



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

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OPINION – T.P. Sreenivasan

Stirring Up the Nuclear Pot

A picture of the globe under the hood of a cobra was a familiar symbol of the precarious state of international security till recently. Accidental or deliberate pressing of the nuclear button was the nightmare that haunted humanity. At the same time, using the nuclear genie and harnessing it for prosperity was the best dream. Today, both the nightmare and the dream have become jaded. Nuclear weapons have ceased to be viable as instruments of war because of the unpredictability of the consequences of a nuclear war. No one can trust even the use of tactical nuclear weapons without collateral damage for the user. Today, nations can be destroyed with mobile phones and laptops without killing a single human being, making the “humaneness” of cyberwarfare the biggest danger.

The theories of deterrence of nuclear stockpiles have also been discredited after 9/11 brought the most formidable nuclear power to its knees. Non-proliferation today, if any, is not on account of the NPT, but on account of the futility of building nuclear arsenals. The threat of terrorism looms larger than the threat of nuclear weapons. After Fukushima, nuclear power too is receding as a sensible component of the energy mix. One clean-up operation after an accident can demolish many years of technological advancement and

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hopes of having cheap power. The sun shines as a source of energy, not the glittering nuclear reactors which seem to emit mushroom clouds.

Still a Flourishing Industry. Old habits die hard, however, and there is constant activity on the weapons and the power fronts. The nuclear and disarmament industry still flourish. Former US President Obama's Prague speech had ignited cautious optimism that nuclear weapons would cease to be the anchor of security, though not during his presidency, not even in his lifetime. Rajiv Gandhi's UNs Plan of Action for total elimination of nuclear weapons came out of the dusty archives. The 'Global Zero' movement gained momentum, even as nuclear weapon

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powers continued investment in developing delivery systems and weapons.

US President Trump had once said that proliferation was good for American allies, but more recently, he said: "It would be wonderful, a dream would be that no country would have nukes, but if countries are going to have nukes, we're going to be at the top of the pack." He even hinted at the use of nuclear weapons in extreme circumstances. The hope raised by four old cold warriors, George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn, by setting the goal of a world free of nuclear weapons and working on the actions required to achieve that goal finally receded, and in desperation, the world turned to the good old UN machinery to create illusions of progress.

Emphasising Non-proliferation: NPT enthusiasts

have been disappointed of late that out of the three pillars of the treaty — non-proliferation, disarmament and nuclear energy for peaceful purposes — the first, non-proliferation, has got watered down and disarmament has become the priority. They also worry that dangerous technologies like enrichment are within

the reach of the non-weapon states. In the context of Japan and South Korea debating acquisition of nuclear weapons, they feel that non-proliferation should be brought back to be the first priority of the NPT. The promotional function of the IAEA is also a concern for them. The IAEA has already shifted its focus from nuclear power to nuclear security, as a result. In 1995, the NPT was made a perpetual treaty with no possibility of amendment, but its votaries now advocate that non-proliferation should be emphasised to the exclusion of disarmament and nuclear energy promotion.

The UN General Assembly, with its unlimited agenda, readily jumped into the first UN conference in more than 20 years on a global nuclear weapons ban, though the nuclear weapon

powers did not join. More than 120 nations in October 2016 voted on a UN General Assembly resolution to convene the conference to negotiate a legally binding treaty to prohibit nuclear weapons, leading to their total elimination. Britain, France, Russia and the US voted no, while China, India and Pakistan abstained. Though India had recommended the convening of such a conference, it abstained on the resolution as it was not convinced that the conference could accomplish much at this time. India said that it supported the commencement of negotiations in the Conference on Disarmament on a comprehensive Nuclear Weapons Convention, which in addition to prohibition and elimination also includes verification. The US and others wanted to accept the reality that such conferences would serve no purpose. The conference has failed even before it commenced.

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In the midst of this ferment, a debate has begun in India about a review of its no-first use doctrine. Experts seem to think that India's doctrine is flexible enough to deal with any eventuality, but others feel that we should enter more caveats to safeguard our interests. Perhaps, it is best to let the sleeping

dogs lie.

On Nuclear Power Production: On the nuclear power front, the efforts to increase nuclear power production suffered a setback as a result of Fukushima. Many countries that had lined up before the IAEA for nuclear technology for peaceful purposes quietly switched to other sources of energy. The much-expected nuclear renaissance withered away. Except for China, India and Russia, most nations have shied away from building nuclear reactors or importing them. India's liability law deterred US companies from exporting reactors to India. The financial problems of Westinghouse, which had agreed to build six reactors in Andhra Pradesh, postponed, if not cancelled, the venture. But India has not fundamentally changed its three-stage nuclear power development, though the

thorium stage eludes it.

The need for reduction of greenhouse gases was an incentive to increase nuclear power production, but President Trump's challenge of the whole concept of climate change as a hoax and the consequent reduction of allocation of funds to protect the environment will further reduce the accent on nuclear power. The Kudankulam project is set to move along with Russian collaboration, but its progress has been slow. The nuclear liability law, the Westinghouse bankruptcy and the protests by local people have combined to delay the expansion of nuclear power in India.

Like everything else in international affairs, the nuclear pot is also being stirred on account of the uncertainties of the US government and changing threat perceptions. Nobody thinks any more that peace and amity will break out between the US and Russia, making nuclear weapons redundant. But no one is certain that the nuclear genie will not take new incarnations as a result of the ferment.

Source: <http://www.thehindu.com/>, 10 April 2017.

OPINION – Stephen Mihm

Nuclear Power's Original Mistake: Trying to Domesticate the Bomb

In recent years, the Fukushima disaster, staggering cost overruns, and a rising tide of cheap solar power has pushed the nuclear energy industry closer and closer to the brink. In the first week of April, the Westinghouse Electric Co., long a leader in nuclear power plant design and construction, went bankrupt. Suddenly, the demise of nuclear energy is no longer impossible to imagine. Dwight

Eisenhower, for one, would not be pleased. More than sixty years ago, the 34th president of the US launched an idealistic quest to turn what he called the "greatest of destructive forces ... into a great constructive force for mankind." Unfortunately, his campaign, while noble in intent, didn't pay attention to the bottom line – a problem that has bedevilled the industry ever since.

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The symbolic dawn of the atomic age took place on December 2, 1942, when the physicist Enrico Fermi and his associates managed to build the first self-sustaining nuclear chain reaction with the so-called Chicago Pile: a small, ramshackle assembly made of graphite, uranium oxide, wood, and uranium metal. The achievement helped pave the way for the bombs dropped on Hiroshima and Nagasaki. In 1946, Congress consolidated control over the nation's nuclear energy in a civilian agency known as the Atomic Energy Commission. The Commission oversaw research on nuclear power at sites like the Bettis Atomic Power Laboratory

outside Pittsburgh, though it turned to Westinghouse to run it. At this early stage, research remained focused on military applications: nuclear submarines, ships, and eventually, planes.

Westinghouse helped design and build the reactor that would eventually propel the Nautilus, the first nuclear sub. As he laid down the keel for the Nautilus on June 14, 1952, President Harry Truman also began bending the arc of atomic history toward peacetime needs at home. "This vessel is the forerunner of atomic-powered merchant ships and airplanes, of atomic power plants producing electricity for factories, farms, and homes," he said.

The election of Dwight Eisenhower later that year helped make this vision a reality; so, too, did the members of the JCoAE in Congress. In July 1953, the construction of the nation's first full-scale civilian nuclear power plant was funded.

Much of this, as historian Paul Boyer has observed, was driven by a desire to find a "silver lining" in the mushroom cloud. While Americans had generally supported the use of nuclear weapons on Japan, the growing specter of thermonuclear war in the 1950s sparked a growing desire to find peaceful applications for the new technology that would compensate for its destructive powers. The government sought private partners for the project, eventually settling on the Duquesne Light Company in Pittsburgh. It was a pragmatic alliance: the new plant in the nearby town of Shipping port would be very close to the Bettis Atomic Power Laboratory run by Westinghouse. Westinghouse would design and build the reactor, and Duquesne Light would build and maintain the non-nuclear portions of the facility.

Eisenhower wasted no time in trumpeting the news of the new plant. In December 1953, he appeared before the UN and delivered his "Atoms for Peace" speech. Eisenhower pledged that the US would solve what he called the "fearful atomic dilemma" – to figure out how the new technology could improve life on Earth rather than destroy it.

Foremost among these was the promise of nuclear energy. "The US knows that peaceful power from the atomic energy is no dream of the future," he declared. "That capability, already proved, is here – now – today." The president didn't have that quite right, though: the government didn't even

break ground for the Shipping port reactor until the following December, as one history of the project points out. When they did, though, it was a spectacle worthy of the atomic age. From

distant Denver, Eisenhower appeared on television. He picked up a plastic rod with a zirconium handle and a small plastic ball on the tip. This ball, Eisenhower explained, contained small quantities of neutron-emitting polonium and beryllium.

He then waved his magic wand over a small cabinet containing uranium. As the neutrons hit the uranium, a fission counter recorded the collisions via a pointer that would slowly move from left to right, triggering a relay that would shut off electricity coursing over a telephone line that connected Denver and Shipping port. That interruption would trip another relay that would in turn activate the controls used on a power shovel at the work site.

Construction began in earnest the following spring, but was quickly beset by a problem all too familiar with today's nuclear energy industry: cost overruns. The original price tag of \$38 million

proved overly optimistic; it eventually cost \$72 million to build, with research and development costs pushing the total to \$120 million. As the project neared completion in late 1957, the project's directors worked hard to insure that the reactor achieved "criticality" – a self-sustained nuclear reaction – on the precise day, fifteen years earlier, that the

Chicago Pile had performed the same feat on a more modest scale.

The Shipping port plant soon began generating electricity, and the government pronounced the reactor a success. And on one level, it certainly

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was: it sparked the construction of dozens of nuclear power plants in the US and abroad, a good number of them designed and built by Westinghouse. Everything miraculous about the nuclear power industry began at Shipping port. But so did everything that is overwhelming it now. Aside from the cost overruns, the electricity produced by Shipping port was quite costly. Though Duquesne Light bought electricity from the government at the rate of 8 mills per Kw-hour, the actual cost ranged between 55 and 60 mills.

In succeeding decades, nuclear power costs declined, but the industry remained heavily dependent on subsidies. And in recent years, the investment cost of developing new nuclear plants ballooned from \$2,065 per Kw in 1998 to \$5,828 in 2015, according to a WNA report. All of this bodes ill for the future of nuclear power. But the failure for nuclear to live up to its potential should hardly surprise us. It began as an idealistic attempt to domesticate the bomb in peacetime; the actual economic cost and benefits of doing was a secondary concern at best. The world has spent nearly sixty years trying to make economic sense of nuclear power, with limited success. It may be time to pull the plug.

Source: <https://www.bloomberg.com/>, 08 April 2017.

OPINION – Pittsburgh Post-Gazette

Nuclear Power Subsidies Can Protect the Environment

The bankruptcy of Westinghouse Electric Co. is yet more evidence, if anyone needed any, that the economics of nuclear power are not good. Like coal, nuclear energy can't compete against cheap natural gas and ever-cheaper renewables. Unlike

coal, however, nuclear energy is a crucial tool in the fight against climate change. So the public subsidies that benefit the nuclear industry in the US are justified, whereas efforts to prop up the

coal industry are not. And states are offering or proposing enormous subsidies. New York Gov. Andrew Cuomo wants to spend \$500 million a year to keep three plants going; Illinois will pay \$235 million a year to rescue two more.

Nuclear plant owners in other states are looking for similar bailouts.

There is no getting around the costs to ratepayers of these handouts, and there's no guarantee they will work. But they are worth trying as a way to keep nuclear in the energy mix as long as possible, and they are cheaper for the consumer than having nuclear plants shut down. There are 99 reactors in the US, and nuclear still provides one-fifth of America's electric power. When nuclear plants close, their output is largely replaced with coal and natural gas.

That's a backward step not only for climate but also for public health. In the 1980s, when the Tennessee Valley Authority temporarily closed two nuclear plants and replaced them with coal-fired power, pollution

increased enough in some counties to lower babies' average birth weight significantly, according to a new study. The right way to account for this cost, as well as for the damage that burning fossil fuels does to the atmosphere, is to put a price on greenhouse-gas emissions – in the form of a substantial carbon tax. Until federal and state lawmakers see the wisdom of enacting one, states should at least include nuclear power in their definitions of what counts as clean energy, so that utilities are required to buy some nuclear power.

The challenge is to keep the existing big nuclear reactors going while smaller, cheaper reactors are

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perfected. Future nuclear technology should have the kind of production and investment tax credits that wind and solar have relied on, as well as reforms to unnecessarily burdensome licensing requirements. It's possible that next-generation nuclear power won't come to fruition in time to fully replace the plants now operating. Perhaps nuclear will one day be eclipsed by other technological innovations – batteries, for example, that could turn wind and solar into a steady stream of energy. But climate change is happening now, and nuclear has already proved to be a reliable source of clean power. It's only prudent for the government to support the latter as a way of fighting the former.

Source: <http://www.post-gazette.com/>, 05 April 2017.

OPINION – Business Insider

Why is India Investing in Nuclear Energy when the Whole World is Experiencing a Nuclear Meltdown?

The global nuclear industry is going through a virtual meltdown on both sides of the Atlantic Ocean, according to PTI. This is happening even as India is investing heavily in nuclear energy. This collapse of atomic giants offers New

Delhi a new opportunity and many in the Indian atomic establishment are silently celebrating this premature death of suitors who were wooing to put tens of atomic plants in India estimated to cost at least USD 150 billion.

“This atomic meltdown is a blessing in disguise” was how a top government official described the unfolding scenario. In addition, in these changed circumstances, if the Indian private industry plays its cards right, it could also provide an opportunity to the country to become a hub for low cost suppliers of nuclear technology. A little far-fetched but who knows how energy games get played in the future.

In a way the diplomatic noose that had been tightened around India's neck to buy super

expensive French and American nuclear reactors has on its own been loosened if not shed at all. As part of the protracted global negotiations on admitting India back into the nuclear commerce club, a kind of barter deal had happened and India had committed itself to buy French and American reactors, but now that the commercial operations of at least two of the foreign giants is floundering, India need not back down from its commercial commitments.

India can retain the moral high ground of wanting to buy the French and American reactors but since the companies themselves are in trouble no deals can be inked. India can once again hope to forge its own nuclear path free of shackles of forced imports of untested technologies. The American atomic giant Westinghouse Electric Company, LLC filed for 'bankruptcy' a week ago, in 2016 the French nuclear giant Areva went through a similar process.

Both these companies had shown aggressive interest in setting up atomic power plants soon after the Indo-US civilian nuclear deal was inked. Both wanted a large chunk of the nuclear commerce worth billions of dollars that India was holding out as a promise once New Delhi was extricated from the atomic dog-house as a

consequence of the landmark Indo-US civilian nuclear deal. All along as negotiations were going on around the Indo-US civilian nuclear deal, there was a small but influential group in the Indian nuclear establishment that was most uncomfortable at importing so many different types of reactors.

This group felt that since India had mastered the making of PHWR's the effort should ideally be to multiple this technology while alongside India's futuristic reactors the PFBR which uses plutonium as its main fuel and the AHWR that uses thorium as its main fuel could be promoted.

Jairam Ramesh, the engineer-turned-influential politician in the UPA government, was an early opponent of importing so many different types of

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reactors. Towards mastering the PHWR, India on its own first enhanced the capacity of these reactors from 220 MW to 540 MW by constructing two of them at Tarapur in Maharashtra and then the same reactor has been modified to enhance the capacity to 700 MW with four units already under construction at Kakrapar and Rawatbhatta. Among imported reactors India successfully started commercial operation of two 1000 MW units at Kudankulam in Tamil Nadu these are made with Russian help. In the Indian nuclear establishment some felt the Russian reactors and the Indian three stage program was more than enough to ensure long term energy security for the country.

Mastering several different technologies is a complex task and there was a lot of consternation among several senior scientists that if the entire Indo-US civilian nuclear deal were to be implemented then at least three new reactor types would have to be mastered.

These included Areva proposing to put six atomic plants each of 1650 MW capacity at Jaitapur in Maharashtra. Westinghouse was wanting to sell at least 6 reactors of 1200 MW each to be put up at Kovadda in Andhra Pradesh – these were initially proposed to be put up at Mithivirdi in Gujarat but land acquisition issues forced Westinghouse to opt for a different site.

General Electric was proposing to put a mega nuclear park as well. Each of these three different reactors are very different from each other and an entirely new set of people would have to be trained to safely operate these. Typically each new reactor operates for 60 years and then it takes

another couple of decades to safely decommission them hence the investment of human resources is a commitment of at least a century.

With Westinghouse filing for bankruptcy it is highly unlikely that India would order any reactors from them anytime soon. The idea was to order in one go 6 nuclear plants that would be delivered on a 'turnkey' basis. Now that Westinghouse itself says it can only supply the technology for the nuclear island and does not want to undertake any construction activity. Despite the fact India has already committed to pay Rs 100 crore to Westinghouse while ordering the AP 1000 reactors. These orders may obviously go into cold storage till Westinghouse and Toshiba its parent company in Japan iron out their differences. Westinghouse denies that the India project is derailed but experts say expect delays galore.

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Similarly, Areva the French giant that owned all the nuclear technology for the EPR 1650 MW reactor having been almost dissolved and the affairs taken over by 'Electricite de France' or EDF the French electricity utility, these reactors for which quite a bit of ground work was already done at Jaitapur has also been cold shouldered since no buyer government would want to

get involved when a messy fight is ongoing in the French public sector companies on ownership of the atomic plants.

On its own General Electric has been dragging its feet on bidding for reactors in India since its lawyers felt India's nuclear liability law was more

'people friendly' as opposed to the usual global nuclear liability law that is 'industry friendly'. In this scenario India is left with no other option but to multiply its indigenous fleet of 700 MW PHWR's and simultaneously expand its collaboration with Russia to buy at least 20 more Russian plants similar in nature but probably more advanced than the reactors operating at Kudankulam.

After India was admitted into the nuclear fold to allow global nuclear commerce all restrictions at importing uranium have already gone and if India seeks to multiply manifold its own home grown reactors that should not be difficult. In addition since the co-operation with Russia is blossoming more light water reactors could well be ordered from Russia. This sudden change in the wind direction with American and French nuclear companies all doddering has in way brought India back to where it was in 2004 before US President George Bush decided to shake hands and be friends with India in the nuclear power sector.

At that point India had its PHWR's and the Russian tech but what the country lacked was an assured supply of uranium fuel. India does not have sufficient native resources of uranium and if the nuclear program has to expand then importing uranium was the only option. Today the supply of imported uranium fuel is well guaranteed under global law thanks to the atomic embrace but this melt down of nuclear giants has tilted the balance in India's favour. Now without ever having to officially deny buying expensive French and American reactors, New Delhi can opt to expand its existing fleet of atomic plants on its own terms. This 'meltdown' is making the Indian nuclear establishment smile all the way.

Source: <http://www.businessinsider.in/>, 09 April 2017.

OPINION – Matthias von Hein

US, North Korea, China – Diplomacy and Saber Rattling

What is at least as dangerous as the Middle Eastern powder keg? That's right – the Korean one! That's what makes it worrying when US President Trump, after firing 59 Tomahawk cruise missiles at a Syrian military air base, gives another show of military strength by sending the nuclear-powered aircraft carrier "Carl Vinson," with its roughly 6,000 crewmembers and 85 warplanes, to patrol off the Korean coast.

It is worrying because, in the case of this supposed demonstration of determination, we do not know what purpose it is meant to serve. It is also unsettling that even the missile attack on Syria did not seem to form part of a larger strategy – and

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that it took place just as Trump was sitting together with his Chinese counterpart Xi Jinping enjoying steak and Californian wine. Xi has to have understood the strike as the exclamation mark on Trump's remarks a few days before that the United States would possibly "solve North

Korea" unilaterally.

Beijing's Dilemma: Xi and Trump sat together for some seven hours in Florida. North Korea is bound to have been near the top of the agenda. But Trump was not able to convince his guest from Beijing to undertake concrete steps against Pyongyang, even though Beijing is increasingly annoyed about Kim Jong Un's wayward actions: North Korea carried out two atomic weapons tests in 2016 alone. They were accompanied by dozens of missile tests, one of them even from a submarine.

This is not what Beijing considers to be a stable environment that is good for the economy, and still less the behaviour of a good neighbour. Its repeated call for a Korean Peninsula that is free of nuclear weapons is believable. China backs the sanctions, tightened as recently as November, against the

already isolated country. It has now again warned of fresh sanctions if Pyongyang carries out further nuclear and missile tests. But importantly, more than anything else, Beijing fears the collapse of the regime in Pyongyang, millions of refugees and, ultimately, US troops possibly on its borders. North Korea, as the American foreign affairs expert Victor Cha already put it in 2010, is a "land of lousy options."

End of 'Strategic Patience':

Trump will also have to come to this conclusion. But the US - unlike in Syria – really does have serious national security interests at stake with regard to North Korea. Pyongyang's missile tests often end in failure, it is true, but North Korean engineers can learn lessons too. The weapons are getting better. In a few years, they could reach the US, possibly with nuclear warheads on board. However, whether the abandonment of the previous "strategic patience" as announced by US Secretary of State Rex Tillerson, coupled with threatening gestures, is the right way to counter this peril is another matter. The presence of American troops in South Korea is already a very visible build-up of military weight. Becoming involved in a game of poker with Pyongyang at an inopportune moment is dangerous. And you don't put out a fire that is only smoldering with gasoline even if it seems to be the only liquid within reach.

Advantage Pyongyang: Like it or not; When it's a matter of threats, the North Korean regime is at an advantage, because it can use its own population as hostages. And it can take its South Korean brothers and sisters hostage as well. Some 25 million people – almost half of all South Koreans - live in and around the capital, Seoul. And it is within the range of North Korean artillery. And as if the South Koreans didn't have enough to worry

about, there is loud talk in US media, some of it stemming from hawkish ex-CIA chief James Woolsey, about "preventive nuclear strikes" on North Korea.

New Security Architecture in East Asia: This would certainly be the lousiest of the lousy options. What might be the best of them would be offering North Korea something - even if that might stick in one's throat in view of the tyrannical regime in Pyongyang. This idea has already occurred to Trump. During his election campaign, he boasted that he would eat

hamburgers with Kim in the White House if it were necessary to solve the missile problem. A peace treaty could be a start. The Korean War has been over since 1953, but officially there is only a fragile cease-fire in place at the 38th parallel. The fact that North Korea is so highly armed is only partly the product of paranoia. And the atomic bomb is the guarantee of the regime's survival. Kim Jong Un will work all the more obsessively on it, the more threatened he feels from outside. If a new security architecture were also to take into account Beijing's interests, it could bring China to put more pressure on Kim. But the North Koreans will have to get rid of their rogue regime themselves.

Source: <http://www.dw.com/>, 10 April 2017.

OPINION – Sipho Masondo

Nuclear Ball Rolls in June

A confidential document reveals that South Africa's nuclear-build programme kicks off in earnest in June when Eskom issues a formal request for proposals from companies bidding for the

But the US - unlike in Syria – really does have serious national security interests at stake with regard to North Korea. Pyongyang's missile tests often end in failure, it is true, but North Korean engineers can learn lessons too. The weapons are getting better. In a few years, they could reach the US, possibly with nuclear warheads on board.

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estimated 1 trillion contract. The nuclear deal – for which Russian company Rosatom is widely considered to be the frontrunner – is, say senior Treasury officials, “directly related” to President Zuma’s axing of finance minister Pravin Gordhan and his deputy Mcebisi Jonas. “It is well known that Gordhan was against the project as he said the country couldn’t afford it. Eskom will be issuing a request for proposals in June and that really is the beginning of procurement. Gordhan had to go because he was going to block it again,” said a senior official.

The internal Eskom document dated three days before Gordhan and Jonas were axed reveals a tight timeline for the programme that will see four plants built to provide 9600 MWs of electricity to the country. The request for information process has already been issued and closes on April 28. After the request for proposals is issued in June, the deadline for bids is September, for evaluation in December. The winning bidder will be decided in March 2018 and the contract signed between December next year and March 2019.

The document also reveals that most of the major nuclear contracts will be implemented through “turnkey” procurement, which Treasury officials are concerned about. “While Treasury allows for turnkey procurement, we know that it is often used to hide corruption. Companies that are asked to deliver turnkey projects are accountable to themselves. They appoint whoever they like, however they like,” a senior official said.

Turnkey projects are when a single company is appointed to manage and deliver an entire project. The management company becomes responsible for appointing all contractors and service providers. This is different from an open tender

that is spread over a range of different contractors appointed by the state. Eskom spokesperson Khulu Phasiwe said Eskom had always embraced being the owner and operator of nuclear plants.

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“The focus in the next two years will be to go out on a request for proposal subject to the requisite authorisations obtained. It is possible that the request could be issued by the end of June, with selection of preferred vendors by the first quarter of 2018,” he

said. “This is dependent on the relevant approvals from Eskom being obtained, as well as the governance processes of the Necs and relevant government departments. It is possible the preferred bidder would be selected by the first quarter of 2018.”

Zuma’s spokesperson Bongani Nqulunga said the presidency was “unaware of the June date for the issuing of the request for proposals for nuclear energy, nor does it get involved in the procurement processes of other state entities. Nuclear energy will be implemented at the scale and pace that is affordable. This position has not changed.” Meanwhile, a confidential legal opinion Treasury

commissioned reveals how Gordhan and Jonas blocked the department of energy from procuring the nuclear deal directly from foreign governments through closed bids.

The opinion, prepared by Advocate Kameshni Pillay

SC and Advocate Nyoko Muvangua in March 2016, shows that the South African government wanted to procure nuclear plants directly through intergovernmental agreements with foreign governments. It also shows that in March 2016, the -department had already prequalified and -selected five countries – Russia, the US, France, Japan and Korea – to submit bids or proposals. This would have contravened the Public Finance Management Act.

The opinion, prepared by Advocate Kameshni Pillay SC and Advocate Nyoko Muvangua in March 2016, shows that the South African government wanted to procure nuclear plants directly through intergovernmental agreements with foreign governments.

The department abandoned its proposed procurement regime after a stinging critique by the lawyers. A senior Treasury official said Gordhan's insistence on doing everything by the book prompted the Presidential State-Owned Companies Coordinating Council, headed by Zuma, to recommend the project be handed to Eskom. Cabinet ratified the decision in October 2016. The Treasury executive said his former political bosses solicited the opinion following sharp disagreements between them and the department of energy about the nuclear build programme's intended procurement process.

"The department of energy would have taken the bid documents to the embassies of the prequalified countries, and not specific companies in those countries. Nobody would have known that procurement had commenced," the official said. The opinion said the department of energy's procurement strategy would have led to the "conclusion of government-to-government contracts" that do "not feature in the legal procurement framework".

"This will have the effect of placing the relevant governments in positions of power to decide independently on suppliers, and this would contradict procurement principles," it says. The opinion also says that, at the time of its compilation, the department had already prequalified and entered into intergovernmental agreements with Russia, the US, France and Korea for the nuclear project. In response, the department stated that South Africa was bound by its international obligations as a member state to the IAEA and that intergovernmental relations should be entered into with countries that are signatories to the NPT.

The department said the arrangement would be "transparent because it will be the outcome of a competitive tender process, and not the result of bilateral negotiations". Following the critique, the department produced a new procurement strategy with a "fundamental shift towards a competitive bidding process, albeit with a few concerns," said the lawyers in a follow-up legal opinion in June last year. Treasury has declined to comment.

The department of energy said it had decided with Eskom and Necsca to recommend to Cabinet that

the last two take over as owner-operators and procurers of the nuclear build programme. "The department's decision was based on a legal opinion about [its] legal competency to procure and complications that would arise regarding the nuclear site applications if the procurer [the department] was different from the licensee and owner-operator of the power plants [Eskom]. The legal opinion noted that the department is not empowered by law to directly procure on behalf of other juristic entities, which are also organs of state, and against their will or without their consent," the department said.

Source: <http://www.news24.com/>, 09 April 2017.

NUCLEAR STRATEGY

NORTH KOREA

Kim: North Korea will Retaliate with Nuclear Weapons if Attacked

North Korea has threatened nuclear retaliation against the US after learning that an American naval carrier strike group had been dispatched to waters off its coast. The Kim regime reacted furiously, making a series of bellicose statements on its state media. "Our revolutionary strong army is keenly watching every move by enemy elements with our nuclear sight," said the Rodong Sinmun newspaper. It said that it was "focused on the US invasionary bases not only in South Korea and the Pacific operation theatre but also on the US mainland".

The foreign ministry said: "If the US dares opt for a military action, crying out for 'pre-emptive attack', the DPRK is ready to react. We will hold the US wholly accountable for the catastrophic consequences to be entailed by its outrageous actions."

The American warships are steaming for the region amid speculation that North Korea is about to carry out another nuclear test or fire off its first intercontinental ballistic missile. In a tweet President Trump said, "North Korea is looking for trouble. If China decides to help, that would be great. If not, we will solve the problem without them! USA." ...

Source: *Richard Lloyd Parry, The Times, 12 April 2017.*

SOUTH KOREA

S. Korea Tried to have Nuclear Bombs in 1980s

While meeting a visiting US official in 1986, then-President Chun Doo-hwan said if South Korea had just three nuclear bombs, it would be enough to induce North Korea to inter-Korean talks, according to diplomatic documents declassified. Chun told this to Edward Rowny who came to Seoul on Oct. 15, 1986, as an envoy of then-US President Ronald Reagan. Rowny made the visit to brief the South Korean government on Washington's arms reduction negotiations with Moscow.

"North Korea will comply with a call for inter-Korean dialogue only if we have three nuclear weapons," Chun reportedly said. "Of course we won't use it, even if we have one." Chun continued, "Communists never respond to pleas if they do not have weak points." The comments are viewed as a euphemistic expression of his regret over the suspension of South Korea's nuclear development program.

The Chun government reportedly gave up nuclear development initiated by the previous Park Chung-hee government to gain support from the US, which was worried about the program. The declassified documents also showed that the Chun government sought to prevent human rights violations in South Korea from being discussed in Europe ahead of Chun's trip to the UK, West Germany, France and Belgium in April 1986.

From 1985 to 1986, South Korea stepped up diplomacy to persuade Europe against branding it a violator of human rights. The Chun government ordered its ambassador in Belgium to convince the members of the European Commission to exclude South Korea from the list of countries

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The United States has 673 deployed ICBMs, SLBMs and heavy bombers; 1,411 warheads on deployed delivery systems; and 820 "deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers.

sponsoring human rights violations.

The measure came after an AFP report in May 1985 that South Korea was to be included on the blacklist again following its removal in 1983. The ambassador highlighted South Korea's positive aspects concerning human rights, expressed regrets over the country being included on the list and requested the commission to remove Seoul from the blacklist. ...

Source: Yi Whan-woo, <https://www.koreatimes.co.kr>, 12 April 2017.

USA

US Boosting Stockpile of Deployed Nuclear Weapons

A new federal report says the US is boosting its stockpile of deployed nuclear weapons while Russia's inventory is in decline, reports Joseph Farah's G2 Bulletin. However, the changes appear to be related to the various ebbs and flows of maintaining arsenals, launchers and equipment, according to a report from the Federation of American Scientists.

The State Department's newest assessment, dated April 1, verified under reporting required by the New START Treaty that the United States has 673 deployed ICBMs, SLBMs and heavy bombers; 1,411 warheads on deployed delivery systems; and 820 "deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers."

Russia's figures in the same three columns were 523, 1,765 and 816. Hans M. Kristensen at the FAS said Russia is "decreasing its number of deployed strategic warheads while the United States is increasing the number of warheads it

deploys on its strategic forces.” He reported the Russian moves follow “its near-continuous increase of deployed strategic warheads compared with 2013.” “But as I previously concluded, the increase was a fluctuation caused by introduction of new launchers, particularly the Borei-class SSBN.” Kristensen said the US changes do “not represent a buildup ... but a fluctuation caused by the force loading on the Ohio-class SSBNs.”

Russia’s deployed warheads total was down by 31 from last October, and it still is 215 warheads over the treaty limit, which it will need to meet before February 2018. “We estimate that Russia has a military stockpile of 4,300 warheads, with more retired warheads in reserve for a total inventory of 7,000 warheads,” he wrote.

“The United States was counted as deploying 1,411 strategic warheads as of March 1, 2017, an increase of 44 warheads compared with the 1,367 strategic deployed warheads counted in October 2016. The United States is currently below the treaty limit and can add another 139 warheads before the treaty enters into effect in February 2018,” Kristensen said. He said the US has an estimated 4,000 warheads in a military stockpile and a total of 6,800.

Source: <http://www.wnd.com>, 11 April 2017.

Trump’s Options for North Korea Include Placing Nukes in South Korea

The National Security Council has presented President Trump with options to respond to North Korea’s nuclear program — including putting American nukes in South Korea or killing dictator

Kim Jong-un, multiple top-ranking intelligence and military officials told NBC News. Both scenarios are part of an accelerated review of North Korea policy prepared in advance of Trump’s meeting with Chinese President Xi Jinping. The White House hopes the Chinese will do more to influence Pyongyang through diplomacy and enhanced sanctions. But if that fails, and North Korea continues its development of nuclear weapons, there are other options on the table that would significantly alter US policy.

The first and most controversial course of action under consideration is placing US nuclear weapons in South Korea. The US withdrew all nuclear weapons from South Korea 25 years ago. Bringing back bombs — likely to Osan Air Base, less than 50 miles south of the capital of Seoul — would mark the first overseas nuclear deployment since the end of the Cold War, an unquestionably provocative move. “We have 20 years of diplomacy and sanctions under our belt that has failed to stop the North Korean program,” one senior intelligence official involved in the review told NBC News. “I’m not advocating pre-emptive war, nor do I think that the deployment of nuclear weapons buys more for us than it costs,” but he stressed that the US was dealing with a “war today” situation. He doubted that Chinese and American interests coincided closely enough to find a diplomatic solution.

“I don’t think that [deploying nuclear weapons is a good idea. I think that it will only inflame the view from Pyongyang,” retired Adm. James Stavridis told NBC News. “I don’t see any upside to it because the idea that we would use a nuclear weapon even against North Korea is highly

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The National Security Council has presented President Trump with options to respond to North Korea’s nuclear program — including putting American nukes in South Korea or killing dictator Kim Jong-un, multiple top-ranking intelligence and military officials told NBC News.

unlikely." Two military sources told NBC News that Air Force leadership doesn't necessarily support putting nuclear weapons in South Korea. As an alternative, it's been practicing long-range strikes with strategic bombers — sending them to the region for exercises and deploying them in Guam and on the peninsula as a show of force.

Mark Lippert, the former U.S. ambassador to South Korea, said nuclear deployment there is a concept that's been embraced by a growing number of Koreans. "Some polls put it at well over 50 %," he said. "It's something that's being debated, and support for it over time, at least at this point, is climbing." Still, he thinks it's a bad idea, undermining the US objective of a nuclear-free zone and "South Korea's moral authority toward de-nuclearization of the peninsula."

Another option is to target and kill North Korean leader Kim Jong-un and other senior leaders in charge of the country's missiles and nuclear weapons and decision-making. Adopting such an objective has huge downsides, said Lippert, who also served as an assistant defense secretary under President Obama. "Discussions of regime change and decapitation...tend to cause the Chinese great pause of concern and tends to have them move in the opposite direction we would like them to move in terms of pressure," he said.

Stavridis, a former NATO commander, said that "decapitation is always a tempting strategy when you're faced with a highly unpredictable and highly dangerous leader." "The question you have to ask yourself," he said, "is what happens the day after you decapitate? I think that in North Korea, it's an enormous unknown." A third option is covert action, infiltrating US and South Korean special forces into North Korea to sabotage or take out key infrastructure — for instance, blowing up bridges to block the movement of mobile missiles. The CIA, which would oversee such operations, told NBC News it could offer "no guidance" on this option. But Stavridis said that he felt it was the "best strategy" should the US

be forced to take military action. He described such action as: "some combination of special forces with South Korea and cyber."

In 2016, South Korea announced the creation of a special operations unit called Spartan 3000 to operate behind enemy frontlines inside North Korea. Trump has already indicated he's open to unilateral action if China fails to rein in its ally, telling the Financial Times over the weekend, "If China is not going to solve North Korea, we will." But, Gen. John Hyten, commander of US Strategic

Command, told the Senate Armed Services Committee that "any solution to the North Korea problem has to involve China." He said that while his job was to present "military options" to the White House, he finds it

"hard ... to see a solution without China."

Still, military exercises and simulations focused on North Korea have been getting larger and more complex in recent years. In 2017 alone, these exercises have included;

- "Key Resolve," a command post exercise held in March
- "Foal Eagle," a peninsula-wide mobilization and logistics exercise underway now,
- An anti-submarine exercise taking place in April, part of the "Silent Shark" series.
- "Nimble Titan," a gigantic multinational missile defense synchronization experiment in March.

And in March, the Army announced that it would permanently station its version of the armed Predator — called Gray Eagle — on the Korean Peninsula. That follows an exercise last summer in which hunter-killer Reaper drones practiced the mock destruction of North Korean mobile missile launchers. Since North Korea's first successful nuclear test in 2009, the US has adopted a strategy to "slow, stop, and defeat" the North's nuclear and ballistic missile pursuits. That ranges from interdiction of supplies to interception of a ballistic missile actually in the air.

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The Trump White House, through the National Security Council, asked for blue sky options in early February, a senior official told NBC on background. "Think big," the official said that the agencies were instructed. Many proposals have already been abandoned, but on the military side, sources say, the three options with the highest impact still constitute the next steps. "It is absolutely appropriate," Stavridis said, for all contingencies to be considered. "In fact, it's mandatory for the Pentagon to present the widest possible array of options. That's what enables presidents to make the right decisions, when they see all the options on the table in front of them."

Source: <http://www.nbcnews.com/>, 07 April 2017.

BALLISTIC MISSILE DEFENCE

USA

US Missile Defence Agency Taps Raytheon for GaN Upgrade

The US MDA has awarded Raytheon a \$10 million contract modification to continue the development of hardware and software that will add GaN semiconductor technology to the AN/TPY-2 BMD radar. GaN increases the radar's range, search capabilities and enables the system to better discriminate between threats and non-threats. GaN technology also increases the system's overall reliability while maintaining production and operational costs, according to the company.

"AN/TPY-2 is already the world's most capable land-based, X-band, BMD radar," said Raytheon's Dave Gulla, vice president of the Integrated Defence Systems Mission Systems and Sensors business area. "Adding GaN technology modernises the system so it can defeat all classes of ballistic missiles in extreme operational environments." The AN/TPY-2 is on pace to be the world's first transportable, land-based BMD radar to use GaN technology.

The AN/TPY-2 Radar Operates in Two Modes: 1) In forward-based mode, the radar is positioned near hostile territory, and detects, tracks and discriminates ballistic missiles shortly after they are launched. 2) In terminal mode, the radar detects,

acquires, tracks and discriminates ballistic missiles as they descend to their target. The terminal mode AN/TPY-2 is the fire control radar for the THAAD, by guiding the THAAD missile to intercept a threat. Raytheon has been developing GaN for 19 years and has invested more than \$200 million to get this latest technology into the hands of military members faster and at lower cost and risk.

Source: <https://www.compoundsemiconductor.net/>, 06 April 2017.

Raytheon's AN/Spy-6(V) Radar Successfully Detects Ballistic Missile Test Target

Raytheon's AN/SPY-6(V) air and missile defence radar has successfully detected the ballistic missile test target at the US Navy's PMRF in Kauai, Hawaii. The radar searched for, acquired and tracked the ballistic missile test target during its first dedicated BMD exercise. The radar system has now registered a series of successes, including tracking of integrated air and missile defence targets of opportunity, satellites and aircraft.

US Navy Above Water Sensors, Programme Executive Office Integrated Warfare Systems major programme manager captain Seiko Okano said: "This marked a historic moment for the navy. It's the first time a ballistic missile target was tracked by a wideband, digital beam-forming radar. AN/SPY-6 is on track for delivery to DDG 51 Flight III." Raytheon's AN / SPY-6(V) offers greater capability in range, sensitivity and discrimination accuracy compared to currently deployed radars, thereby enhancing battlespace, situational awareness and reaction time to effectively counter present and future threats.

The system was built with Radar Modular Assemblies radar building blocks, and is the first scalable and standalone radar that can be grouped to develop any size radar aperture, from a single RMA to configurations larger than those facilitated by currently available systems. Raytheon Air and Missile Defence Radar programme director Tad Dickenson said: "We

remain on track to deliver an unprecedented capability to the fleet. ... AN / SPY-6 also recently carried out an engineering exercise where it searched for, acquired and tracked a MRBM target, from launch through flight. The exercise was performed in conjunction with a SM 3 Block IIA SFTM-01 flight test.

Source: <http://www.naval-technology.com/>, 03 April 2017.

NUCLEAR ENERGY

CHINA

Why the US Fears a Chinese Bid for Westinghouse Electric

The Trump administration is worried that Chinese investors might try to buy Westinghouse Electric, the troubled American nuclear power company that the Japanese conglomerate Toshiba has offered for sale. It is not clear if Chinese buyers might be interested in the business, which filed for Chapter 11 bankruptcy protection. But the worries highlight the new administration's stance on China's global acquisition strategy, and its plans to build up American industries.

Why would China want Westinghouse?:

China is a rapidly expanding nuclear-energy power. It has more than 20 reactors under construction and is aiming to double the amount of electricity it can produce at its plants in the next three to four years. But it lags behind the West in technology. Advanced reactors in China are being built by foreign groups, including Westinghouse, which is installing its next-generation AP1000 units at two facilities in the country. Westinghouse is believed to have been targeted by Chinese spies. If a Chinese entity were to buy the company, China could obtain secrets without the cloak and dagger.

What's Alarming about that?: The Trump administration has not explained why it does not want China to own Westinghouse. Part of its

concern could be economic: A widely predicted "nuclear renaissance" has stalled across most of the developed world – few plants are being built or planned in Western countries – but it is possible Washington does not want China to dominate a future revival. China is an increasingly wealthy and ambitious rival, and an advanced nuclear energy program could help it catch up to the US faster.

Security is most likely a bigger concern. Although Westinghouse does not make nuclear weapons, the Trump administration may fear that China could find ways to use the company's technology to improve its nuclear arsenal, another pillar of its growing power.

How Might Washington Block a Sale?: It has options. The most direct involves the Committee on Foreign Investment in the United States, or Cfius, a government body that reviews acquisitions with possible national security implications. Its members include the secretaries

of defense, state, energy, commerce and the Treasury. While only the American president has the power to block a cross-border acquisition on national security grounds, a recommendation by the committee to squelch a deal is widely considered a death sentence.

Alternatively, the

administration could encourage a rival bid from a business based in the US or in a friendly country — though that could be a challenge, given the small number of nuclear-plant builders and Westinghouse's history of losing large amounts of money.

Does Japan have a Say?: If anything, Japan is more wary of China than the US is, and the government in Tokyo has no wish to see China get its hands on Westinghouse's technology. That means that Japan would most likely welcome moves by the Trump administration to block a Chinese bid. In any case, since Westinghouse is based in the US, Cfius has jurisdiction, regardless of what the

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Japanese might want. Yet Japan does need someone to buy Westinghouse, whose problems have caused billions of dollars in losses at Toshiba, one of Japan's largest and proudest conglomerates, pushing it perilously close to collapse. Eliminating Chinese groups from the pool of potential buyers would come at an economic cost. So of all the ways Washington might block a Chinese bid, simply saying "no" through Cfius, but without arranging a "yes" elsewhere, would be the least appealing to Japan.

Source: <https://www.nytimes.com/>, 07 April 2017.

USA

Origins and Effects of the Downfall of a Nuclear Giant

Westinghouse Electric Company, a subsidiary of Japanese company Toshiba and the largest historic builder of nuclear power plants in the world, filed for Chapter 11 bankruptcy protection in the US

Bankruptcy Court for the Southern District of New York. The insolvency has resulted from a number of factors, most importantly, the massive cost increases and time delays at the two projects in Georgia and South Carolina. As Westinghouse's website puts it somewhat more discreetly, the "company is seeking to undertake a strategic restructuring as a result of certain financial and construction challenges in its US AP1000 power plant projects".

Contributing to the bankruptcy are also certain decisions that Westinghouse made, including, for example, its choice to purchase Chicago Bridge and Iron, which was working on the Vogtle reactors. Done as a part of attempts to resolve a complicated legal tangle, that purchase left Westinghouse with "no way to pass on the cost overruns" associated with the project. Fundamentally, though, what led to this bankruptcy were two bets that Westinghouse and Toshiba made.

The first bet was that there will be a growing and large market for nuclear power plants. When

Toshiba acquired Westinghouse from British Nuclear Fuels Ltd. in February 2006, the press release confidently projected: "By 2020, the global market for nuclear power generation is expected to grow by 50 % compared with today". At that time, the President and CEO of Toshiba estimated that there would be 10 large (1 GW) nuclear reactors built each year till 2020 amounting to 130 GW of new reactor capacity. That estimate was off by at least an order of magnitude. Much of the hype around that time was over what many saw as a coming nuclear renaissance, including Westinghouse personnel.

The second bet that Westinghouse and Toshiba made was that the well-known problems of cost increases and lengthy construction periods could

Indeed one study of construction cost overruns showed that 175 out of the 180 nuclear projects examined exceeded the initial budget, on average by 117 %, and took on average 64% more time than projected.

be solved using its AP1000 design. These problems have afflicted nuclear power plants around the world. Indeed one study of construction cost overruns showed that 175 out of the 180 nuclear projects examined exceeded the

initial budget, on average by 117 %, and took on average 64% more time than projected. Westinghouse promised to beat this trend because of their expectation that "plant costs and construction schedules benefit directly from the great simplifications provided by the design" and because of the adoption of "modular construction techniques".

Based on these, Westinghouse estimated a "cost per kWh of about 3.0 to 3.5¢/kWh for a twin unit plant". Westinghouse projected that the AP1000 reactor would have "an accelerated construction time period of approximately 36 months, from the pouring of first concrete to the loading of fuel". All of these projections have gone spectacularly wrong in both China, with the Sanmen and Haiyang projects, and especially in the US. The modular construction methods only had the effect of shifting some of the problems from the building site to the factory. An important source of technical problems, although not the only one, has been the reactor coolant pumps that were supplied by US-manufacturer Curtiss-Wright Corporation.

In January 2013, NIW reported that Curtiss-Wright found that a piece of a “blade within the pump had separated from the...casting” and it had to recall the RCPs that had already been shipped off. It took two years to make the necessary design changes and fixes. More recently, in February 2017, NIW reported that during pre-commissioning tests, the material that was in the shield blocks had “volumetrically expanded and extruded out of the shield blocks into the nozzle gallery” and there was “internal pressurization of the shield blocks,” according to a heavily redacted report on the issue presented by Westinghouse to the US Nuclear Regulatory Commission and the company was forced to admit that it had “not properly considered” the possibility that the shielding material might expand in volume. The general impression one gets from these reports is that Westinghouse had rushed through with a half-baked design.

Chinese nuclear officials have expressed concern in the past about these problems. In 2013, for example, a former Vice-President of CNNC and Vice-Minister of Atomic Energy complained to South China Morning Post: “Our state leaders have put a high priority on [nuclear safety] but companies executing projects do not seem to have the same level of understanding”. The idea that Westinghouse might get any more contracts to build nuclear reactors in China seems doubtful, to say the least.

As Lin Boqiang, director at the China Center for Energy Economics Research at Xiamen University told Bloomberg News: “The only way Westinghouse can win contracts in China is to demonstrate they can build reactors quicker and cheaper than anyone else in China’s market and win hearts with actions, not words. Westinghouse so far hasn’t demonstrated such abilities.” It is still not clear what the Westinghouse bankruptcy means for the nuclear projects it is involved in, especially with KEPCO, the only serious potential buyer, ruling out acquiring the company.

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China’s State Power Investment Corporation put out the optimistic statement: “The restructuring application by Westinghouse will not have a substantial impact on third generation reactor work such as the construction of the AP1000, the subsequent construction of a batch of CAP1000 reactors or the CAP1400 demonstration project”. Whether this statement really follows a careful assessment or if it is just based on the inherent ambiguity of what “substantial” means, remains to be seen. However, there is no doubt that overly optimistic assumptions, not to say unrealistic wishful thinking, has been part of the generic reasons for the company’s decline—just as in the case of its French counterpart AREVA.

The outcome for the US AP1000 projects is more dire, and abandonment is an explicit option. In the case of the Vogtle project in Georgia, Stan Wise, chairman of the state’s Public Service Commission, pointed out that it is “possible...that Plant Vogtle just doesn’t get finished at all. It’s a real hit and a real blow to something that we felt like was going to be the very best possible energy choice for Georgia maybe even into the next century”. But he also went on to talking about the changes in the energy landscape since the Vogtle plan was initially approved, “with natural gas getting very cheap, and technologies like solar power and batteries improving” and declaring: “If I’d known any of this a decade ago we would have gone a different way”.

SCANA chief executive Kevin Marsh, on the other hand, was more bullish: “Our commitment is still to try to finish these plants. That would be my preferred option. The least preferred option, I think realistically, is abandonment”. But he has also said that SCANA will evaluate various options during the coming 30 days, including:

- Continuing with the construction of both new units;
- Focusing on the construction of one unit, and delaying the construction of the other;

- Continuing with the construction of one and abandoning the other; and
- Abandoning both units.

Independent analysts have pointed out that not abandoning the project right away could result in “the chaos of bankruptcy and reorganization [leading] to a long period of project restructuring uncertainly and more spiraling costs”. If either of those projects are abandoned, they would join the ranks of the forty nuclear new-build projects—including 12 Westinghouse reactors—that were abandoned in the US between 1977 and 1989 at various stages of construction (see Global Nuclear Power Database for details).

At the time, several utilities went bankrupt. The most spectacular among those bankruptcies occurred in August 1983. In what became known as “whoops”, the Washington Public Power Supply System “formally declared that it could not repay US\$2.25 billion in bonds used to finance partial construction of two now abandoned nuclear power plants in Washington State” which led to “the largest municipal bond default in US history”. Rate payers in the region are still paying for those projects.

In 2014, when Westinghouse lost its second bid to get funding from the US Department of Energy’s Small Modular Reactor commercialization program, Westinghouse “reprioritized” staff devoted to SMR “development and funneled their efforts to the AP1000”. Now, with the AP1000 also proving a commercial and engineering bust, it might be time for Westinghouse to turn to plan B and focus on a profitable part of its business: decommissioning nuclear plants, of which Westinghouse CEO at that time Danny Roderick, had said: “We see this as a US\$1 billion-per-year business for us”.

Source: <https://www.worldnuclearreport.org/>, 02 April 2017.

Yes, Nuclear Energy does have a Future in US

As a physicist who has vested my career in energy research, the claim that nuclear energy will never be cost-effective is one I have heard countless times but refuse to believe. The importance of safe and efficient power generation to energy security — and national security — challenges me to push the boundaries of what is possible.

Nuclear energy is by far the largest source of clean, non-intermittent electricity in the United States. We have more reactors than any other nation and produce over 25% of the global supply of nuclear power. But nuclear energy isn’t just important to the US — it also plays a critical role in energy markets around the world. As of 2015, 13 countries relied on nuclear energy to provide

at least 25% of their electricity.

One thing is clear: The world needs nuclear. However, skeptics have a point when they note that cost and reliability issues threaten the nuclear industry. For reactors under construction in the US, cost has a particularly large

influence. As one example, cost overruns have contributed to the visible and unfortunate bankruptcy filing by Westinghouse.

In seeking to address these challenges, some have focused on smaller and less-expensive conventional light-water reactor designs, with mixed success. Just this month, Generation mPower — a joint venture between BWXT and Bechtel to develop small modular reactors (SMRs) — announced the termination of its partnership.

To get its reactor to market as quickly as possible, mPower leveraged existing fuels and materials that had already been approved by the NRC to make marginal improvements over current reactor designs. But now, seven years and \$400 million later, the program was terminated because of a lack of investor interest.

Yet cost, while significant, isn’t the only problem facing the industry. In a post-Fukushima world,

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safety is paramount, and renewables like solar and wind are increasingly attractive to many people, even if they can only provide intermittent power generation.

What will raise the bar to ensure nuclear energy can meet these challenges and continue providing the benefits of its reliable, low-carbon energy? The answer is advanced, non-light-water reactors that leverage new materials and efficient power generation technologies to replace an outdated fleet with 1950s-era designs.

In the last 30 years, researchers have made unprecedented advances in materials science. It is now possible to engineer and manipulate materials for specific applications in ways that were unimaginable just a few years ago. The nuclear industry must embrace these breakthroughs and incorporate new engineered materials and technologies to reshape the future of nuclear power. Now is the time to explore this potential.

For an advanced reactor to be commercially successful in today's market, it must produce cost-competitive clean electricity, be safer, produce less waste, and reduce proliferation risk. These four core attributes must be addressed jointly in an advanced reactor — a reactor that excels at one without regard to the others will not make it to the market. Advanced reactors must also make significant improvements over existing designs, or they risk failure. As the mPower example shows, marginal improvements will not suffice.

In response to these challenges, General Atomics has created an innovative reactor concept, the Energy Multiplier Module, or EM2, that takes advantage of the many advances in materials and energy technology over the past few decades. Designed to minimize cost, EM2 is smaller and more much efficient than conventional light-water reactors.

The differences start in EM2's core, which employs engineered ceramics that are far more durable than the metals used today. Its advanced core

design, which relies on helium rather than water for cooling, allows for higher operating temperatures and higher power densities, thus burning up far more of its uranium fuel and producing far less waste. EM2 eliminates the steam cycle used in light-water reactors, using its helium coolant to directly drive a turbine-generator. Finally, EM2's fuel utilization is five times greater than a light-water reactor's, allowing it to operate for up to 30 years without refueling.

These advances mean EM2 can generate electricity at 35% lower cost than current designs. By greatly extending the fuel cycle and reducing fuel-handling requirements relative to existing reactors that must be refueled every 18 months, the risk of proliferation is significantly reduced.

EM2's fuel rods can survive higher-radiation environments and higher temperatures — more than twice those of the materials used in Fukushima — which combined with additional passive safety methods, mean safety is dramatically improved.

One key component is already showing promise. General Atomics is significantly involved in the Department of Energy's Accident Tolerant Fuel program, ATF, in which the fuel rod technology developed for EM2 is being adapted for use in light-water reactors. This technology can be deployed in the near-term to make our existing fleet much safer.

The way forward for nuclear is through advanced materials and innovative reactor designs that can meet all of the core challenges facing the industry. By leveraging the incredible progress made by the scientific community, we can revolutionize nuclear energy and the larger energy industry. To give up on nuclear power now is to sacrifice an emissions-free, non-intermittent source of electricity with the potential to provide thousands of years of safe, clean energy. As a nation, that is something we simply cannot afford.

Source: Christina Back, <http://www.investors.com>, 11 April 2017.

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NUCLEAR COOPERATION

CHINA-THAILAND

China, Thailand Agree to Nuclear Energy Cooperation

According to an NEA statement on 1 April, the two countries also discussed bilateral cooperation on nuclear power, power networking, power trading and others areas of potential cooperation. "China is very willing to provide Thailand with the most advanced, most economical and safest nuclear power technology, as well as equipment, management experience and quality service," China General Nuclear said the same day. CGN added that China and Thailand had cooperated in nuclear energy over recent years. In particular, China has provided training for hundreds of Thai nuclear professionals and technical personnel. Bekri said he hoped that through the agreement, China and Thailand can "strengthen communication, enhance understanding and make greater progress in nuclear cooperation".

Thailand's NEPC commissioned a feasibility study for a nuclear power plant in the country and in 2007 approved a Power Development Plan for 2007-2021, including the construction of 4000 MWe of nuclear generating capacity, starting up in 2020-21. The new Power Development Plan 2010-30, approved in 2010, envisages five 1000 MWe units starting up over 2020-28. In June 2015, CGN said Thailand was carrying out an independent review of the Hualong One reactor technology. The design, CGN anticipates, could make Thailand's short-list for

possible deployment in any future nuclear power program.

Ratchaburi Electricity Generating Holding – Thailand's largest private power company – agreed in December 2015 to take a 10% stake in the two Hualong One reactors being built as Phase II of CGN's Fangchenggang nuclear power plant in China's Guangxi province.

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Source: <http://www.world-nuclear-news.org/>, 05 April 2017.

INDIA-RUSSIA

Indo-Russian Nuclear Cooperation Blossoms as West Fails to Deliver

It is not surprising, therefore, that Russia's Deputy Minister for Economic Development Oleg Fomichev says "successful collaboration in the nuclear power is driving Indo-Russian economic ties." He said this at the recent Global R&D Summit 2017 in Bangalore. The "meltdown on both sides of the Atlantic Ocean" is a boon for India as the country committed itself to buying French and American reactors as part of the long negotiations to be admitted back into the nuclear commerce club.

Even as Western companies drag their feet over nuclear collaboration with India over various reasons ranging from regulatory hurdles to problems at their own end, India successfully started commercial operation of two 1000 Megawatt units at Kudankulam nuclear power plant built with Russian help and technology in the southern state of Tamil Nadu. Not only that, the India is set to construct 12 Russian-designed units in the coming years.

As India plans to invest \$150 billion in nuclear energy, these Western companies entered into agreements with the country to build atomic plants. But with many of these companies running into financial trouble and eventual bankruptcy, the fate of these deals is now uncertain with India free to chart its course on the

nuclear energy path based on merit. Even as Western companies drag their feet over nuclear collaboration with India over various reasons ranging from regulatory hurdles to problems

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Experts agree that the nuclear cooperation between Russia and India takes the bilateral ties to unparalleled level with arguably no other two countries enjoying a similar relationship. "It is unprecedented, even the former USSR didn't cooperate at this level. Whether you talk about the nuclear power plants in Tamil Nadu or technological collaboration in designing nuclear submarine, there is no parallel between India and Russia," former Russian diplomat Vyacheslav Trubnikov told Sputnik during a recent high-level panel discussion.

"The US did all the heavy lifting in getting India entry into the elite nuclear club, but it is Russia which is actually delivering on the ground," Nandan Unnikrishnan, Vice-President at New Delhi-based ORF told Sputnik at the same discussion.

Source: <https://sputniknews.com/>, 11 April 2017.

RUSSIA-INDONESIA

Russia, Indonesia to Cooperate on Nuclear Regulation

A MOU has been signed between the nuclear regulatory authorities of Russia and Indonesia to cooperate in a range of issues related to the regulation of nuclear and radiation safety and nuclear security. The MOU was signed by Alexey Aleshin, chairman of Russia's Federal Environmental, Industrial and Nuclear Supervision Service (Rostekhnadzor), and Jazi Eko, chairman of Indonesia's BAPETEN.

The agreement was signed on 31 March on the side-lines of the 7th NSC, currently under way at

the headquarters of the IAEA in Vienna. The MOU covers the development of regulations on nuclear safety, radiation and security of nuclear technology; development and implementation of a licensing program; inspection of nuclear and radiation facilities; development of regulations and supervision of the mining and processing of radioactive minerals; and, emergency preparedness and response.

Russia and Indonesia signed a nuclear cooperation agreement in December 2006. Indonesia's Batan is promoting the introduction of nuclear power plants in Indonesia to help meet the county's demand for power. It envisages the start-up of conventional large light-water reactors on the populous islands of Bali, Java, Madura and Sumatra from 2027 onwards. In addition, it is

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planning for small HTGRs (up to 100 MWe) for deployment on Kalimantan, Sulawesi and other islands to supply power and heat for industrial use. Prior to the introduction of commercial reactors in Indonesia, Batan is considering building a test and demonstration HTGR

with an electrical output of 3-10 MWe and a thermal output of 10-30 MWt.

Source: <http://www.world-nuclear-news.org/>, 05 April 2017.

URANIUM PRODUCTION

AUSTRALIA-INDIA

Ready to Supply Uranium to India as Soon as Possible: Australian PM Malcolm Turnbull

Australian PM Turnbull said his country is ready to start export of uranium to India as soon as possible, two-and-a-half years after the two countries signed a civil nuclear cooperation deal. Soon after holding wide-ranging talks with PM Modi, Turnbull said cooperation between the two countries in the energy sector has been on an upswing and Australia would like to assist India in generation of nuclear power.

"We are working closely with India to meet our respective requirements for the provision of fuel for India's civil nuclear programme," he said, adding Australia was looking forward to supply of uranium to India as soon as possible. On his part Modi said Australia is now ready to export uranium to India with the passage of a legislation in the Australian Parliament with bi-partisan support. A joint statement issued after the talks said Modi and Turnbull reiterated their support for continued bilateral nuclear cooperation and that they anticipated commercial export of Australian uranium to India could begin soon.

Australia has about 40 per cent of the world's uranium reserves and exports nearly 7,000 tonnes of yellow cake annually.

India and Australia began talks on the CNCA in 2012 after Australia lifted a long-standing ban on selling uranium to energy-starved India. The agreement was signed during a state visit to India by Australia's then PM Tony Abbott in

September 2014. India, which has nuclear energy contributing just 3 per cent of its electricity generation, will be the first country to buy Australian uranium without being a signatory to the NPT. In the talks, Turnbull noted Australia's strong support for India's membership of the NSG. The Australian side also expressed its support for India's membership of the Australia Group and the Wassenaar Arrangement, the two export control regimes. ...

Source: <http://economictimes.indiatimes.com/>, 10 April 2017.

NUCLEAR PROLIFERATION

NORTH KOREA

Trump Wants Plan to Destroy Nukes

Trump has asked for military options to destroy North Korea's nuclear program, as fears rise the rogue regime of Kim Jong-un is preparing a test within days to mark the 105th birthday of his grandfather and the nation's founding leader Kim

Il-sung. The US President has ordered a US naval strike group to the region, raising the stakes against the hermit state. The USS Carl Vinson super aircraft carrier and its battle group was due to visit Australia but is now steaming north from Singapore towards the western Pacific near the Korean peninsula in a show of force aimed at North Korea.

A joint command centre of Russian, Iranian and militia forces supporting Syrian dictator Bashar al-Assad said the US missile strike on a Syrian airfield had crossed a red line. It's feared Pyongyang may conduct another nuclear test as it prepares its first ICBM test in 2016 — a move that will eventually bring Australia and the US

within range. "The President has asked to be prepared to give him a full range of options to remove that threat (to) the American people and to our allies and partners in the region" Mr Trump's national security adviser HR McMaster said. He said it

was a "prudent" move against "a rogue regime that is now nuclear capable ... North Korea has been engaged in a pattern of provocative behaviour."

Mr Trump "agreed this was unacceptable, that what must happen is the denuclearisation of the Korean peninsula". Secretary of State Rex Tillerson directly linked the recent missile strike in Syria to North Korea, saying it illustrated America's willingness to strike at rogue regimes. "The message that any nation can take is, 'If you violate international norms, if you violate international agreements, if you fail to live up to commitments, if you become a threat to others, at some point a response is likely to be undertaken,'" he said.

"In terms of North Korea we've been very clear that our objective is a denuclearised Korean peninsula." Mr Tillerson said China's President Xi Jinping and Mr Trump, who held a summit in Florida at the weekend, agreed something needed to be done to cut North Korea's weapons program.

North Korea has staged five nuclear tests, two of them in the past year, and satellite imagery suggests its may be preparing for a sixth. North Korea lashed out at the US over the Syrian strike, describing it as “an unforgivable act of aggression” that justified Pyongyang’s decision to acquire nuclear weapons.

China’s Special Representative for Korean Peninsula Affairs, Wu Dawei, has travelled to Seoul for talks on the North Korean threat. The US has urged China to do more to prevent the North from developing its nuclear weapons and missile programs and Mr Tillerson said at the weekend it was prepared to go it alone on North Korea. Mr Trump said that the US was willing to “solve” the problem of North Korea.

Source: <http://www.theaustralian.com.au/>, 11 April 2017.

SAUDI ARABIA–IRAN

Saudi-Iranian Rivalry Fuels Potential Nuclear Race

Saudi Arabia is developing nuclear energy and potentially a nuclear weapons capability. The Saudi focus on nuclear serves various of the kingdom’s goals: diversification of its economy, reduction of its dependence on fossil fuels, countering a potential future Iranian nuclear capability, and enhancing efforts to ensure that Saudi Arabia rather than Iran emerges as the Middle East’s long-term, dominant power.

Cooperation on nuclear energy was one of 14 agreements worth \$65 billion signed during March visit to China by Saudi King Salman. The agreement is for a feasibility study for the construction of high-temperature gas-cooled nuclear power

plants in the kingdom as well as cooperation in intellectual property and the development of a domestic industrial supply chain for HTGRs built in Saudi Arabia.

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The agreement was one of number nuclear-related understandings concluded with China in recent years. Saudi Arabia has signed similar agreements with France, the US, Pakistan, Russia, South Korea and Argentina. To advance its program, involving the construction of 16 reactors

by 2030 at a cost of \$100 billion, Saudi Arabia established the King Abdullah Atomic and Renewable Energy City devoted to research and application of nuclear technology.

Saudi cooperation with nuclear power Pakistan has long been a source of speculation about the kingdom’s ambition. Pakistan’s former ambassador to the US, Husain Haqqani, asserts that Saudi Arabia’s close ties to the Pakistani military and intelligence during the anti-Soviet jihad in Afghanistan in the 1980s gave the kingdom arms’ length access to his country’s nuclear capabilities.

“By the 1980s, the Saudi ambassador was a regular guest of A.Q. Khan” the controversial nuclear physicist and metallurgical engineer who fathered Pakistan’s atomic bomb, Mr. Haqqani said in an interview. ...

The Washington-based ISIS said in a just published report that it had uncovered evidence that future Pakistani “assistance would not involve Pakistan supplying Saudi Arabia with

a full nuclear weapon or weapons; however, Pakistan may assist in other important ways, such as supplying sensitive equipment, materials, and know-how used in enrichment or reprocessing.”

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The report said it was unclear whether "Pakistan and Saudi Arabia may be cooperating on sensitive nuclear technologies in Pakistan. In an extreme case, Saudi Arabia may be financing, or will finance, an unsafeguarded uranium enrichment facility in Pakistan for later use, either in a civil or military program," the report said.

The report concluded that the 2015 international agreement dubbed the JCPOA to curb Iran's nuclear program had "not eliminated the kingdom's desire for nuclear weapons capabilities and even nuclear weapons.... There is little reason to doubt that Saudi Arabia will more actively seek nuclear weapons capabilities, motivated by its concerns about the ending of the JCPOA's major nuclear limitations starting after year 10 of the deal or sooner if the deal fails," the report said.

Rather than embarking on a covert program, the report predicted that Saudi Arabia would, for now, focus on building up its civilian nuclear infrastructure as well as a robust nuclear engineering and scientific workforce. This would allow the kingdom to take command of all aspects of the nuclear fuel cycle at some point in the future. Saudi Arabia has in recent years significantly expanded graduate programs at its five nuclear research centres.

Saudi officials have repeatedly insisted that the kingdom is developing nuclear capabilities for peaceful purposes such as medicine, electricity generation, and desalination of sea water. They said Saudi Arabia is committed to putting its future facilities under the supervision of the IAEA. Saudi Arabia pledged to acquire nuclear fuel from international markets in a 2009 memorandum of understanding with the US. In its report, ISIS noted however that the kingdom could fall back on its own uranium deposits and acquire or build uranium enrichment or reprocessing plants of its own if regional tension continued to fester. It quoted a former IAEA inspector as saying Saudi Arabia could opt to do so in five years' time.

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Saudi Arabia's nuclear agency has suggested that various steps of the nuclear fuel cycle, including fuel fabrication, processing, and enrichment, would lend themselves to local production. Saudi Arabia has yet to mine or process domestic uranium. Saudi insistence on compliance with the IAEA and on the peaceful nature of its program is designed to avoid the kind of international castigation Iran was subjected to. Saudi Arabia is likely to maintain its position as long as Iran adheres to the nuclear agreement and US President Donald J. Trump does not act on his campaign promise to tear up the accord. Mr. Trump has toughened US attitudes towards Iran but has backed away from tinkering with the nuclear agreement.

...Saudi ambitions and the conclusions of the ISIS report put a high premium on efforts by Kuwait and Oman to mediate an understanding between Saudi Arabia and Iran that would dull the sharp edges of the two countries' rivalry. They also are likely to persuade Mr. Trump to try to pressure Iran to guarantee that it will not pursue nuclear weapons once the JCPOA expires in a little over a decade. That may prove a tall order given Mr. Trump's warming relations with anti-Iranian Arab autocracies evident in visit to Washington by Egyptian President Abdel Fattah Al-Sisi and an earlier visit by Saudi Deputy Crown Prince Mohammed bin Salman.

Source: <http://mideastsoccer.blogspot.in/>, 05 April 2017.

NUCLEAR DISARMAMENT

GENERAL

US, Britain, France, Others Skip Nuclear Weapons Ban Treaty Talks

The US, Britain and France are among almost 40 countries that will not join talks on a nuclear weapons ban treaty starting at the United Nations on 16th, said US Ambassador Nikki Haley. Haley

told reporters the countries skipping the negotiations are instead committed to the NPT, which entered into force in 1970 and is aimed at preventing the spread of nuclear weapons and weapons technology. "There is nothing I want more for my family than a world with no nuclear weapons. But we have to be realistic. Is there anyone that believes that North Korea would agree to a ban on nuclear weapons?" Haley told reporters.

The UNGA adopted a resolution in December – 113 in favor to 35 against, with 13 abstentions - that decided to "negotiate a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination" and encouraged all member states to participate. "You are going to see almost 40 countries that are not in the General Assembly," Haley said. "In this day and time we can't honestly that say we can protect our people by allowing the bad actors to have them and those of us that are good, trying to keep peace and safety, not to have them."

The Trump administration is reviewing whether it will reaffirm the goal of a world without nuclear weapons, a White House aide said, referring to an aim embraced by previous Republican and Democratic presidents and required by a key arms control treaty. Britain's UN Ambassador Matthew Rycroft said: "The UK is not attending the negotiations on a treaty to prohibit nuclear weapons because we do not believe that those negotiations will lead to effective progress on global nuclear disarmament."

Deputy French UN, Ambassador Alexis Lamek said the security conditions were not right for a nuclear weapons ban treaty. "In the current perilous context, considering in particular the proliferation of weapons of mass destruction and their means of delivery, our countries continue to rely on nuclear deterrence for security and stability," Lamek said. Beatrice Fihn, executive director of the International Campaign to Abolish Nuclear

Weapons, said in a statement: "It is disappointing to see some countries with strong humanitarian records standing with a government which threatens a new arms race."

Source: <http://www.reuters.com/>, 27 March 2017.

NUCLEAR SAFETY

IAEA

IAEA Calls for 'Commitment and Vigilance' on Safety

Contracting Parties to the Convention on Nuclear Safety highlighted the importance of sustaining and enhancing a nuclear safety culture, maintaining effective legal frameworks, and enforcing safety precautions within the supply chain following a two-week review of nuclear power plant safety. Their seventh review meeting was held from 27 March to 7 April at the IAEA headquarters, in Vienna.

The IAEA said on 7 April that, following intensive discussions and reflections on the national reports of nuclear safety programs from 79 countries,

delegates at the meeting "identified and offered ideas to ensure achievement of high levels of safety". These included ideas to address financial and human resource constraints, safety concerns related to ageing nuclear facilities, and the need for harmonised cross-border emergency planning approaches.

In their summary report, released at the close of the meeting, the Contracting Parties also encouraged the IAEA to continue developing guidance to help countries strengthen regulatory body oversight and practice safety culture. "Maintaining nuclear safety requires long-term commitment and vigilance from countries, as well as effective mechanisms for early detection and assessment of problems and networks for sharing lessons learned," said Juan Carlos Lentijo, IAEA deputy director-general and head of the DONSS.

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He said the need to maintain oversight of the supply chain to ensure safety was a common issue both for countries operating nuclear power plants and those considering nuclear power programs, "because of the lack of availability of identical replacement parts and the need to be able to detect non-conforming, counterfeit, suspect or fraudulent items". And with the number of nuclear-grade certified suppliers "diminishing", he said, access to manufacturers able to meet nuclear standards will become more challenging.

The Convention entered into force on 24 October 1996, setting international benchmarks in the areas of nuclear installation siting, design, construction and operation, as well as financial and human resources, safety assessment and verification, quality assurance and emergency preparedness. The CNS Contracting Parties hold review meetings every three years.

Source: <http://www.world-nuclear-news.org/>, 10 April 2017.

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physical reserve of LEU, acting as a supplier of last resort for Member States in case they cannot acquire LEU from the commercial market or by any other means.

"The agreement with China is a milestone that will help bring the IAEA LEU Bank into operation," Mr Amano said following the signature of the agreement on 5 April in Beijing. Mr Amano also visited China's Centre of Excellence for Nuclear Security, opened last year, which he described as "advanced and comprehensive". The Centre is already training Chinese nationals, as well as professionals from other countries, in a broad range of nuclear security activities – including physical protection measures, nuclear forensics, and frontline training for police and security guards. Mr Amano noted the important role the Centre was playing in strengthening nuclear security in the region and beyond, and looked forward to further collaboration between the Centre and the IAEA in this area in the future.

During his three-day visit to China, Mr Amano met Chinese Vice Premier Ma Kai and Deputy Foreign Minister Li Baodong. Discussions between Mr Amano and his hosts centred around the development of nuclear power in China and globally, and the importance of strengthening nuclear safety and security both regionally and around the world. "China is one of the main centres of nuclear development globally," Mr Amano said. "You have the technology, you have the funds, you have very capable people." China has 20 nuclear power reactors under construction, more than any other country, as well as 36 in operation.

Mr Amano visited the Shanghai Nuclear Engineering Research and Design Institute, as

NUCLEAR SECURITY

IAEA-CHINA

IAEA and China Sign Transit Agreement for LEU Bank

IAEA Director General and Wang Yiren, Acting Chairman of the CAEA, signed a transit agreement for the transport of LEU in support of the IAEA LEU Bank. LEU is the basic ingredient used to fabricate the fuel that runs most nuclear power reactors in the world. Under the agreement, China will ensure the safe and secure transit of LEU and equipment through Chinese territory to and from the IAEA LEU Bank, which is being established in neighbouring Kazakhstan. The IAEA LEU Bank will host a

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well as the major components manufacturing site of the Shanghai Electric Company, which are involved in key projects such as the development and construction of the CAP1400 nuclear power plant, and the high temperature gas-cooled reactor project in China, a project currently under construction at Shidaowan, 800 km southeast of Beijing. The gas-cooled reactor project, which is expected to be completed by 2018, will be the first advanced SMR installation in the world. SMRs are an option for flexible and affordable power generation. Deployable either as single or multi-module plant, SMRs offer the possibility to combine nuclear with alternative energy sources, including renewable.

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

SPAIN

Nuclear Reactor at Spanish Power plant Suffers Unexpected Shutdown

A reactor at a Spanish nuclear power station suffered an unexpected shutdown, according to the CSN. The CSN said it had received a notification from the Almaraz nuclear plant – located in the central province of Caceres and 200 Kms (124 miles) to the southwest of Madrid – informing of a shutdown in one of its reactors.

The plant said that at 9:57 local time, Unit 1 suffered an unprogrammed disruption when the pump that supplied its refrigeration system stopped working due to a power outage. According to the plant, the unit was later restored and returned to a stable condition, “with all controls and safety protocols having functioned correctly.”

The station’s staff were investigating the cause of the anomaly – as well as conducting multiple relevant tests – before reconnecting the reactor to the power grid. The incident had no impact on personnel, the wider public or the environment, the CSN said.

It was classified as a level 0 event on the International Nuclear Events Scale. The Almaraz

nuclear power plant, located on a section of the Tagus River that flows through the western region of Extremadura, sits around 115 Kms upstream from the Portuguese border.

The plant has been the subject of a dispute with Portugal over the construction of a nuclear waste storage site that has required mediation by the European Commission. The Tagus flows west into the Atlantic by the Portuguese capital, Lisbon. Spain planned to build the waste storage facility at Almaraz, which uses the river to cool its reactors, but Portugal objected and took the matter to the European Union. Construction of the storage site has been postponed.

Source: <http://www.laht.com/>, 11 April 2017.

NUCLEAR WASTE MANAGEMENT

USA

Trump Plans to Revive Nuclear Waste Plans Axed by Obama in 2010

The Trump administration in March revived controversial plans to bury the US’s growing stockpile of highly radioactive spent fuel from nuclear power plants and weapons factories in tunnels dug into Yucca mountain in Nevada. But, with local opposition to the plan axed by President Obama undimmed, scientists at the DoE are already hedging their bets. They are pursuing an alternative scheme to drop the hot radioactive waste down hundreds of deep shafts across the US, where it can mix with molten granite in the Earth’s crust. In May, they are expected to announce the site for the first test drilling.

The US currently has some 79,000 tonnes of spent fuel in at least 76 power-station cooling ponds and secure dry stores across the country. Another 2000 tonnes are added each year. The stores contain an estimated 444,000 petabecquerels of radioactivity, which is some 50 times more than released from all atmospheric nuclear weapons

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tests. "US spent fuel pools are densely packed and at severe risk of a fuel fire in the event of an earthquake or terrorist attack that drained cooling water from the pools," says Edwin Lyman of the Union of Concerned Scientists in Washington DC.

Dry air-cooled stores are safer. The NRC says such stores could act as a stopgap for up to 160 years. But all agree that geological burial is eventually needed for waste that will be dangerous for tens of thousands of years. The question is where?

Desert Fuel Dump: Yucca Mountain, which is part of the former atomic weapons testing grounds in the Nevada desert near Las Vegas, has for 30 years been earmarked as the sole burial ground for spent fuel, the most dangerous radioactive waste. A tunnel was dug 500 metres into the mountain in the early 1990s. The plan was to start taking spent fuel in 1998. But local opposition blocked the plan, and some geologists questioned its safety, warning of the risks of local volcanoes erupting magma into the storage tunnels and blasting radioactivity to the surface.

President Obama effectively abandoned the \$100-billion project in 2010 by pulling funding for the licensing process. But he failed to find a replacement site, and Washington is already liable for an estimated \$30 billion to compensate power companies for its failure to deliver a final burial ground for their waste fuel. In March, President Trump asked Congress to approve \$120 million to resume licensing for Yucca Mountain. But the state's governor and senators vowed to continue blocking the plan.

Quietly, since 2010 the DoE has established an alternative disposal route. The idea is to bury the spent fuel in hundreds of narrow shafts drilled 5 kilometres down into solid granite. Up to 40 per

cent of the US might have suitable bedrock, but the technique has still to be tested. In December, the DOE selected four companies to find somewhere with the right geology and local support for test drilling. And in March, at a conference in Phoenix, Arizona, Tim Gunter, the DOE's head of spent fuel management said he expected to announce a test site in May. One site being discussed is in granite bedrock beneath Haakon County in South Dakota. Others are in Texas and New Mexico.

Fergus Gibb of the University of Sheffield, UK, who first came up with the idea 15 years ago, says the radioactive waste would generate so much heat it would melt the surrounding rock and then slowly solidify into a "granite coffin". Yucca may soon be yesterday's news.

Source: <https://www.newscientist.com/>, 07 April 2017.

Shipping Resumes to Only US Underground Nuclear Waste Dump

The nation's only underground nuclear repository has received its first shipment of waste, more than three years after shipping was halted in response to a radiation release that contaminated part of the facility and sidetracked the federal government's multibillion-dollar cleanup program. The US Energy Department said that the shipment from a federal facility in Idaho marked a milestone for the Waste Isolation Pilot Plant and the government sites where tons of waste left over from decades of nuclear weapons research and development have been stacking up.

The Waste Isolation Pilot Plant was forced to close in February 2014 after an improperly packed drum of waste ruptured. Some operations at the repository resumed in December 2016 after an

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expensive recovery effort, but federal officials have acknowledged the resulting backlog. A semi hauling two large casks containing the waste passed through the front gates at the repository in south-eastern New Mexico under the cover of darkness. Two honks of the horn spurred cheers and hoots from workers who were waiting for the delivery.

“To see shipments arriving again at WIPP is celebrated not only by the WIPP workforce and the Carlsbad community, but also by our DOE host communities that support the critical missions of the department,” Todd Shrader, head of the Energy Department’s field office in Carlsbad, said in a statement. The repository plans to receive two shipments a week at first, then ramp up to four a week by the end of 2017.

The initial shipments will come from Idaho, Savannah River in South Carolina and the private Waste Control Specialists in West Texas. Both Los Alamos National Laboratory in northern New Mexico and Oak Ridge in Tennessee are expected to send off two dozen shipments each later in 2017. The Energy Department has said the exact schedule will be adjusted based on several

factors, including weather and how quickly the waste can be taken below ground once it arrives in southern New Mexico.

Work to move the waste into its final resting place – disposal vaults carved out of an ancient salt formation about a half-mile below the surface – now takes more time because of the extra clothing, respirators and heavy monitoring devices that workers must wear to protect against the contamination. Limited ventilation also slows the work. The waste includes gloves, tools, clothing and other materials. It was a drum packed at Los Alamos that triggered the 2014 release. Investigators have said the incident could have been avoided had existing policies and procedures been followed.

In the wake of the incident, policies were overhauled and criteria for characterizing, treating and packaging the waste were bolstered. The Energy Department and its contractors also reached a multimillion-dollar settlement with the state of New Mexico for numerous permit violations.

Source: <http://www.ctvnews.ca/>, 10 April 2017.



Centre for Air Power Studies

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

Centre for Air Power Studies

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