



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

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## OPINION – Peter Prozesky

### Safety Seven Years On

Seven years have now passed since the Fukushima Daiichi accident took place in Japan in March 2011. The event served as an important reminder to everyone in the nuclear industry that safety is a priority for us all. It is opportune to review the practical measures taken by the WANO to support its members to enhance both safety and reliability of nuclear plants worldwide. What has been done in the last seven years, and what more can be done to continue to reinforce safety standards?

In the aftermath of Fukushima, there was a firm resolve from the nuclear industry to identify and address the safety issues that were brought to light by the accident. In particular, there was a commitment to be rigorous in ensuring that lessons were learnt from the event, areas for improvement were identified and that measures to enhance safety were fully implemented worldwide.

WANO – with over 130 members managing more than 460 commercial power plants worldwide – worked closely with its members to identify and implement measures intended to drive excellence in safety at member sites. WANO's Post-Fukushima Commission (PFC), established in April 2011, was charged with

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determining changes that should be implemented within the organisation and its membership. It identified 12 projects. Many improvements were complex and challenging. They required a significant investment of time and resources. These projects have been successfully rolled out and are now a core part of WANO's business activities.

**Emergency Preparedness:** One of the most important early lessons from Fukushima was ramping up the assistance the association provides to its members following an accident, and more focus on accident mitigation, not just prevention. This major aspect of emergency planning is now a fundamental part of WANO's

activities. The regular peer review programme visits now include detailed assessment of a plant and parent nuclear operating organisation's emergency preparedness arrangements.

**Emergency Support Plan:** WANO developed an emergency support plan to provide its members with assistance in an emergency. It aids members in requesting knowledge and technical expertise from other members and ensures accurate information about the emergency is communicated within the membership. The plan integrates WANO's actions with those of other industry organisations such as the IAEA and the World Nuclear Association. In the event of an emergency the plan will be activated, and the organisation will be able to provide accurate event information to its members, as well as coordinating requests for technical expertise and support to the worldwide membership. Each of the four WANO regional centres now has a functional, on-call emergency response capability working in conjunction with our member plants.

**Severe Accident Management:** Severe accident management focuses on the management of onsite actions, as well as contact with offsite organisations, to mitigate the consequences of a severe accident. It ensures that appropriate resources, facilities, equipment and documentation are in place at plants, and that trained and knowledgeable personnel manage severe accidents efficiently. WANO published a self-assessment guide for members and self-assessment is now a routine procedure at member sites. An addendum is to be added this year to WANO's Performance Objectives and Criteria (PO&Cs) incorporating these severe accident management guidelines. The PO&Cs set out the global standards of excellence in nuclear safety and form the guiding document for peer reviews.

**Early Event Notification:** When a newsworthy event at a nuclear power plant happens, WANO gathers information and shares a concise 'early

notification' report with member CEOs. The report provides an overview of the event, its cause, consequence and importance, providing CEOs with timely and factual information. This addresses the problem of a lack of verifiable information immediately following a nuclear event. This amplifies the affected member's public message to a wider audience, who can assess relevance to their country and organisation, and interface effectively with their own stakeholders.

**Onsite Fuel Storage:** The Fukushima event showed that spent fuel storage, including dry fuel storage is sensitive to an event response. WANO's oversight has now improved to ensure that a station can respond quickly to events that affect spent fuel pool cooling or coolant inventory control. These recommendations are also now formally included in

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the regular peer review.

**Design Safety Fundamentals:** The association has extended its activities to assess whether design features deemed necessary to ensure reactor safety are appropriately managed. It looks at design authority, design responsibility and the design-basis-management processes. It is important to emphasise that WANO does not make design-change recommendations or evaluate the design of the plant itself. However, it does utilise design information to inform the reviews and analyses. 'Design-informed' peer reviews now enable WANO to identify areas for improvement in the context of the design features of the station.

**Peer Review Frequency:** Peer reviews are a cornerstone of the service WANO delivers to its members. They help nuclear power plants compare themselves against standards of excellence through an in-depth, objective review of their operations by an independent team from outside their organisation. After the events in Japan, a key recommendation was that peer reviews should be more frequent. Peer reviews are now delivered to each member once every four years, with a follow-up at the two-year point. More frequent insights

into where they can improve means members are more likely to achieve a sustainable uplift in safety levels.

**Peer Review Equivalency:** The organisation now has a process that establishes the equivalency of activities conducted by other external organisations' reviews to those of a WANO peer review. This means that peer reviews conducted by an organisation like the Institute of Nuclear Power Operations (INPO) are equivalent to a scheduled WANO peer review. Members are obliged to host a WANO peer review every four years; equivalency means that peer reviews by other organisations such as INPO can help members meet this obligation. INPO was granted equivalency for corporate peer reviews in February 2016 and other organisations have requested that their activities also be evaluated.

**Corporate Peer Reviews:** Corporate peer reviews are similar to station peer reviews, but focus on the role of the corporate organisation in supporting safe and reliable operation. Their importance lies in the fact that nuclear safety is not just a reflection of the quality of the management and governance systems at a plant, but also the parent company that oversees it. These reviews are now mandated to take place once every six years and look at governance, oversight and monitoring, human resources and communications. Every member has now had at least one corporate peer review, and these provide a benchmark from which to drive improvements in the future.

**WANO Assessment:** The assessment is incorporated into a peer review at a power plant and assigns a numerical rating that captures its overall standard of safety relative to the rest of the worldwide nuclear industry. The assessment rating provides CEOs with quantitative feedback and is intended to help them understand their utility and plant's performance and where resources would be best allocated to yield the greatest improvements. The scale is 1-5, with 1 being the

highest standard and 5 the lowest.

**Visibility and Transparency:** Another requirement from members has been to improve the external visibility and internal transparency of WANO. Visibility is about externally promoting the organisation as a credible entity that collectively represents every nuclear power plant operator regarding nuclear safety. Transparency is about effectively sharing information and best practices within the membership. This is an ongoing effort and includes tailored communication products for members, social media campaigns, corporate videos, infographics and a revitalised public website, which is undergoing further redevelopment in 2018.

**WANO Internal Assessment:** Post-Fukushima, WANO was determined to ensure that it worked better across its global offices, providing greater value for members. Internal assessments of the business take place every four years and corrective actions are suggested, with a reduced-scope follow-up assessment after two years. This ensures the business internally replicates its belief in a learning culture and delivers its mission more effectively and efficiently.

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**Towards a Safer Future:** These 12 projects have been successfully delivered by WANO and its worldwide membership. Our members have collectively implemented around 6000 safety enhancement activities worldwide. The result is that, overall, nuclear safety has improved. The journey towards safety is continuous. The industry must always guard against complacency. WANO will continue to analyse industry performance trends and industry-wide events to support this vigilance. We continue to publish performance indicator data for our members and reports on the more important industry events.

Corporate leadership at the mid-to senior management level within the nuclear industry has a major influence on performance of the plants. A

strong safety culture is at the heart of an effective leadership team and senior managers are key players, due to their positional influence both upwards and downwards. A nuclear leadership programme is helping to bring members together in an environment where they will gain new insights, and hone their leadership skills through interaction with other senior leaders.

Although major advances have been made in nuclear safety and plant performance since Fukushima, the industry must continue to evolve. The ethos and culture at WANO – and the nuclear industry as a whole – is to focus on continuous improvement. WANO will continue to work with its members to deliver on its mission to maximise the safety and reliability of nuclear plants worldwide.

Source <http://www.neimagazine.com/features/03April2018>.

**OPINION – Steve Kidd**

**How to Ensure a Future for Nuclear: Stage 1**

Writers on nuclear tire of concluding that nuclear is at a crossroads, but that remains the case. If nuclear advocates can argue that the environmental impact of nuclear power is trivial by comparison with other generation, it should be possible to achieve traction when clean air and minimising greenhouse gas emissions have become important to the world's population. Other arguments in favour of nuclear may then be put forward, such as enhancing supply security and (in many cases) favourable operating costs.

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achieved. People previously opposed to nuclear (including some within the environmental movement) have shifted their ground. Yet on a sober assessment of the evidence today, achieving the nuclear growth highlighted in the scenarios looks highly unlikely. A remarkable feature of nuclear power's contribution to world electricity supply has been its steadiness over many years. Generation reached 2000TWh in 1990, then carried on rising slowly to exceed 2500TWh in 1999 and 2000. During these years, the nuclear share of world electricity remained at roughly 17%. Since then, apart from reaching 2800TWh in 2006, worldwide nuclear production has stabilised at 2500-2700TWh. But rapidly growing power demand in many parts of the world means its market share has fallen to around 11%.

The most likely scenario for the future is moderate growth at best, eventually reaching 3000TWh but probably struggling to get much beyond. The next ten years are likely to see an average of 7-10 new reactors starting up annually worldwide, to be offset by 4-7 units shutting down. The industry's goal of achieving over 1000GWe of capacity and tripling nuclear production to 7500TWh by mid-century looks like a fantasy.

The number of countries that see nuclear playing an increasingly prominent role in their energy supply is today very limited. In many of the countries where nuclear is currently well-established merely maintaining the existing position is going to be challenging, with closures rather than new build on the cards. The chances of nuclear achieving substantial growth globally without North America and Western Europe look negligible.

Where new reactor programmes are set to go ahead, such as in the UK, it is often to maintain rather than grow the nuclear share. There will undoubtedly be substantial nuclear growth in China and India (and maybe other important developing countries) but without a proper renaissance of nuclear in the West the global targets seem almost impossible to achieve. Moving away from coal and other fossil fuels has to involve a large element of new nuclear, as well as renewables.

The overall theme of these columns over the period since the Fukushima accident in 2011 is that this cannot be achieved without a paradigm shift. I characterise the history of nuclear power since the 1970s (if not the 1950s) as being dominated by a fear paradigm, which is based on deep concerns about the impact of incremental radiation exposure. This, sometimes indirectly, is an important driver of the important arguments advanced against nuclear, such as plant safety, waste management and economics.

**Starting Point for Reform:** The task is to end the exceptionalism of nuclear, to get the technology and its commercial application regarded as just a normal business, rather than something characterised by a huge number of misunderstandings (indeed some blatant lies) and emotion. This task is obviously a huge one, as it is asking people to unlearn most of what they understand about nuclear. The starting point for this has to be achieving a better public understanding of radiation and reforming an international regulatory regime which assumes any incremental doses, however small, are potentially harmful. Those refusing to accept sensible exposure thresholds have to prove that their position is beneficial to human life and health, even if this creates all the stress and uncertainties we saw in the evacuations of citizens after Fukushima. A credible cost benefit analysis of this and alternative regimes needs to

happen.

The nuclear industry and its representative organisations have refused to embrace this approach. In the aftermath of Fukushima, there were discussions within the industry about “rebranding nuclear”. Yet nothing of note has been achieved by the same tired old strategies that have failed in the past, although they have been revamped for a new environmentally-conscious age. Energy decision-making must be reformed in key countries. This has two stages. Firstly, the health, environment and safety benefits of nuclear have to be valued correctly, compared with other energy sources, by focusing on enhancing genuine public wellbeing. Then a level playing field in

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energy markets has to be achieved where nuclear energy is treated on equal terms with other technologies, valuing not only health and environmental qualities, but also reliability and true grid system costs.

That energy policies in many countries are clearly sub-optimal in achieving their objectives is hardly a new revelation and the nuclear sector has been pushing this point for many years. Governments often end up making power supply less secure, more expensive and dirtier. To expect them suddenly to embrace a more rational, evidence-based approach in policy-making is asking a lot. The big hope for nuclear is that policy-makers eventually appreciate that renewable energy has severe limitations and realise that they need a lot more nuclear to achieve environmental, security of supply and economic objectives. This may happen one day, possibly even before 2050, but the omens today don't look so good.

**Fear Factor:** The problem is that for many countries, nuclear is either ruled out or severely hindered because of the fear paradigm. The industry may argue that the advantages of nuclear are so overwhelming that the radiological protection regime is minor, but this is not the case.

If people are afraid of a technology, a factually based evaluation of relative merits goes out of the window. Germans, Austrians and (now it seems) South Koreans are not prepared to use a technology which makes them feel uncomfortable, especially where there are good alternatives available. Their opposition is also not irrational. All they are doing is responding to what they have learned about nuclear, where adverse images have never been successfully countered by fact- and evidence-based nuclear advocacy.

A problem for those trying to favour nuclear with powerful arguments is changing political discourse. Modern politics increasingly resembles a form of tribal warfare, with disrespect for anyone professing to be an expert and a lack of tolerance. There cannot be a proper debate between competing parties unless they accept each that the other's view is worthy of discussion. Achieving a balance in energy policy - accepting that many technologies have an important role to play in tackling climate change not ruling some out for ideological reasons - becomes more difficult. People resent each other's differences, rather than cherishing shared goals.

Any campaign to change things demands a huge focus. It may be possible to win over and excite a new younger generation with an expansive nuclear future, but I would argue for putting all this to one side to concentrate directly on overcoming the fear paradigm. This is a precondition for achieving the 1000 or more nuclear reactors. The problem can be described quite simply. If nuclear power becomes three times as big as it is today, the chance of there being a significant accident involving offsite radiation exposure also triples. If the Linear No Threshold

(LNT) model of radiation protection is still in place, the outcome is unlikely to be much different to the aftermath of Fukushima. In other words, a mass of confusion, uncertainty and sub-optimal policy-making.

LNT means, in many people's minds, that nuclear power cannot be acceptable. It is therefore a mystery why the nuclear industry does little to overcome it. One reason is that it will be very difficult to do so. But if nuclear power is to be a long-term business and appropriate as an energy solution for this century and probably beyond, a start has to be made somewhere. One big problem is that the nuclear sector has now been around for 60 years and has huge inertia. A range of institutions has grown up around it staffed by people who claim to be very much in favour of more nuclear, but do nothing to advance it. Much of what they do is actually harmful.

Meanwhile, many staff have grown up with LNT and their careers have been based on it. Trying to get the general population to understand that radiation is not so scary after all is not going to be their focus. Others involved in non-proliferation and nuclear security aspects continue to focus on unlikely scenarios which also rely on perpetuating nuclear fear. The nuclear sector is actively promoting nuclear as one of the solutions to climate change, while accepting that people should be fearful of it! This resembles the renewables lobby: both act so serious about climate change, but all they seem to be doing is promoting themselves.

Nuclear is trying to join balanced environmentally - focused energy strategies with groups who are determined to shut it down, because it feels too weak to shout louder. So, it will remain as the last

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resort in most countries' energy strategies – and as new energy solutions gradually become available, it will recede further and further into the future. In short, a new strategy is badly needed today, much tougher and much more focused than in the past.

*Source: Nuclear Engineering International, 28 March 2018.*

**OPINION – Bill Gertz**

**Pentagon: Russia Tested Nuclear-Powered Cruise Missile Twice**

U.S. intelligence agencies monitored two Russian tests of an experimental nuclear-powered cruise missile in recent months and found both tests failed to demonstrate the novel use of a reactor to fuel long-range flight, according to Pentagon officials. The two flight tests were conducted in the Russian arctic, including one in November on the island of Novaya Zemlya, the location of a Russian air base and nuclear testing site.

During both tests, the nuclear power source failed to ignite. "Both times it didn't light," one defense official said. This official said the tests raised concerns Moscow created nuclear fallout from the missile impact, either in waters around Novaya Zemlya or on arctic land in northern Russia. Norway's Radiation Protection Authority detected small amounts of a radioactive substance called ruthenium-106 in October 2016. The particles may have come from the test of the nuclear-powered missile. The isotope is not found in nature. Russia denied the fallout came from any of its civilian reactors.

During one test, a modified Russian military transport known as a Il-976 was spotted near the testing site along with vehicles related to Rosatom—an indication nuclear material was used in the test. Few details were available on the new missile, which has been known to both U.S. civilian and military intelligence agencies for at least a year and has been given a classified military designation. The weapon, however, was not mentioned in the Pentagon's recent Nuclear Posture Review among the new strategic weapons Moscow is developing.

Russian press reports have said the missile could be deployed in 10 years. A second official, however, said the missile may have used a non-nuclear energy source to simulate the new technology. The missile was among several new strategic weapons disclosed publicly for the first time March 1 2018, in a speech by Russian leader Vladimir Putin. The new weapons were unveiled days before Putin was reelected president, and were touted by the Russian leader as powerful strategic countermeasures to U.S. missile defenses and what he said was the threat posed to Russia from the United States and its allies.

"One of these is the creation of a small-size super-powerful nuclear power plant placed inside a cruise missile like our latest airborne missile Kh-101 or the U.S. Tomahawk, yet with a flight range tens of times greater and, in effect, unlimited," Putin said. "The low-flying, stealth cruise missile with a nuclear warhead with a practically unlimited range, unpredictable flight path and the ability to bypass interception lines is invulnerable to all existing and future missile defense and air defense systems," he added. According to Putin, the nuclear-powered cruise missile was successfully tested in late 2017 from an unspecified central test range. Putin sought to portray the missile shown in a brief video as having unlimited range and the ability to navigate outside of missile defense radars. "No one in the world has anything like it," he said.

In the video released by the media, the missile appears to be launched from a road-mobile test launcher. A simulation of the missile's flight path shows a launch from Novaya Zemlya. U.S. video analysis of the new missile determined that it is not similar the Kh-101 long-range cruise missile and appears to be an entirely new system. Also, initial intelligence assessments of the missile based on the video suggest that it was powered by some type of high-temperature thruster powered by a nuclear reactor. The United States developed and tested a nuclear reactor-powered ramjet engine for missiles in the late 1950s and early 1960s, but eventually abandoned the program.

Military analysts question whether nuclear-

powered cruise missile would have additional value in penetrating enemy radars compared to a traditionally fueled, long-range cruise missile. Also, the high heat generated by the reactor could make the missile more vulnerable to countermeasures than an ordinary cruise missile. "During the flight, the power plant reached the designated output and provided the necessary thrust," Putin said. "The missile launch and tests on the ground make it possible to move on to the creation of a totally new type of weapon, a strategic nuclear weapon system with a nuclear-powered missile." The defense officials, however, said the Russian leader's boast was false because during both tests the missile's power plant failed to ignite. Missile experts said flight testing an active nuclear reactor is dangerous.

"If the missile had ignited and then failed, they would have had a disaster on their hands," said former Pentagon nuclear weapons expert Mark Schneider. "My view is that this weapon is insane," Schneider said. "It is going to cause a nuclear disaster in testing. What do they plan to do? Dump it into the deep ocean at the end of a successful test? Even if they can soft land it with parachutes, the reactor will melt down because it won't have any cooling." Mitigating the effects of a nuclear reactor meltdown would be are very difficult.

"There would be significant radiation release," Schneider said. "Depending where the wind was blowing, it might end up in Eastern and Western Europe. In my view Russia should be subject to serious economic sanctions for this system and Status 6." The Status 6 is a developmental Russian underwater drone submarine armed with a huge nuclear warhead.

Russian military analyst Aleksey Ramm, who writes for state-run news outlets, reported last month that the new cruise missile is being built by Russia's OKB Novator, a manufacturer of missiles, including long-range cruise missiles.

Ramm stated that public documents from Novator revealed the company is building two new missiles, designated 9M729, a conventional long-range cruise missile, and a second missile known as 9M730 that Ramm believes is the designation for the nuclear-powered weapon. The analyst quoted Russian experts as describing operations of the new cruise missile as employing a nuclear power plant to heat air to several thousand degrees and then creating thrust by ejecting the superheated air. A video of the new missile made public during Putin's speech show the missile employing four rear ports for thrust. Ramm said the missile was tested in the same region as Novaya Zemlya near a town known as Nenoksa.

Source: *The Washington Free Beacon*, 04 April 2018.

**OPINION – Melodie Ha**

**Nobody Puts Japan in the Corner**

North Korean leader Kim Jong Un's surprise two-day visit to Beijing resets the negotiating table for the future of the Korean Peninsula. Kim's meeting with Chinese leader Xi Jinping prior to other heads of state signaled that China will play a significant role in talks to denuclearize and bring a durable peace to the peninsula. To date, Kim has

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also lined up meetings with South Korean President Moon Jae-in on April 27 and U.S. President Donald Trump in May. Talks between Russian President Vladimir Putin and Trump appear to be in the works.

The only party conspicuously left out of these talks is Japan. Tokyo needs to send an unmistakable message to the United States that Japanese interests must also be represented in any bargaining with North Korea. Tokyo has struggled to keep pace with the growing developments regarding North Korea over the past few months. The government only learned Trump would meet Kim after the president had already agreed to the invitation. While Tokyo is trying to establish its presence at these talks, it keeps getting pushed aside.

Trump's agreement to meet Kim in May prompted Prime Minister Shinzo Abe to immediately organize a visit to the U.S. for April 17 and 18 at Mar-a-Lago, to discuss developments with and strategy about North Korea. Abe has stated that he is willing to join a trilateral meeting with Trump and Kim and he has already told Moon that Tokyo is ready for direct talks with Kim. Abe's sudden eagerness to talk shows Tokyo is nervous about being marginalized throughout the series of spring summits. Most notably, Abe is anxious that the U.S.-North Korea talks will focus only on intercontinental-range ballistic missiles, ignoring the medium-range and short-range missiles that threaten Japan.

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In addition, Abe cannot afford to ignore the sensitive domestic issue of compelling Pyongyang to account for the abductions of Japanese nationals by the North Korean regime. Abe's second meeting with Trump at his Mar-a-Lago estate will be a crucial moment for Abe to ensure that Japan's priorities are represented during the U.S.-North Korea summit. Despite a close personal rapport between Abe and Trump, the U.S. not only walked away from the Trans-Pacific Partnership when Trump came to power, but it also recently left Japan off a list of allies (which included South Korea) that would receive exemptions from the Trump administration's tariffs on steel and aluminum.

**Japan needs to work closely with South Korea to secure common interests. South Korea, too, has a vested interest in disarming North Korea's short- and medium-range missiles, but unresolved historical tensions continue to keep the two nations at a distance and isolate Tokyo from the negotiating tables.**

Trump's slights prove that it's not enough for Abe to just meet with the president — Abe needs to spread Japanese interests across the administration during his visit, including meetings with the secretary of state, the national security advisor and the vice president. Moreover, Abe is losing popular support in Japan over a favoritism scandal, which damages his hopes of securing a third term as prime minister. Abe needs

a show of strength not only abroad but also at home, and his April meeting may be the only time to take action.

In addition, Japan needs to work closely with South Korea to secure common interests. South Korea, too, has a vested interest in disarming North Korea's short- and medium-range missiles, but unresolved historical tensions continue to keep the two nations at a distance and isolate Tokyo from the negotiating tables. More than ever, Japan needs to work to resolve these issues with South Korea to ensure its interests can capitalize on current momentum.

Likewise, the U.S. and South Korea benefit greatly from including Japan. First, allied unity is the surest counterweight to having China exercise undue influence on crucial security issues affecting the future of the peninsula. Second, should talks prove no more effective than previous attempts at reducing North Korea's nuclear-armed missile programs, then it is the combination of the Japanese, South Korean and U.S. militaries that will be on the front lines of maintaining deterrence and defense, including layered missile defenses. Third, North Korean diplomacy provides an opportunity for all three countries to cooperate even when confronted with potentially thorny trade and economic disputes in a more protectionist world. If Japan wants to ensure the safety of its citizens and maintain its status in Northeast Asia as a regional power, it needs to

reach out to its allies now before its interests are relegated.

*Source: Melodie Ha is a researcher with the Asia Pacific Security Program at the Center for a New American Security in Washington. <https://www.japantimes.co.jp/>, 09 April 2018.*

**OPINION – Dave Majumdar**

**The Shocking Story of How One Country Built Nuclear Weapons (and Gave them Up)**

The Republic of South Africa is the only country in the world to build a nuclear weapons program, then unbuild that program after domestic and international conditions changed. Why did South Africa decide to build nukes, how did it build them and why did it decide to give them up? The answers are largely idiosyncratic, although they may hold some lessons for the future of nuclear weapons development on the Korean Peninsula and elsewhere.

**South Africa explored the possibility of building or acquiring ballistic missiles capable of carrying nuclear weapons, although this would have required a substantial upgrade of the devices themselves. No full test of the devices has ever been confirmed, as heavy pressure from the United States, the Soviet Union and France helped force Pretoria to cancel an underground detonation in 1977.**

**Origins of Program:** South Africa sought nuclear weapons for familiar reasons. Although it enjoyed presumptive conventional dominance over any likely regional opponent, Pretoria worried that the advantage might erode over time. The South African government also appreciated that widespread disdain for its apartheid system might prevent Western countries (including the United States) from coming to its aid in any serious confrontation against the Soviet Union or its allies. Nuclear weapons would provide not only a direct way of confronting a military attack against South Africa, but also a means of leveraging Western diplomatic and military support during a crisis.

South Africa could mine the requisite uranium on its own territory, and enrich it in domestic facilities. With a modern industrial economy and access to technologically sophisticated institutions of learning and research in the United States and Europe, South Africa could easily develop the technical expertise needed to build a weapon. Already the target of harsh international disdain for its domestic institutions, the South African government did not worry overmuch about how the pursuit of nuclear weapons might make it into an international pariah.

Overall, South Africa constructed six uranium gun fission weapons (similar in nature to the Little Boy weapon dropped on Hiroshima). The devices were

too large to fit onto any existing South African missiles, and consequently would have been delivered by bombers such as the English Electric Canberra or the Blackburn Buccaneer. South Africa explored the possibility of building or acquiring ballistic missiles capable of carrying nuclear weapons, although this would have required a substantial upgrade of the devices themselves. No full test of the devices has ever been confirmed, as heavy pressure from the United States, the Soviet Union and France helped force Pretoria to cancel an underground detonation in 1977.

**Foreign Assistance:** Rumors of foreign assistance for the South African nuclear program

have circulated for years. As a general rule, states do not openly discuss their contributions to nuclear proliferation. In the case of South Africa, the nature of the regime made the idea of open assistance even more poisonous.

Still, analysts suspect or know of at least four countries that supplied a degree of support to South Africa's nuclear program. The United States supplied much of the initial technology associated with South Africa's civilian nuclear program under a variety of different assistance programs. Although not intended to accelerate proliferation, the assistance did provide the basis for South Africa's eventual nuclear program. France and Pakistan may also have supplied technical assistance at various points during the development of the program.

Source: <http://nationalinterest.org/>, 28 March 2018.

**OPINION – Evans J.R. Revere**

**Kim Jong Un will not Give Up North Korea's Nuclear Weapons**

President Donald J. Trump's upcoming summit with North Korean leader Kim Jong Un will be an historic encounter between two supremely self-confident, headstrong, and mercurial men, each seeking the

other's surrender. The irresistible force of Donald Trump, whose administration has declared it will never accept, allow, or tolerate a North Korean nuclear threat to America, will soon meet the immovable object of a North Korean regime that has declared it will never give up its nuclear weapons "even in a dream." What could possibly go wrong?

President Trump agreed to the summit on a whim, surprising his advisers and the South Korean envoys who conveyed Kim Jong Un's invitation. Had he discussed the invitation with his advisers first, he would have heard that Kim's reported interest in a deal on "denuclearization of the whole Korean Peninsula" is nothing of the kind. Those who have negotiated nuclear matters with Pyongyang know that Kim's words were a familiar North Korean demand to end the "threat" posed by the U.S.-South Korea alliance, the presence of U.S. troops in Korea, and the nuclear umbrella that defends South Korea and Japan. A senior North Korean official once explained to a group of American experts, "If you remove those threats, we will feel more secure and in ten or twenty years' time we may be able to consider denuclearization. In the meantime," he continued, "we are prepared to meet with you as one nuclear weapon state with another to discuss arms control."

That is North Korea's concept of "denuclearization." It bears no resemblance to the American definition. It's no wonder that veterans of U.S. nuclear talks with Pyongyang have been troubled by President Trump's eagerness to talk to Kim Jong Un about "denuclearization," especially since he seems convinced this long-sought goal may be within reach.

Experts have questioned whether the president fully appreciates that Kim has no intention of giving up the nuclear weapons his regime has struggled and sacrificed so much to build, and

which play a central role in Pyongyang's survival strategy. North Korea will not give up its nuclear weapons easily, if at all. As Kim Jong Un declared on January 1, 2018, North Korea has "at last come to possess a powerful and reliable war deterrent, which no force and nothing can reverse."

Kim Jong Un travelled to Beijing on March 26 to get China's support before his summits with South Korean

President Moon and President Trump. He offered Chinese President Xi Jinping the same assurances about the "denuclearization of the whole Korean Peninsula." The Chinese, noted experts on North Korean rhetoric, understood these were empty words. But Xi Jinping also knew that Seoul's and Washington's willingness to open negotiations based on insincere promises would reduce tensions on the Korean Peninsula and prevent, at least for now, China's nightmare—a military conflict on the Korean Peninsula.

China was also prepared to bless Kim Jong Un's game plan because it shares North Korea's hope to dismantle the U.S.-South Korea alliance. For all the difficulties in China-North Korean relations in recent years, Beijing and Pyongyang remain strategic bedmates when it comes to the U.S.

"threat." Xi Jinping was also pleased that Kim Jong Un declared the need for South Korea and the United States to "create an atmosphere of peace and stability" and to take "phased, synchronized measures to achieve peace." In plain English, the first phrase aims to get Washington and Seoul to

ease sanctions, reduce military exercises, and ease the pressure on Pyongyang—all steps China favors.

But the second phrase speaks ominously to Pyongyang's intentions. North Korea wants to resuscitate the approach it pursued in every previous nuclear negotiation: Launch a lengthy,

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complicated negotiation to get agreement on actions each party must take, and use this process to buy time for the development of the North's nuclear weapons program. Kim Jong Un's game plan is a familiar one. It is tainted old wine in old bottles. But this time, the North Korean leader is offering to pour it himself, in the hope that President Trump will find it as palatable as his predecessors did.

**Brahmos missile is the heaviest weapon to be deployed on India's Su-30 fighter aircraft. Work has already begun to integrate the Brahmos supersonic cruise missile on 40 Sukhoi combat aircraft which is expected to fulfil the critical needs of the Indian Air Force in the wake of evolving security dynamics in the region.**

By now, the president has been briefed on Kim's game plan and understands the challenge he faces. His new national security team, who have no illusions about North Korea, may try to convince him to cancel or postpone the summit, urging him instead to ramp up the pressure on Pyongyang so that it has no choice but to yield on denuclearization. But if President Trump insists on meeting Kim, he must be prepared either to agree to a long negotiating process that will play into Kim's hands, or to walk away from the table, admit failure, and look at other options, including the use of military force—a step he has previously threatened and one that would lead to a disastrous second Korean War. Faced with these options, the prudent choice might be to press the 'pause' button.

*Source: Evans J.R. Revere is a Nonresident Senior Fellow, Foreign Policy, Center for East Asia Policy Studies, www.newsweek.com, 04 April 2018.*

**OPINION – Thomas W. Lippman**

**Saudi Arabia and the Nuclear Temptation**

Saudi Arabia's crown prince and defense minister, Mohammed bin Salman, seems to have gotten what he wanted from his long glad-handing tour through the United States and several European

capitals. He met President Trump and brand-name business tycoons and potential investors, and took home some actual deals, including a commitment by the giant French oil company Total to invest billions in a new petrochemical complex.

What he should have gotten but did not were stern lectures excoriating his glib, casual attitude about acquiring or developing nuclear weapons. Asked by Norah O'Donnell of CBS

what Saudi Arabia would do if Iran obtained such weapons, he replied, "Saudi Arabia does not want to acquire any nuclear bomb, but without a doubt if Iran developed a nuclear bomb, we will follow suit as soon as possible."

**Nuclear power generation is growing rapidly in Asia, having increased by 35% over the last five years. Asia is a focus of new nuclear build, with 40 of the 56 reactors under construction globally being built in Asian countries. New countries are planning to start using nuclear generation, with construction of Bangladesh's first reactor under way and preparations progressing in countries such as Jordan, Saudi Arabia and Turkey.**

Either the young prince was badly briefed or his knowledge of history and international security affairs is thin. He does not seem to realize that his grand plans for modernizing his country and restructuring its economy, which are based on full integration into the global industrial and financial system, would fall apart if the United States and its allies thought that Saudi Arabia was pursuing nuclear arms. He could forget those big

investments and deals, and most of his country's sources of military equipment and training would dry up. The damage to his country that pursuit of nuclear weapons would cause would far outweigh any conceivable strategic gain. Does he not know why Iran was subjected to crippling economic sanctions for all those years before the multinational agreement of 2016 curtailed its nuclear program? Does he not know why North Korea is a pariah state?

Saudi Arabia is a party to the NPT, which prohibits signatories other than the five recognized nuclear

powers from acquiring or developing a nuclear arsenal. Israel, India, and Pakistan have gotten away with their weapons programs because they are not parties to the NPT and thus have no legal obligation to abide by its terms. Even so, Pakistan did not escape the wrath of the U.S. Congress when it tested nuclear weapons in the 1990s, as bipartisan majorities enacted laws that authorized Presidents George H.W. Bush and Bill Clinton to impose stiff sanctions, which they did.

Saudi Arabia, which has few friends in Congress, would be unlikely to escape the same fate. The kingdom cannot afford to become an international outlaw, like North Korea, or to see its oil sales curtailed and its access to global financial markets cut off, like Iran. That would put an end to the grand development plan the prince has styled "Vision 2030."

The kingdom, like any other NPT state, is authorized to develop nuclear energy for peaceful purposes, and in fact President George W. Bush promised to help it do so. There is not necessarily any connection between nuclear energy and nuclear weapons—many countries have one without the other. But given the prince's comments, his country's plans to develop nuclear power are bound to attract scrutiny and inspire suspicion, not only in Congress but in Israel.

When the Kingdom first aroused suspicion on this subject in 1988 by secretly acquiring nuclear-capable missiles from China, senior U.S. officials warned the Saudis that they had added the country to Israel's target list. Bipartisan majorities in both houses of Congress promptly passed resolutions opposing the sale of support equipment for the kingdom's AWACS spy planes, and the White House postponed a new round of weapons sales. The United States calmed down only when Saudi Arabia agreed to sign the NPT,

which it had previously refused to do because Israel had not.

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The crown prince, who is 32 years old, is not the first senior member of the ruling family to say that Saudi Arabia would match whatever weaponry Iran acquired. Prince Turki al-Faisal, the former intelligence chief and ambassador to the United States, has been saying that for years. But Prince Turki was out of government when he took that position. Prince Mohammed, who is destined to become king within a few years when his father passes from the scene, has the authority to make what would amount to a catastrophic blunder.

Unfortunately, there do not appear to be many voices inside Saudi Arabia urging caution or restraint on this front. At one recent private gathering, Saudis with years of experience in foreign affairs and security policy seemed quite blasé about it. Their attitude was that the crown prince was only stating the obvious when he made his comments to O'Donnell: Iran is dangerous, hostile, and threatening, and would only become more so if it had nuclear weapons and Saudi Arabia did not. If they understood the gravity of the consequences for the kingdom if it went down that road, they showed no sign of it.

Prince Mohammed was perhaps shooting from the hip in his response to O'Donnell, emulating his buddy Donald Trump, rather than articulating a serious policy decision. A clue to the his true intentions will be found in the outcome of Saudi Arabia's negotiations with the United States over a nuclear cooperation agreement, which would set the terms by which U.S. companies could sell nuclear equipment or technology to the kingdom.

According to many reports, the Saudis are asking that a bilateral deal, known as a "123 Agreement" for the section of the law that requires it, permit

them to control both ends of the nuclear fuel cycle. In that way, they could enrich their own uranium and reprocess fuel once it is used up to extract the plutonium generated by the chain reaction. An existing agreement between the United States and Saudi Arabia's neighbor Abu Dhabi permits neither. That agreement is known in the industry as the "gold standard." But Saudi Arabia does not want to accept the "Abu Dhabi model" because the international agreement limiting Iran's nuclear program does not prohibit enrichment.

Enriched uranium fuel for nuclear reactors is plentiful in world markets, but Prince Mohammed has said that Saudi Arabia wants to take advantage of its own domestic resources by doing its own enrichment. Even if there is a valid argument to be made for enrichment, however, the Saudis cannot make a legitimate argument for reprocessing to capture plutonium, which has limited civilian uses but is primarily a fuel for nuclear weapons.

Sen. Edward Markey (D-MA), who has long opposed nuclear energy in any form, can be expected to lead congressional opposition to a 123 agreement that allows reprocessing. "Saudi Arabia's crown prince has confirmed what many have long suspected—nuclear energy in Saudi Arabia is about more than just electrical power, it's about geopolitical power," Markey said in a statement last month. "The United States must not compromise on nonproliferation standards in any 123 agreement it concludes with Saudi Arabia." He said Saudi Arabia is interested more in "megatons than megawatts."

The Saudis could obtain civilian nuclear power reactors from other countries—South Korea provides those in Abu Dhabi—and it would not need an agreement with the United States to do that. But if it rejects a 123 agreement because it insists on retaining the right to reprocess, it will be sending an unmistakable and ill-advised

signal.

Source: <https://lobelog.com>, 13 April 2018.

**OPINION – Daily Times**

**USA's Nuclear Hypocrisy**

According to media reports (March 26, 2018), USA has clamped nuclear-trade sanctions on seven Pakistani companies. This step presumes the companies may import dual-use material for nuclear fabrication or proliferation. Imposing

sanctions without defining offence is unjust. Lt General (Retd) Kamal Matinuddin, in his book *The Nuclearisation of South Asia* (page 17) says, "...by now nuclear technology was no secret. Dual use technology was available off the shelf. The Atom for Peace programme, initiated by the Eisenhower Administration in 1953, also

helped in spreading technical know-how to produce nuclear energy in many developing countries".

India was the foremost critic of the NPT in 1968 when it was sponsored by the USA, erstwhile USSR and UK. India pointed out that the NPT was flawed in that it did not cover several types of nuclear weapons which could be made available to NATO forces, including non-nuclear countries, during 'alert'.

NATO gave operational training to troops of even non-nuclear countries to use such weapons. The nuclear weapons, outside circumference of NATO, included: (1) Genie air-to-air rockets, (2) thermonuclear tactical bombs (e.g. B28), (3) Honest-John missile, (4) Nike-Hercules missile, (5) Lance missile, (6) artillery-fired atomic projectiles, and (6) Pershing missiles. K Subrahmanyam in his book *Nuclear Proliferation and International Security* points out 'the real problem of proliferation as highlighted by the history... is the continuing 'qualitative and quantitative' proliferation of nuclear weapons by the sponsors of the treaty and not so much new nations becoming self-acknowledged nuclear weapon

**The Saudis are asking that a bilateral deal, known as a "123 Agreement" for the section of the law that requires it, permit them to control both ends of the nuclear fuel cycle. In that way, they could enrich their own uranium and reprocess fuel once it is used up to extract the plutonium generated by the chain reaction.**

powers'. Pakistan too had reservations concerning the NPT.

Sahibzada Yaqoob Khan, former Foreign Minister of Pakistan, in his inaugural address at an international conference on Nuclear Non-Proliferation in South Asia, at the Institute of Strategic Studies, Islamabad, in September 1987, questioned: Does the United States have the moral right to ask other nations not to produce nuclear weapons when, even after the collapse of the 'evil empire' and the threat from its enemy having virtually disappeared, its nuclear arsenal still has a total of 35,0230 nuclear warheads? The five countries which possess nuclear weapons can legitimately ask others not to acquire these weapons only if they themselves are genuinely prepared to eliminate their own nuclear arsenals.

This ethical basis for nuclear non-proliferation is all too often forgotten. Matinuddin adds, 'According to one estimate, 127,000 nuclear warheads, including strategic and tactical weapons were produced during the Cold War.... Despite the NPT, the recognised nuclear weapon states continued to produce more nuclear weapons, reaching the maximum of 55,000 nuclear weapons by 1988'.

Source: <https://dailytimes.com.pk/>, 31 March 2018.

**NUCLEAR STRATEGY**

**PAKISTAN**

**Pakistan Tests Nuclear-Capable, Submarine-Launched Missile with a Range of 450km**

Pakistan tests nuclear-capable, submarine-launched missile with a range of 450km Pakistan has conducted a test of its nuclear-capable, SLCM, Babur, which has a range of 450 km, with the country's military saying the weapon system

provides it a "credible second strike capability". Pakistan has been working hard on developing this capability – to carry out a retaliatory nuclear strike even after an enemy's nuclear attack destroys or neutralises its land-based nuclear arsenal – which India already has.

**The Israeli military for the first time publicly acknowledged carrying out the 2007 airstrike that destroyed a suspected nuclear reactor in Syria, noting the mission should be a warning to Iran the Islamic Republic will not be allowed to develop nuclear weapons.**

The Pakistan military's media arm described the test of the indigenously developed missile as successful. The missile is capable of delivering various types of payloads and incorporates advanced technologies, including underwater controlled propulsion and sophisticated guidance and navigation features.

"SLCM Babur provides Pakistan credible second strike capability, augmenting the existing deterrence regime," the ISPR said in a statement. There was no official word on the development from India's defence ministry or the military. ... The development of second strike capability "reflects Pakistan's response to provocative nuclear strategies and

**Israel and Syria have always been bitter enemies. Throughout Syria's seven-year civil war, Israel has carried out well over 100 airstrikes, most believed to have been aimed at suspected weapons shipments destined for the Iranian-backed Hezbollah militant group, which targets Israel.**

posture being pursued in the neighbourhood through induction of nuclear submarines and ship-borne nuclear missiles, leading to nuclearisation of Indian Ocean region," the statement said.

The Babur missile was fired "from an underwater dynamic platform" and "successfully engaged its target with precise accuracy, meeting all the flight parameters", the statement said. A brief video posted on the ISPR website showed the red and white missile emerging from water and cruising over the sea before hitting a target on land. At the time of its launch from the underwater platform, the missile was within a capsule which was jettisoned when the Babur rose above the sea surface. The military did not say where the test was conducted.

The test was witnessed by director general of the SPD, which is responsible for managing Pakistan's nuclear arsenal, the commander of the Naval Strategic Force Command, senior officials, and scientists and engineers from strategic scientific organisations. This is only the second time that Pakistan has announced a test of the submarine launched Babur-III missile, with the first test being conducted in January 2017. During the first test, the Babur-III was launched from an unidentified "underwater mobile platform". The Babur-III is the naval variant of the land-based Babur-II, which was tested in December 2016.

Source: <https://www.hindustantimes.com/world-news/>, 30 March 2018.

**RUSSIA**

**Russia Almost Brought Back a Terrifying Weapon: Nuclear ICBM's on Trains**

In 2013, the Russian military announced it would bring back rail-mobile ICBMs. In other words, trains with big nukes crammed inside, capable of darting around Russia, raising their launchers and firing at a moment's notice. It was called Barguzin and would begin testing in 2019.

That was the idea. In December 2017, the Russian government put the Barguzin project on hiatus, saving the world from the specter of doomsday trains roaming Siberia. The ostensible reason — the weapon is too expensive, according to Rossiyskaya Gazeta, the government's paper of record. The Barguzin project was a revival of a retired leg of the Soviet Union's ground-based nuclear "triad." While the Soviets had nuke-equipped submarines and nuclear-armed bombers, its ground-based component had nuclear missiles mounted on huge trucks, inside underground silos and on trains. The Soviet military first signed the order for the creation of rail-mobile ICBMs in 1969, but the launchers came later.

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**Barguzin was a response to the U.S. Prompt Global Strike program which focuses in part on hypersonic weapons capable of rapidly striking anywhere in the world. But that project is still active. Last year, the Pentagon spent more than \$180 million on it.**

In October 1987, the first rail ICBM became operational in the form of the "Moldets," a train armed with a 77-foot-long RT-23 — a type of ICBM which was also stored in silos — carrying 10 multiple-reentry warheads with 550 kilotons of explosive power each. In the 1990s and 2000s after the START II treaty, Russia decommissioned these missiles, which NATO referred to as the SS-23 Scalpel. The Kremlin produced 12 of these trains.

And that was the end of Russia's rail-mobile missiles until the Kremlin announced in 2013 that it would create a new nuke-armed train under the moniker Barguzin, or BZhRK, this time equipped with the more advanced RS-24 Yars ICBM.

The RS-24 has a similar range to the RT-23 but is three meters shorter and weighs half as much — a considerable advantage for mobile missiles. The RS-24 is also, by the way, road-mobile. The perks are clear, in theory. Missile launchers that can dart across a country before they launch are harder to detect compared to fixed silo-based missiles.

Smaller launchers can also blend in better with ordinary rail cars. It's all about making the job of U.S. military intelligence a little bit harder.

Enemy launchers — "counterforce" targets — that are harder to track also

require you to use more of your own missiles to destroy them, which leaves fewer of your missiles for other targets. The Russian military made some progress on Barguzin with a 2015 test, according to Rossiyskaya Gazeta. But the decision to cancel it makes one wonder whether the Kremlin was even serious about the project, or whether it was merely engaged in a form of military posturing as U.S.-Russian relations deteriorated during the same timeframe.

One Russian general in 2012 said the Barguzin was a response to the U.S. Prompt Global Strike program which focuses in part on hypersonic weapons capable of rapidly striking anywhere in the world. But that project is still active. Last year,

the Pentagon spent more than \$180 million on it. In any case, putting the kibosh on the Barguzin is for the best. The world doesn't need more nuclear missiles. And it's better for Russia, as rail-mobile nuclear missiles are expensive compared to silo-launched missiles, and are in some ways more vulnerable than their logic suggests.

During peacetime they require a network of bases for storage and maintenance, where international treaties require them to stay, and extensive security detachments to protect the missiles when they move during wartime. And they're still stuck on railroad tracks — so U.S. spies have a general idea of where to look. Which also begs the question as to whether the nuclear-war trains could even make it out of their bases in time before incoming missiles hit in the opening minutes of a nuclear war. Sure enough, the Pentagon studied the issue during the Cold War, and even built two prototype train cars intended for the Peacekeeper ICBM, but found them to be not worth the cost and rather vulnerable.

Source: <http://nationalinterest.org/blog/the-buzz/>, 03 April 2018.

## BALLISTIC MISSILE DEFENCE

### USA

#### Missile Defense Review Expected in May

The Trump administration's review of America's missile defense capabilities is now expected to be released in May. The Missile Defense Review, a strategy document designed to take a holistic view of America's missile defense posture, was expected to be released in February. But finally, it appears the document is nearing completion.

Pentagon spokesman Tom Crosson, in response to an inquiry by *Defense News*, said that the review is "currently in development" and that "we expect to release the review sometime next month." The review is expected to be unclassified.

The review is part of a series of big-picture strategic documents that started with the December release of the National Security Strategy, followed by the January release of the National Defense Strategy, and continued with February's Nuclear Posture Review.

Notably, the review was originally positioned as a "ballistic missile defense review," but the term ballistic has since been dropped by the Trump administration — something Tom Karako, a missile

defense expert with the Center for Strategic and International Studies, said was a wise choice. "The fact that the administration has dropped 'ballistic' from the review's title indicates the document will probably employ a wider lens," Karako wrote in a CSIS analysis. "This could

include a robust effort to better defend against Russian and Chinese cruise missiles, other maneuvering endo-atmospheric threats like hypersonic boost-glide vehicles (HGVs), and advanced short-range ballistic missiles."

Although no one has spelled out the direction of the review, there have been some hints given about where the administration intends to take missile defense. The FY19 budget request for the Missile Defense Agency, for instance, increased by \$2 billion from previous funding levels, with an express focus on defeating a missile threat from North Korea. And Michael Griffin, the Pentagon's new head of research and engineering, has expressed support for investing in airborne missile defense capabilities.

Source: <https://www.defensenews.com/space/>, 07 April 2018.

## NUCLEAR ENERGY

### BELGIUM

#### Belgium Approves Nuclear Phase-Out Strategy

The Belgian government on 30 March approved a new energy strategy to phase out its seven commercial nuclear power reactors between 2022

and 2025. Investment will be allocated instead to renewable energy, and in particular for offshore wind farms. A draft bill will be ready for submission to the Council of Ministers by 31 May. Belgium has two NPPs at Doel and Tihange. Doel NPP has four pressurised water reactor and Tihange NPP has three. The Brussels-based Nuclear Forum, which represents 12 nuclear industry organisations, said on 3 April 2018 that the phase-out would harm Belgium's chances of achieving its climate targets, adding that emissions would triple by 2050.

The Forum added: "Even if the share of renewable energies increases considerably in the coming years, we will have to resort to complementary sources of energy. "Nuclear energy makes it possible to maintain affordable prices, to guarantee our security of supply and to achieve the climate objectives in limiting our CO2 emissions." The Doel and Tihange units are licensed until the end of 2025, and the phase-out will simply be a case of not renewing their permits. Both plants have been the focus of safety concerns. Micro-cracks were discovered in reactors at both sites in 2013 and units closed until 2015 while extensive safety checks were carried out.

Source: <http://www.neimagazine.com/>, 04 April 2018.

## JAPAN

### Japan Pushes Renewables, Keeps Nuclear in Energy Plan through 2050

Japan will accelerate the development of renewable energy and keep its current policy of lowering its dependence on nuclear power as it aims for a low-carbon society, a government panel report on the country's energy plan through 2050.

The long-term policy comes as Japan lags behind the global trend to invest in renewables, and nuclear power is no longer deemed a cheap energy source in the wake of the core reactor meltdowns at the Fukushima Daiichi plant in 2011, with utilities required to invest massively to meet

tougher safety regulations. "Japan will keep the policy of lowering its dependency on nuclear power generation as much as possible while seeking to expand economically independent and carbon-free renewable energy," the report by the eight-member panel said. The members include scholars and business executives.

The report did not set out numerical percentages of the country's future energy mix in 2050. An official at the Ministry of Economy, Trade and Industry said it is hard to predict a specific energy scenario as it depends on how technological developments in energy sources progress. The most recent targets set out in 2015 seek to have renewable sources account for 22 to 24 percent and nuclear 20 to 22 percent of electric power generation in fiscal 2030. Under the 2015 Paris climate accord, Japan aims for an 80 percent cut in greenhouse gas emissions by 2050 from 2013 levels.

**The most recent targets set out in 2015 seek to have renewable sources account for 22 to 24 percent and nuclear 20 to 22 percent of electric power generation in fiscal 2030. Under the 2015 Paris climate accord, Japan aims for an 80 percent cut in greenhouse gas emissions by 2050 from 2013 levels.**

The report acknowledged that while there have been global movements to phase out nuclear power following the Fukushima crisis, efforts have also been made to enhance the "safety, economic feasibility and mobility" of nuclear power generation. Japan should first regain public trust in nuclear power following the Fukushima disaster, triggered by the March 2011 massive earthquake and tsunami, and strive to "strengthen personnel, technology and industry base" in pursuit of nuclear reactors with enhanced safety, the report stated.

"There have been concerns that our country's high-level nuclear technology and personnel will be lost following the Fukushima crisis. The panel members pointed out the need to maintain them to enhance safety of nuclear reactors," the ministry official said. The official said the report puts an emphasis on the development of renewable energy out of a "sense of crisis," with the country currently slow to invest in such energies.

"Honestly speaking, Japan does not have competent companies in the field of renewable energy and we rely heavily on imports of

renewable technology, such as solar panels. The panel is concerned Japan should recoup in the long-term," the official said. Noting that output of solar and wind power generation tends to be influenced by the weather, the panel called for the development of batteries to store surplus renewable energy and converting it to hydrogen. As for thermal power generation, the report said it will remain a major power source in 2050 but inefficient coal plants should be phased out with more focus on gas plants. The report is set to be reflected in a separate government energy plan through 2030 that is due to be finalized this summer.

*Source: <https://mainichi.jp/english/articles/>, 10 April 2018.*

## **RUSSIA-CHINA**

### **Atlantic Council Report Analyzes Russian, Chinese Nuclear Power Competition**

In a recent report, Washington, D.C.-based think tank Atlantic Council analyzed challenges to U.S. nuclear power leadership from Russia and China and emphasized the role of U.S. nuclear energy engagement and investment in nuclear energy in promoting nuclear safety and nonproliferation.

"Nuclear power should be elevated in the Trump administration's U.S. National Security Strategy, including its 'energy dominance,' defense-industry capacity development, and international partnership efforts with allies," the report said. "U.S. global nuclear engagement is critical—not only because it supports military needs and advances commercial interests, but also because it brings with it a culture that promotes safety, security of nuclear materials, and nonproliferation."

The report argues that the United States has a stronger commitment to nuclear safety, security of nuclear materials and non-proliferation than China or Russia. Challenges to U.S. nuclear power leadership could have significant geopolitical and security consequences, the report said. The report also estimated that approximately two-thirds of the new reactors under construction worldwide use designs from China and Russia.

China offers financing options from its own Export-Import (Ex-Im) Bank, and Russia uses resources from the Russian state budget and the

Russia Wealth Fund, the paper explains. China and Russia are also investing heavily in the development of advanced commercial nuclear technology. The U.S. Export-Import Bank's board of directors, on the other hand, is without a quorum and so cannot consider medium- and long-term transactions exceeding \$10 million, which excludes commercial nuclear deals from consideration.

*Source: <https://dailyenergyinsider.com/news>, 09 April 2018.*

## **TURKEY**

### **Turkey's First Nuclear Plant Kick-Started by Erdoğan, Putin**

Turkey and Russia launched construction of Turkey's first nuclear power plant in the southern province of Mersin with a ceremony in the capital Ankara on April 3. President Recep Tayyip Erdoğan and his Russian counterpart Vladimir Putin jointly lay the ground for the plant on the Mediterranean coast via a video teleconference held at the presidential complex.

"The Akkuyu plant will become the 56th nuclear plant under construction in the world. When the first reactor of the Akkuyu plant is put into operation in 2023, Turkey will join the family of nuclear energy producers," Erdoğan said. "The distance we have covered in our relations with Russia in the last 15 years is very important," he added, also referring to an agreement for Ankara to purchase long-range S-400 missile defense systems from Russia and the Turkstream natural gas pipeline project to transport Russian gas. ...

Turkey's TAEK atomic energy authority on April 2 granted Russian builder Rosatom a construction license to start work on the first unit of the Akkuyu nuclear power plant, state-run Anadolu Agency reported. "As a result of the construction license process, an important step in the project started nearly three years ago, being completed ... it has been decided by TAEK to grant a construction license for the construction of the first unit of the Akkuyu Nuclear Plant," read a TAEK statement. Meanwhile, Turkey's approval for Gazprom's onshore portion of the TurkStream gas pipeline's second line is still pending, Russian Energy Minister Alexander Novak said on April 3.

"As for the onshore part, this is now at the

discussion stage ... the [Russian and Turkish] companies are discussing the protocol," Novak told reporters. All permissions for the offshore part have been received and it is under construction, he added. Akkuyu nuclear plant will be built by Russia's Rosatom on the Mediterranean coast for a price tag of \$20 billion. Rosatom holds a majority share in the plant with 51 percent. The remaining 49 percent stake was originally planned to be divided between a Turkish consortium of three contracting conglomerates under the name Cengiz-Kolin-Kalyon (CKK). However, Kolin and Kalyon recently decided to pull out of the project, citing an inability to agree on commercial terms.

Rosatom has said it is engaged in talks aiming to bring in Turkish state electricity producer EÜA<sup>a</sup> as a new shareholder in the project. The plant will have a capacity of 4,800 megawatts in four units and a working life of 8,000 hours per year. In the first phase of the construction, two units with a capacity of 2,400 megawatts are planned. ...

Source: <http://www.hurriyetdailynews.com/>, 03 April 2018.

**NUCLEAR COOPERATION**

**CHINA-RUSSIA**

**Chinese, Russian Nuclear Exports Threaten US Leadership**

The Trump administration must not neglect the influence of the U.S. commercial nuclear industry in building alliances and spreading American norms for nuclear safety and nonproliferation in the face of increasing Chinese and Russian competition, a new report from the Atlantic Council urges.

**Rosatom has said it is engaged in talks aiming to bring in Turkish state electricity producer EÜA<sup>a</sup> as a new shareholder in the project. The plant will have a capacity of 4,800 megawatts in four units and a working life of 8,000 hours per year. In the first phase of the construction, two units with a capacity of 2,400 megawatts are planned.**

**Russia and China lead the international market in commercial nuclear energy by offering a complete package of construction and operation of new nuclear power plants, technological innovation and attractive financing options. In contrast, the U.S. often struggles to offer its international customers a comparable comprehensive deal.**

"Nuclear power should be elevated in the Trump administration's U.S. National Security Strategy, including its 'energy dominance,' defense-industry capacity development, and international partnership efforts with allies," the report says. "U.S. global nuclear engagement is critical—not only because it supports military needs and advances commercial interests, but also because it brings with it a culture that promotes safety, security of nuclear materials, and nonproliferation."

The report from the influential Washington, D.C.-based think tank analyzes the growing clout of China's and Russia's growing commercial nuclear industries and how the nations use these industries to further their foreign policy agendas. It points out that as China and Russia push to expand their domestic nuclear industries, they also are aggressively exporting their reactor technologies into new international markets.

"The results of these efforts are striking—nearly two-thirds of the new reactors under construction wide are estimated to be using designs from China and Russia," the report says. "The two countries' overseas nuclear push challenges the post-World War II nuclear-safety and nonproliferation policy and legal framework, which were put in place through the combined efforts of the U.S. government and industry, as well as U.S. leadership in international organizations."

According to the report, Russia and China lead the international market in commercial nuclear energy by offering a complete package of construction and operation of new nuclear power plants, technological innovation and attractive financing options. In contrast, the U.S. often

struggles to offer its international customers a comparable comprehensive deal.

The report says China brings “a complete package of design, construction, labor, technology, and financing, which improves the economics compared to industries in the West.” Russia, through its state-owned nuclear company Rosatom, offers an “integrated solution” to commercial nuclear customers including construction, operation and maintenance and human resources development. Rosatom is involved in seven nuclear reactor construction projects in Russia and 33 abroad. Russia is building reactors or pursuing commercial nuclear deals in India, Bangladesh, Turkey, Hungary, Belarus, Egypt, Jordan, Iran and Saudi Arabia.

To make the decision to build plants even more attractive, the report notes that both countries offer attractive financing packages to fund these projects. China goes into markets abroad with financing options from its own Export-Import (Ex-Im) Bank, while Russia uses resources from both the Russian state budget and the Russia Wealth Fund. In contrast, the U.S. Export-Import Bank’s board of directors remains without a quorum and as a result cannot consider medium- and long-term transactions exceeding \$10 million. Typically, commercial nuclear deals are measured in billions of dollars, not millions: Turkish President Tayyip Erdoğan said that the investment in the country’s first nuclear power plant, being built by Russia’s Rosatom, will exceed \$20 billion.

“Potential foreign customers of nuclear power projects generally require a secure array of viable financing options to choose from when they walk into the room.” NEI Vice President of Suppliers, New Reactors and International Programs Dan Lipman said. Not having a full quorum on Ex-Im Bank’s board hampers our ability to close multibillion dollar deals in the face of

international competitors who offer attractive financing from day one.

The report notes that Russia and China also are positioning themselves to be leaders in advanced commercial nuclear technology. China is pumping money into the development of small modular reactors, high-temperature gas-cooled reactors and pressurized heavy water reactors. Russia is focusing on modular reactors and fast reactors with a closed fuel cycle, which will allow used nuclear fuel to be processed and reused.

“The Chinese and Russian use of nuclear-power financing and technology as a means of expanding their overseas physical presence, and their foreign-policy influence in key countries, has important implications for the United States,” the report says. “Russia and China are vying for expanded influence in countries critical to U.S. diplomacy, namely Iran, Saudi Arabia, Turkey, Jordan, Egypt, and Pakistan.” Lipman said the report shows the need for the administration and Congress to support

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American commercial nuclear exports through concrete action. ...

Source: <https://www.nei.org/news/>, 05 April 2018.

## NUCLEAR PROLIFERATION

### NORTH KOREA

#### Blue House Describes its Nuclear Plan for North

The Blue House gave more specifics on how it would try to negotiate denuclearization with North Korea, calling for a comprehensive package that is implemented in a series of steps. “The package deal and phased-in settlement are two sides of the same coin,” said a senior Blue House official speaking on condition of anonymity during a meeting with reporters. “We have no choice but to declare a package deal and take gradual procedures to implement it.” The official’s remark

illustrates the Blue House's position that once North Korea strikes a denuclearization deal, measures to implement it and verify the denuclearization should be carried out in a gradual manner.

"Nothing has been decided except that the deal should be made in a comprehensive and gradual manner as advocated by President Moon Jae-in," stressed the official. The official's remarks followed reports that the Blue House rejected any notion that the 2003 deal in which Libya disposed of its weapons of mass destruction for sanctions relief could be repeated. In that deal, the West made the disposal of weapons of mass destruction as a precondition for sanctions relief.

North Korea believes Muammar Qaddafi signed his own death warrant by surrendering his nuclear arsenal. He was murdered at the hands of rebels in 2011. The overthrow of Colonel Qaddafi and his death are proof to Pyongyang that it must hold onto its nuclear weapons until it has an ironclad assurance of regime survival, experts say.

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"If one insists the North must carry out complete, verifiable and irreversible disarmament as a pre-condition for dialogue, then we are going back to the status-quo," the Blue House official said. The official also stressed Seoul will be a "mediator" between Pyongyang and Washington in denuclearization talks, saying it will closely coordinate with the two for two upcoming summits.

... The official admitted what will come out of an inter-Korea summit this month will have a "direct impact" on the Kim Jong-un-Donald Trump meeting. The Moon government has been preparing for the third inter-Korean summit meeting "in earnest," the official continued. "But no one can predict at this point what could happen after the North-U.S. summit meeting.

"There have been many reports speculating possible scenarios," said the official. "But nothing

has been determined so far." In recognition of the high stakes in the two upcoming summits and potential breakthrough, the official said, "The eyes of the world are on the Korean Peninsula now." The official dismissed concerns of a possible gap in positions between Seoul and Washington in light of the nomination of John Bolton as U.S. President Donald Trump's new national security adviser.

Source: <http://koreajoongangdaily.joins.com/news/>, 04 April 2018.

### China Halts Tech Exports to North Korea

China announced a comprehensive ban on exports of dual-use items and technologies for WMD to North Korea, a move that might be able to hinder the progress of North Korean experiments on nuclear technology effectively, observers noted.

In keeping with Resolution 2375 of the UN Security Council and based on the Foreign Trade Law of China, it is forbidden to export to North Korea dual-use items and technologies related to weapons of mass destruction and their transport, as well as dual-use items of regular

weapons, according to a notice posted on the Ministry of Commerce (MOFCOM) website.

The notice was released by five national departments and institutes, including the China Atomic Energy Authority. It listed 32 dual-use items, materials, devices, goods and technologies related to weapons of mass destruction, including particle accelerators, mass spectrometers, radioactive nuclides and centrifuges. ... The centrifuge is the key device on the banned list, Gui said. Without a high-velocity centrifuge, North Korea will not be able to produce uranium-235, which is needed to make nuclear weapons. Meanwhile, the banning of measurement devices would also greatly affect North Korea's ability to conduct nuclear experimentation, Gui said. The notice also gave details on many other related materials and items, such as high-energy batteries, integrated circuits and certain radars.

Dual-use items that are also for civilian use, such as X-ray devices, are excluded, Gui said. This means local residents' lives will not be affected. "And it is difficult to transform the devices from civil-use to military-use," he noted. The ban comes two weeks after North Korean leader Kim Jong-un paid an unofficial visit to China from March 25-28. ...

Source: <http://www.globaltimes.cn/content/09April2018>.

### S. Korea Seeks Denuclearization Declaration from Summit with N. Korea

South Korea is seeking a denuclearization declaration from the upcoming summit with North Korea, a presidential official said confirmed. The official said it's a "matter of course" to seek such a declaration because denuclearization is one of the three key agenda items for the April 27 summit, along with bringing permanent peace on the Korean Peninsula and improving inter-Korean relations.

The official spoke in response to a newspaper report that the South is seeking to produce a declaration of Korean Peninsula denuclearization during the summit between President Moon Jae-in and North Korean leader Kim Jong-un at the border village of Panmunjom. As to the solution to the North Korean nuclear issue, the official said the "Libyan style solution," often referred to in the media, would be difficult to apply if it means providing the North with rewards only after Pyongyang dismantles its nuclear program in a complete, verifiable and irreversible manner.

The official also said that the media got the meaning of the Libyan style solution wrong, saying the United States provided rewards to Libya three times as the African nation abandoned its nuclear program in the early 2000s. The official also said it was "too premature" to talk about a media report that the two Koreas and the U.S. are seeking to make a joint peace declaration during the U.N.

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The official said the presidential office has no comment on the remark by top North Korean official Kim Yong-chol that he is the one that is accused in the South of being the "main culprit" in the deadly 2010 sinking of the South Korean warship Cheonan. Kim, a ranking Workers' Party official in charge of affairs with South Korea, made the remark half-jokingly when he introduced himself during a visit to South Korean reporters at a Pyongyang hotel to apologize for restricting their coverage of a concert by South Korean musicians in Pyongyang.

Kim, a former top military official who headed the North's reconnaissance bureau, has long been accused of masterminding the sinking that left 46 South Korean sailors dead. His visit to the South for the closing ceremony of the PyeongChang Winter Olympics sparked criticism

of the government for allowing the visit. Asked about Russian news reports that President Moon decided to visit Russia in July on the occasion of the World Cup soccer finals, the presidential official said there has been no change in Cheong Wa Dae's position that such a visit is under consideration.

Source: <http://english.yonhapnews.co.kr/news/03April2018>.

## NUCLEAR SAFETY

### USA

#### Radioactive Sludge Barrel Ruptures at Idaho Nuclear Site

A barrel containing radioactive sludge ruptured at an Idaho nuclear facility, federal officials said on 8 April, resulting in no injuries and no risk to the public but possibly slowing progress in shipping waste out of the state. The U.S. Department of Energy said the 55-gallon (208-liter) barrel ruptured late Wednesday (7 April) at the 890-square-mile (2,305-square-kilometer) site

that includes the Idaho National Laboratory, one of the nation's top federal nuclear research labs.

The rupture triggered a fire alarm, and three Idaho National Laboratory firefighters extinguished the smoldering barrel and pulled it away from a dozen other barrels nearby. When the firefighters left the building, emergency workers detected a small amount of radioactive material on their skin, said department spokeswoman Danielle Miller. The material was washed off the firefighters, who were taken to a nearby medical facility as a precaution, she said.

Initial assessments showed they did not inhale the radioactive material and were not injured, Miller added. None of the radioactive material was detected outside of the building where the rupture occurred, she said. Federal officials said it's the first known rupture of a barrel containing radioactive sludge at the site but might not be the last.

That's because secretive record-keeping during the Cold War makes it hard for officials to know the exact contents of similar barrels, said Idaho National Laboratory Joint Information Center spokesman Don Miley. The barrel contains a mixture of fluids and solvents that came from nuclear weapons production at the Rocky Flats Plant near Denver.

...A preliminary theory about the cause of the rupture is that radioactive decay made the barrel heat up and ignite particles of uranium, he said. ... He said an investigation will try to determine if there are other barrels at risk of rupturing. Workers entering the structure, even before the breach, must use self-contained breathing apparatus and wear full protective clothing. Officials said no radiation has been detected outside the structure,

which has special filters to prevent radioactive particles from escaping.

It's not clear how many barrels are in the earthen-floor structure that's 380 feet (116 meters) long and 165 feet (50 meters) wide. The barrel that ruptured had been moved to the containment structure in preparation for shipment to the Waste Isolation Pilot Plant near Carlsbad, New Mexico.

At the underground repository in 2014, a barrel of radioactive waste ruptured after being inappropriately packed at Los Alamos National Laboratory, another of the nation's nuclear research labs. The waste had been mixed with organic cat litter to absorb moisture, resulting in a chemical reaction. The incident resulted in a radiation release that forced the closure of the repository for nearly three years and prompted an expensive recovery effort and a major policy overhaul for handling Cold War-era waste.

The sprawling Idaho site in high-desert sagebrush steppe sits atop the giant Eastern Snake Plain Aquifer that's used by cities for drinking water and farmers for irrigation. The area is near the striking 7,550-foot (2,300-meter) Big Southern Butte, which has a road to the top for adventurous drivers.

The site has been used for nuclear waste disposal and storage beginning in the 1950s. The federal government has been cleaning it up following court battles and several agreements with Idaho in the 1990s amid concerns by state officials that Idaho was becoming the nation's nuclear waste dump. The Energy Department has already missed several deadlines under those agreements involving moving nuclear waste out of Idaho and

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The federal agency also faces deadlines concerning waste stored in barrels, and the radioactive release and investigation could slow the process of moving that waste out of state. The Energy Department has floated the idea of bringing in more nuclear waste from Hanford in Washington state for treatment at a \$500 million facility at the Idaho site. ...

Source: <https://abcnews.go.com>, 12 April 2018.

## NUCLEAR WASTE MANAGEMENT

### USA

#### Texas Consolidated Nuclear Waste Storage Facility to be Revived

Waste Control Specialists (WCS) and Orano USA intend to revive licensing of a consolidated interim storage facility (CISF) in Andrews County, Texas, where spent nuclear fuel (SNF) from reactors across the country can be stored until a permanent repository is developed.

The companies said on March 13, 2018, they intend to form a joint venture that will ask the NRC to resume its review of the CISF license application, which WCS originally submitted in April 2016. In that application, WCS requested NRC authorization to store up to 5,000 metric tons of uranium for a period of 40 years at its Texas Compact Waste facility.

In April 2017, however, the company requested that the NRC temporarily suspend all safety and environmental review activities as well as public participation activities associated with the license application. The company cited “a magnitude of financial burdens” that made pursuit of licensing unsupportable.

One issue was that the NRC’s estimate of the cost of the application review—\$7.5 million—was “significantly higher” than WCS originally estimated. Costs associated with a public

participation process and a potential adjudicatory hearing were also estimated to be “considerable.” WCS also said a cost-sharing agreement it had in place with one of its partners was “depleted” and it could not be “extended.” At the same time, WCS has faced significant operating losses in each of its operating years, and the cost of actively pursuing the project only serves to increase those losses, it said.

WCS said on its website in March that a joint venture with Orano USA—formerly AREVA Nuclear Materials—would leverage the French company’s decades of expertise in used fuel packaging, storage, and transportation. Scott State, CEO of WCS, noted that WCS’s proposed solution was an “industry-driven near-term solution” that will use “proven storage technology and procedures to expand the capabilities and operations at the WCS site to include consolidated interim storage of commercial used nuclear fuel.” Sam Shakir, CEO of Orano USA, in a statement said the WCS-Orano USA joint venture “will provide safety, flexibility and value for used nuclear fuel titleholders and reduce U.S. taxpayer liabilities for ongoing storage, while plans for a permanent federal repository continue.”

WCS’s Texas Compact Waste Facility in western Andrews County has been operational since early 2012. Owned and licensed by the State of Texas, it is the only commercial facility in the U.S. licensed in the past 40 years to dispose of Class A, B, and C low-level radioactive waste. It primarily serves Texas and Vermont, which are member states of the Texas Compact Commission, but it is also available to 34 other U.S. states that have no access to a compact disposal facility. However, irradiated SNF discharged from commercial nuclear reactors is classified as high-level radioactive waste.

**A Boost for Consolidated Interim Storage:** As POWER reported, the nation lacks a long-term nuclear waste strategy, and nearly a third of the nation’s SNF is in dry storage in about 2,080 cask or canister systems at 75 reactor sites scattered across 33 states. U.S. SNF pools have reached capacity limits, forcing nuclear generators to load about 160 new dry storage canisters each year.

Nuclear generators currently recover costs for SNF storage and management by suing the DOE, which, under the Nuclear Waste Policy Act (NWPA), was contractually obligated to dispose of SNF by January 1998. The DOE, however, cannot fulfill its obligation because no permanent

repository exists—or is even in sight. (For an in-depth look at the current state of nuclear waste management, see “A Break in the Nuclear Waste Impasse?” in POWER’s March 2018 issue.

*Source: <http://www.powermag.com/>, 29 March 2018.*



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