korea and France, are willing to sign a statement to emphasize the NPT community's desire for North Korea to change its course.

The statement stresses that "something has to give with regards to the DPRK, (and) the DPRK has to take steps to prevent the escalation of further tension," Wood explained. "One thing notable: China and Russia did not join. I'm not quite sure why," he added.

Wood said North Korea has conducted five nuclear tests so far, and hoped that it would not conduct any more. According to Reuters, North Korea is working to develop a long-range missile with a nuclear warhead capable of striking the mainland US. It quoted North Korea's ambassador to China, Ji Jae Ryong, as telling reporters on 15 May 2017 that the test firing of intercontinental ballistic missiles would continue "at any time and place, at the will of North Korea's highest leadership." President Trump had earlier told Reuters that a "major, major conflict" with North Korea was possible. Wood said they were looking at a number of measures – political, economic, and security-related – to deal with North Korea's "dangerous acts." They would be focusing on how they could isolate North Korea even more so as to convince the latter to turn its back on the "very dangerous path" it was treading on. At the same time, Wood announced the US' donation of 1 million euros to the International Atomic Energy Agency so it could develop peaceful applications of nuclear technology.

Source: <http://beta.interaksyon.com>, 17 May 2017.

NUCLEAR SAFETY

TURKEY

**IAEA Mission Prepares for External Events Safety Review of Turkish Nuclear Power Plant Site**

The IAEA's peer reviews help Member States determine if they are in line with the Agency's safety standards, which is a set of more than 100 documents that reflect a consensus on what is considered a high level of nuclear and radiation safety. For countries that are planning to build nuclear power reactors, there are several reviews that help ensure a high level of safety at different stages throughout the process. The Site and External Events Design (SEED) missions offer users support for nuclear installation site selection, site assessment, and design of structures, systems and components, taking into consideration site-specific hazards. Countries requesting a SEED mission can select review modules to suit their specific needs. The Turkish Atomic Energy Authority (TAEK) has requested a SEED mission to primarily review matters related to design of the planned Akkuyu Nuclear Power Plant against external hazards. To prepare for the SEED mission, a team of IAEA experts held a preparatory three-day meeting in Turkey earlier IN May to discuss background considerations related to site selection and evaluation, as well as to review documentation of the plant's design elements relevant for hazards.

The upcoming SEED mission, planned for July 2017, complements other IAEA safety review services requested by TAEK, including a review of its Preliminary Safety Analysis Report and a Probabilistic Safety Assessment (Level 1). It will also follow up on actions taken following a 2015 SEED review mission on site parameters relevant to design protection of the NPP against external hazards. "Turkey's active engagement with the

IAEA on safety-related matters helps the country ensure that it adheres to a high standard of safety as it embarks on its nuclear power project," said Greg Rzentkowski, Director of the IAEA's Division of Nuclear Installation Safety. "We look forward to continuing our intense cooperation as requested by Turkey." Mehmet Ceyhan, the Head of TAEK's Department of Nuclear Safety, said that the upcoming SEED mission would assist TAEK as it begins to assess of the construction license application for the site's four planned WWER-1200 units.

Source: <https://www.iaea.org>, 18 May 2017.

USA

**US Nuclear Lab's Future Up in the Air after Recent Fire**

A recent fire has put a national laboratory's ability to operate safely into question. The Defense Nuclear Facilities Safety Board announced Friday that it will hold a hearing next month to discuss the future of the Los Alamos National Laboratory, the Santa Fe New Mexican reported. The board is an independent panel that advises the US Department of Energy and the president.

A fire broke mid-April at the lab's PF-4 plutonium building where the plutonium cores of nuclear weapons are produced. Lab officials said that the fire was put out quickly and only caused minor injuries. According to the report, the board is unsure if the lab is fit to continue to operate and handle increasing quantities of plutonium in coming years after a series of problems with management in the maintenance and cleanup of the dangerous materials.

The Department of Energy has announced plans to increase manufacturing of the plutonium pits at Los Alamos over the next decades. President Donald Trump's budget proposal will also increase funding for weapons work in the next fiscal year.

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The moves make local nuclear watchdog groups uneasy. "Fattening up our already bloated nuclear weapons stockpile is not going to improve our national security," said Jay Coghlan, the director of Nuclear Watch New Mexico, in a news release issued Friday. "New Mexicans desperately need better funded schools and health care, not expanded plutonium pit production that will cause more pollution and threaten our scarce water resources." The board will have the chance to get the opinion of a number of experts on the matter at its June 7 hearing.

Source: <http://abcnews.go.com>, 27 May 2017.

## NUCLEAR WASTE MANAGEMENT

### USA

#### A First Look at Energy Issues in Trump's Budget

President Donald Trump's fiscal year 2018 budget proposal calls for a number of energy policy reforms, some good and some bad. Some of the highlights include opening the Arctic National Wildlife Refuge for drilling, selling off some government-controlled oil reserves, reinvigorating Yucca Mountain's nuclear waste management activities, divesting power marketing administration assets, and diverting offshore drilling royalties from Gulf Coast states to the federal government.

These are examined as under. **Opening the Arctic National Wildlife Refuge:** The US Geological Survey estimates that 10.4 billion barrels of oil lie beneath a few thousand acres in the refuge. Producers can access that oil with minimal environmental impact. The amount of land available to energy production would represent 0.01 percent of the refuge's total land mass. The designated area is largely desolate and has no trees, deep-water lakes, or mountain peaks. Opponents to opening the refuge to industry will say there's no interest because the price of a barrel of oil is so low—but that's for the market to

determine, not politicians or regulators. Oil companies make investments looking far into the future. It's not the role be the federal government or environmental activists to tell energy companies what's economically feasible, especially as American energy companies continue to innovate and drive down costs of production. By opening the Arctic National Wildlife Refuge, we could truly discover Alaska's energy potential. Importantly, the US Geologic Survey also notes that "nearly 80 percent of the oil is thought to occur in the western part of the ANWR 1002 area, which is closest to existing infrastructure." Oil produced in the refuge could relieve the potential technological challenges the Trans-Alaska Pipeline System faces if the supply becomes too low.

#### Selling Off Strategic Petroleum Reserve: Trump's

budget calls for the sale of 250 million barrels of oil from the Department of Energy's Strategic Petroleum Reserve. As part of the US commitment to the International Energy Agency, the federal government created the Strategic Petroleum Reserve through the Energy Policy and

Conservation Act in 1975. Congress initially authorized the Strategic Petroleum Reserve to store up to 1 billion barrels of petroleum products, and mandated a minimum of 150 million barrels of petroleum products. The reserve, which opened in 1977, currently has the capacity for 727 million barrels of crude oil. The Strategic Petroleum Reserve, located in Freeport, Texas, held 695.1 billion barrels of oil in September 2016. The Strategic Petroleum Reserve has been a futile tool for responding to supply shocks, and it disregards the private sector's ability to adapt to price changes. Whether a shortage or a surplus of any resource exists, the private sector can more efficiently respond to changes in oil prices, whether it is unloading private inventories, making investments in new drilling technologies, or increasing the use of alternative energy sources. Congress and the Trump administration should

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liquidate the entire reserve, specifying that the sales go exclusively toward deficit reduction.

***Yucca Mountain and the Nuclear Waste Fee:*** As previewed in the original “skinny budget,” the president’s budget proposal commits to making progress on a nuclear waste management facility at Yucca Mountain. The courts made clear that unless Congress directs otherwise, the federal government is required to continue the licensing review of a repository at Yucca Mountain. This is a good step forward. The budget appropriates \$120 million through the Department of Energy to support participation in the remaining licensing activities by the department, the state of Nevada, and local governments. It similarly appropriates \$30 million to the Nuclear Regulatory Commission. ...The budget also directs the Department of Energy to re-establish the organizational and technical capabilities needed to complete a licensing process, presumably under the statutorily required Office of Civilian Radioactive Waste Management, which the Obama administration eliminated in its efforts to block the possibility of a repository at

Yucca Mountain. In doing so, the budget also calls for interim storage activities and a 0.1-cent fee per kilowatt-hour on nuclear power starting in 2020. This arbitrary fee has been problematic and politicized before, and in fact is one of the fundamental flaws in the current approach.

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Though the budget provides clear, long-needed leadership on nuclear waste management and the implications of failed leadership, the Trump administration sets its sights short when it comes to the purpose. The

mission, as stated, “is to fulfill the federal government’s obligations to address nuclear waste in a safe and fiscally responsible way.” A more dynamic approach is possible if incentives and responsibilities are properly aligned. Decades of dysfunction demonstrate the federal government’s inability to manage nuclear waste rationally, economically, or at all. The private sector should ultimately take responsibility for managing its own nuclear waste while the federal government should maintain a regulatory oversight role. ...

Source: <http://dailysignal.com>, 23 May 2017.



Centre for Air Power Studies

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