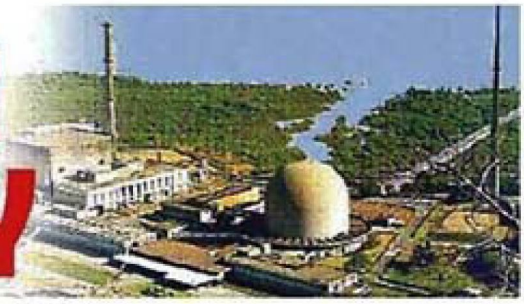
NUCLEAR SECURITY



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

Vol 15, No. 05, 01 JANUARY 2021

OPINION – Hiroshi Minegishi

Is North Korea's Silent Leader Planning a Surprise for Biden?

With Joe Biden due to take the oath of office as the 46th president of the U.S. next month, North Korea's supreme leader, Kim Jong Un, is likely planning his next move. It may take a while to find out what it is, but there are hints he may try to shake things up on the Korean Peninsula.

There are many factors darkening the outlook for relations between Washington and Pyongyang. In an October presidential debate, Biden called Kim a "thug" and criticized President Donald Trump for chumming up with him, thereby legitimizing Kim's rule. Although the U.S. is certainly not the only country where a political challenger criticizes the incumbent, Biden's remarks were weighty given his election victory. His emphasis on human rights, U.S. allies, and incremental steps toward international agreements does not square well with the priorities of Trump and Kim.

North Korea may be a low priority for Biden, who faces a mountain of domestic problems, including the continuing COVID-19 pandemic. Nevertheless, moves are afoot. According to Japanese, U.S. and South Korean diplomatic sources familiar with nuclear issues, Biden aides and foreign policy experts are pushing for a prompt restart of disarmament talks between Washington and Pyongyang. Behind these calls is regret over the Obama administration's policy of "strategic patience," in which the U.S. essentially turned its back on North Korea, allowing the secretive country to rapidly improve its nuclear and missile technologies.

North Korea is believed to have 20 to 60 nuclear warheads. To carry them, it has developed ballistic missiles with atypical flight paths that are hard to track and intercept.

With Joe Biden due to take the oath of office as the 46th president of the U.S. next month, North Korea's supreme leader, Kim Jong Un, is likely planning his next move. It may take a while to find out what it is, but there are hints he may try to shake things up on the Korean Peninsula. According to Japanese, U.S. and South Korean diplomatic sources familiar with nuclear issues, Biden aides and foreign policy experts are pushing for a prompt restart of disarmament talks between Washington and Pyongyang.

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In the second half of 2017, the North repeatedly test-fired intercontinental ballistic missiles capable of reaching the U.S. mainland. The U.S. objectives when it comes to North Korea are to prevent the situation on the peninsula from deteriorating further, and to reduce the direct threat to its mainland, say the advocates of a new approach to North Korea.

The North's nuclear weapons program consists of three parts: the warheads it already has, its ongoing nuclear work and its future plans. The advocates for extending an olive branch to Pyongyang argue the U.S. should ignore the weapons the North already has for now. The new proposal for talks could be cast as a plan to freeze North Korea's nuclear weapons development, something the two sides have discussed in the past. The Biden administration will pursue a phased denuclearization of North Korea, according to a former high-ranking South Korean official, adding that this chimes with the type of disarmament negotiations that Pyongyang wants.

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"We are now capable of inflicting damage on the U.S. capital," a North Korean government official told me after an ICBM test-firing. "North Korea and the U.S. will pull out cards one by one, and continue negotiations on an equal footing as nuclear nations for the denuclearization of the Korean Peninsula, the removal of economic sanctions and the establishment of peace," the official said.

"Phased denuclearization" is a weighty option, said Chon Yong-u, a former top South Korean presidential adviser for national security, in an interview with Nikkei in November. The Biden team's North Korea experts believe it would be difficult to achieve immediate denuclearization of the North, Chon said. "They will likely seek to prevent North Korea from further improving its nuclear development capacity, and then opt for a move to reduce nuclear weapons, starting with those that threaten the U.S. mainland."

Unlike Trump, a businessman-turned-politician who favors big deals, Biden considers himself an expert in diplomacy and tends to go for smaller agreements, according to Chon. This view runs counter to the common belief that the issue of North Korea's nuclear development will reach an impasse under Biden's presidency.

One question is how the international community would respond to the prospect of an incremental deal. China, which backs the North, and Moon Jae-in, South Korea's reformist president who is seeking reconciliation between the two Koreas, are likely to welcome it. By contrast, a step-by-step approach would alarm the Japanese government and conservatives in South Korea because an interim deal would likely allow North Korea to keep its short- and medium-range missiles, leaving Japan and the South within striking distance.

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Another question is what, if anything, will prompt the U.S. and North Korea to resume negotiations. Biden and the North Korean leadership are suspicious of each other. In addition, Pyongyang set a high bar for restarting bilateral talks, demanding the removal of sanctions and an end to joint U.S.-South Korea military drills, among other conditions. After the last denuclearization talks ended in October 2019, North Korea stressed its right to development and existence, going so far as to say it would not return to the negotiating table unless the U.S. ended its hostile policy toward it.

North Korea recently instructed its diplomatic installations around the world not to antagonize the U.S., warning that ambassadors would be held accountable for any trouble, according to South Korea's National Intelligence Service.

Despite the fact that it has been a month and a half since Biden won the White House, neither Kim nor the North Korean media has mentioned the results of the U.S. presidential election. While North Korea may not want to stir up trouble as long as Trump remains in office, some experts say Pyongyang is trying to gather bargaining chips ahead of talks with the U.S. before Kim makes any dramatic proposals, such as a freeze on nuclear development, as he tries to grab the new president's attention.

With Kim unlikely to make big moves anytime soon, analysts are trying to determine when he will break his silence. To sound out Biden's position, Pyongyang is expected to call for the incoming U.S. administration to uphold commitments mentioned in the joint statement issued after the 2018 U.S.-North Korea summit, including the establishment of bilateral relations and the fostering of mutual trust. If Biden does not respond favorably, Pyongyang is likely to resort to provocative acts, such as firing ballistic missiles, as soon as it has a suitable pretext.

Pyongyang is expected to call for the incoming U.S. administration to uphold commitments mentioned in the joint statement issued after the 2018 U.S.-North Korea summit, including the establishment of bilateral relations and the fostering of mutual trust. If Biden does not respond favorably, Pyongyang is likely to resort to provocative acts.

Test-firings are essential to turn new missiles into operational weapons. Tests could thus help concentrate minds among Biden's aides in restarting negotiations with North Korea.

At a meeting of North Korea's ruling Workers' Party of Korea at the end of 2019, Kim warned that the world would see "a new strategic weapon" from the country in the near future. "The supreme leader delivers on what he says at any price," according to one North Korean official. Pyongyang may test-fire a big ICBM unveiled during a military parade on Oct. 10, or a submarine-launched ballistic missile from a large submarine now under construction. Another possibility is a military operation near the Northern Limit Line, a maritime demarcation line between the two Koreas, to provoke the South.

If North Korea prioritizes measures to address the prolonged U.N. sanctions, the novel coronavirus and flood damage, it may wait until next March to stage any provocation until after the U.S.-South Korea military drills. Kim will probably send a message to the U.S. in his speech to the ruling party convention in Pyongyang early next year, offering clues to his next gambit.

Source: https://asia.nikkei.com/Spotlight/, 27 December 2020.

OPINION – Robert Johnson

Iran Joins China, Russia, EU, France, Germany and UK in Reaffirming Commitment to 'Nuclear Deal'

Amid speculations about Iran's reaction to the assassination of the country's eminent nuclear scientist Mohsen Fakhrizadeh on a road outside of Tehran on November 27, participants in the JCPOA have reiterated their commitment to preserving the agreement and stressed their respective efforts in this regard. The pledge emerged from a virtual ministerial meeting of the E3/EU+2 (China, France, Germany, the Russian Federation, the United Kingdom, and the High Representative of the European Union for Foreign Affairs and Security Policy) and the Islamic Republic of Iran on December 21, 2020.

The EU High Representative Josep Borrell chaired the meeting. The ministers agreed that full and effective implementation of the JCPOA by all parties remains crucial and asserted the need to address ongoing implementation challenges, including on nuclear non-proliferation and commitments to lift sanctions.

According to the German Foreign Affairs ministry, the ministers underscored the important role of the IAEA as the sole impartial and independent international organisation mandated by the UN Security Council to monitor and verify the

implementation of the nuclear non-proliferation commitments under the JCPOA. They stressed the importance of continued good faith cooperation with the IAEA. Ministers recalled that the JCPOA, as endorsed by UN Security Council resolution 2231 (2015), remains a key element of the global nuclear non-proliferation architecture and a significant achievement of multilateral diplomacy that contributes to regional and international security. Ministers reiterated their deep regret towards the US withdrawal from the agreement. They stressed that the Security Council resolution 2231 remains fully in force. The United States announced its withdrawal from the JCPOA, also known as the "Iran nuclear deal" or the "Iran deal", on May 8, 2018.

Ministers recalled that the JCPOA, as endorsed by UN Security Council resolution 2231 (2015), remains a key element of the global nuclear non-proliferation architecture and a significant achievement of multilateral diplomacy that contributes to regional and international security. Ministers reiterated their deep regret towards the US withdrawal from the agreement.

Ministers agreed to continue dialogue to ensure the return of the US to the JCPOA and underlined their readiness to positively address this in a joint effort. Analysts are far from certain how Fakhrizadeh's death might impact Iran's nuclear program. He reportedly led the Islamic Republic of Iran's alleged covert nuclear weapons program in the early 2000s. Most recently he served as a brigadier general in Iran's Ministry of Defence and Armed Forces Logistics, as head of the ministry's Defensive Research and Innovation Organization (DRIO). He also taught physics at Imam Hossein University, an institution associated with the Islamic Revolutionary Guards.

While the perpetrators of this attack may have hoped to draw the Iranian government into a military conflict with the United States during the Trump administration's remaining weeks in office, says Sahimi, there's little evidence to suggest Iran's calculus has changed.

Fakhrizadeh is believed to have been involved in the nuclear talks in some capacity and received one of Iran's highest honours for his service. However, his active role, if any, in Iran's nuclear program before his death is otherwise unclear. According to Muhammad Sahimi, the effects of Fakhrizadeh's death on the DRIO, tasked with overseeing advanced defence R&D, is also difficult to discern without knowing the details of his work or the organization's pool of personnel to draw on. "Leadership changes in any organization entail disruption. But the nature of R&D projects, institutionalization of knowledge in Iran's military-industrial complex and the DRIO's relatively deep human resources pool suggest Fakhrizadeh's death may have a limited impact," he writes for the Responsible Statecraft website.

Sahimi's analysis has been re-published by *Iran Review*, "the leading independent, non-governmental and non-partisan website representing scientific and professional approaches towards Iran's political, economic, social, religious, and cultural affairs, its foreign policy, and regional and international issues within the framework of analysis and articles". ... In the past two decades, he has published extensively on Iran's political developments and its nuclear program. While the perpetrators of this attack may have hoped to draw the Iranian government into a military conflict with the United States during the Trump administration's remaining weeks in office, says Sahimi, there's little evidence to suggest Iran's calculus has changed.

Though there have been calls for vengeance from across Iran's leadership and political spectrum, under its policy of "strategic patience," Iran has absorbed successive blows from the U.S. "maximum pressure" campaign since May 2018, adds Sahimi. These include one of the most punishing sanctions regimes in recent memory, an aggressive cyber offensive and sabotage effort

against Iran's critical infrastructure including nuclear facilities, and the assassination of senior government personnel.

Analysts agree that Israel and the United States had been looking for Fakhrizadeh for at least 15 years as part of a larger covert war against Tehran supposedly designed to slow its nuclear and missile programs, which Israel insists are aimed at producing weapons and the means to deliver them. But, have multiple assassinations, considered "criminal" by the European Union and condemned by Agnes Callamard, the United Nations Special Rapporteur on Extra-Judicial Executions, achieved their goals? No. Because "Iran's nuclear advances went on, even as its scientists were picked off, one by one".

Analysts agree that Israel and the United States had been looking for Fakhrizadeh for at least 15 years as part of a larger covert war against Tehran supposedly designed to slow its nuclear and missile programs, which Israel insists are aimed at producing weapons and the means to deliver them.

Dr. Ardeshir Hosseinpour, an authority on electromagnetism and its application to the nuclear program, was the first major Iranian scientist to be assassinated, on January 15, 2007. The last report by the IAEA on Iran's nuclear program before Dr. Hosseinpour's death was issued exactly two months before the assassination, on November 15, 2006.

That report confirmed that Iran had produced no enriched uranium at the time and had not built any significant number of centrifuges used for enrichment. Between January 2010 and January 2012, four Iranian scientists were assassinated. Sahimi points to a fact that has been often ignored: Pursuant to the signing of the JCPOA, Iran subsequently exported 97 per cent of its LEU to Russia, placed over 13,000 centrifuges into storage; removed centrifuges from the Fordow site destroyed the Arak research reactor and began implementing the Additional Protocol of the NPT, which gives the IAEA the right to conduct more intrusive inspections of Iran's nuclear facilities to ensure its compliance with the NPT.

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However, in return, writes Sahimi, "the Trump administration exited the JCPOA in 2018 in violation of UN Security Council Resolution 2231 and imposed the harshest U.S. economic sanctions against Iran".

Besides, for two decades the United States and Israel left no stone unturned to attempt to sabotage Iran's missile program, which is its only credible conventional defence in the absence of a modern air force. None of the acts of assassinations and sabotage, with the possible exception of the Stuxnet attack – involving a malware that was designed to sabotage Iran's nuclear enrichment facility – "has appreciably slowed Iran's missile and nuclear programs". In fact, science has become indigenous, and when a program's leader is killed, many are ready to take over.

"Given Iran's strategic importance, the change in the attitude of the Iranian people toward the U.S. and Israel may well be the most consequential result of these acts of sabotage and murder – and that does not bode well for the future," warns Sahimi, the professor at the University of Southern California in Los Angeles. Highlighting another aspect of Fakhrizadeh's assassination, *The New York Times*' David E. Sanger warns that it "threatens to cripple President-elect Joseph R. Biden Jr.'s effort to revive the Iran nuclear deal before he can even begin his diplomacy with Tehran. And that may well have been a main goal of the operation". He quotes intelligence officials saying that there is little doubt about Israel having been behind the killing, especially as it had all the hallmarks of a precisely timed operation by

Mossad, the country's spy agency. "And the Israelis have done nothing to dispel that view."

In fact, Prime Minister Benjamin Netanyahu has long identified Iran as an existential threat and named the assassinated scientist, Mohsen Fakhrizadeh, as national enemy No. 1, capable of building a weapon that could threaten a country of eight million in a single blast. "But Mr. Netanyahu also has a second agenda," adds Sanger. "There must be no return to the previous nuclear agreement," he declared shortly after it became clear that Mr. Biden – who has proposed exactly that – would be the next president.

The thirteenth Presidential elections are scheduled to be held in Iran on June 18, 2021. The moderate Rouhani will be stepping down and there is the likelihood that a hard-line conservative will succeed him – someone who is less keen on negotiations.

Meanwhile, analysts such as Jonathan Power are warning that the thirteenth Presidential elections are scheduled to be held in Iran on June 18, 2021. The moderate Rouhani will be stepping down and there is the likelihood that a hard-line conservative will succeed him – someone who is less keen on negotiations. He is of the view that a new deal could be wrapped up in a month. "If negotiators on both sides honour their pledges to return at once to how it was before Trump squashed the deal this is possible. It will make the Middle East a safer and calmer place. Then will be the time to make it even safer by negotiating the other divisive issues, hopefully with the same good faith," writes Jonathan Power.

Source: https://www.pressenza.com/2020/12/, 26 December 2020.

NUCLEAR STRATEGY

RUSSIA

Russia Building Next-Gen Nuclear-Capable, Stealth Strategic Bomber – PAK DA: Reports

Codenamed Poslannik, the PAK DA (an acronym for Prospective Aviation Complex for Long-Range Aviation), is a next-generation missile carrier strategic bomber, which is being built by the Moscow-based aerospace giant, Tupolev, for the Russian Air Force.

The news of the parallel flight and ground tests of PAK DA prototypes has been confirmed by a source in Russia's military-industrial complex. "Two or three objects are already being launched (into production) – for "statics", for flight (tests)," said the source. Reports suggest the PAK DA stealth bomber has been designed using the flying wing scheme, which means that the bomber will be a tailless fixed-wing aircraft with no definite fuselage. Its crew, payload, fuel, and equipment are all accommodated inside the main wing structure. The bomber will complement and eventually replace the older Tupolev Tu-95 in Russia's Air Force service.

It has been equipped with the newest communication and jamming equipment. The new bomber reportedly possesses the ability to carry nuclear-capable air-launched cruise missiles along with air-to-air missiles for self-defense and air-launched hypersonic weapons.

The stealth bomber can travel at subsonic speed and is estimated to have an operational range of about 12,000 kilometers. It has been equipped with the newest communication and jamming equipment. The new bomber reportedly possesses the ability to carry nuclear-capable air-launched cruise missiles along with air-to-air missiles for self-defense and air-launched hypersonic weapons. The most significant feature of the aircraft is that its stealth technology enables it to reduce its radar visibility. While the prototypes of the bomber are undergoing tests, there has been no official comment from the United Aircraft Corporation, which is designing the bomber.

Source: Mansij Asthana, https://eurasiantimes.com/russia-building-next-gen-nuclear-capable-stealth-strategic-bomber-pak-da-reports/, 26 December 2020.

USA

US Navy Zooms in on Lockheed C-130J-30 Hercules as the Next 'Doomsday' Plane

The US Navy has reportedly identified a modified version of Lockheed Martin's C-130J-30 Hercules turboprop airlifter as the next "doomsday" aircraft, capable of offering airborne command and control support to the US' nuclear deterrent forces.

The C-130J-30 Hercules will be fielded by the US military to carry out the 'Take Charge And Move Out' (TACAMO) survivable nuclear communications role. It envisages relaying orders to carry out nuclear strikes or even remotely initiating the launch of intercontinental ballistic missiles from their silos (a specially built place underground where a nuclear missile is kept).

The C-130J-30 Hercules will be fielded by the US military to carry out the 'Take Charge And Move Out' (TACAMO) survivable nuclear communications role. It envisages relaying orders to carry out nuclear strikes or even remotely initiating the launch of intercontinental ballistic missiles from their silos (a specially built place underground where a nuclear missile is kept).

TACAMO is a US military system of survivable communication links that have been designed to be used in nuclear warfare. It maintains the communication link between the National Command Authority (the decision-makers) and the triad of strategic nuclear weapon delivery systems.

The primary mission of the system is to serve as a signals relay — after receiving orders from a command plane such as Operation Looking Glass (US's airborne command and control center), it verifies and retransmits their emergency action messages (EAMs) to the US strategic forces.

Currently, the mission is performed by the US Navy's fleet of E-6B Mercury jets, which are modified versions of the Boeing 707 airliner, commonly referred to as 'Doomsday Planes'. Based on the Boeing 707 airframe, the E-6's mission is to provide the US Navy with a "survivable airborne communication system" during times of an emergency. The platform, which has now been modified to the E-6B Standard, is the airborne portion of the TACAMO communications system.

The Boeing E-6Bs had replaced an earlier EC-130Q aircraft just over 30 years ago in carrying out missions for the US Navy. An "Analysis of Alternatives" was carried out by the Naval Air Systems Command (NAVAIR) earlier, after which its results were announced on December 18.

The US government's official contracting website also hinted at the navy's intent on acquiring up to three C-130J-30s for TACAMO test purposes through a sole-source deal with Lockheed Martin. According to NAVAIR's contracting notice, "The Analysis of Alternatives (AoA) results indicated that the four-engine, militarized C-130J-30 is optimally configured aircraft for performing the TACAMO mission. The characteristics of this airframe also maximize the operational deployability of the assets to austere environments."

Lockheed Martin already has an established domestic production line that has the ability to "produce test units for PMA271 (NAVAIR's Airborne Strategic Command, Control, and Communications Program office) that will enable the acceleration of the risk reduction and subsequent engineering and manufacturing development test program.

The C-130 is currently extensively fielded within the Department of Defense, and deployed at various bases that create operation, training, and logistics support synergies for TACAMO execution.

The notice further says that Lockheed Martin already has an established domestic production line that has the ability to "produce test units for PMA271 (NAVAIR's Airborne Strategic Command, Control, and Communications Program office) that will enable the acceleration of the risk reduction and subsequent engineering and manufacturing development test program".

The C-130J is the latest addition to the famous Hercules family. The strategic military transport aircraft is said to be a comprehensive upgrade of the earlier C-130 Hercules. Built by the world-renowned Lockheed Martin, the aircraft's distinctive feature has been its ability to use unprepared runways for takeoffs and landings. The platform is currently in service with more than 70 nations across the world and has proved to be a highly modular platform.

On the other hand, the C-130J-30 is an extended length version of the standard C-130J and is 15-feet longer, which makes it more suitable for TACAMO missions. The availability of the additional space is considered extremely important for the US Navy, which can carry an extensive suite of secure communications equipment using these aircraft. In addition, the extra room paves the way for the installation of the extremely long Very Low Frequency (VLF) antenna, which is necessary for communicating with ballistic missile submarines.

Source: https://eurasiantimes. com/us, 27 December 2020.

BALLISTIC MISSILE DEFENCE

ISRAEL

Israel Touts Successful Test of Integrated Missile Defense System

Israel's Defense Ministry said it has "successfully" tested a multi-range missile defense system that is capable of intercepting long-range and short-range missiles.

The live-fire drills took place in an Israeli air force base in central Israel a few weeks ago, jointly with the U.S. Missile Defense Agency, the ministry said in a statement. The tests simulated attacks by cruise missiles, ballistic missiles, and drones, it said.

Defense officials with the ministry said it was the first time that integrated tests have been carried out, bringing together different components of the country's multi-layered areal defense systems. These components include the Arrow, a long-range ballistic missile interceptor, David's Sling, a medium-to-long-range missile defense system, and the Iron Dome, a short-range anti-rocket system.

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The tests indicated that the systems "will be capable of intercepting threats simultaneously during a conflict," the ministry said. Head of the defense ministry's Israel Missile Defense Organization, Moshe Patel, said in the statement that the tests were "unprecedented in their complexity" and demonstrated that Israel has "a robust, multi-layered capability to face a variety of threats - cruise missiles, UAVs (unmanned aerial vehicles) and ballistic threats." Israeli Defense Minister Benny Gantz said in the statement that the tests were the first demonstration of Israel's multi-layered approach to dealing with threats.

"This is one of the most advanced air defense mechanisms in the world and it protects the state from threats near and far," Gantz said. These anti-missile systems have been developed by the Directorate of Defense Research and Development in the Defense Ministry, and Rafael, an Israeli weapons and defense technology company.

Source: http://www.xinhuanet.com/english/2020-12/16/c_139592291.htm, 16 December 2020.

NUCLEAR ENERGY

CHINA

China Plans Clean Energy Future

The State Council said it published the white paper - Energy in China's New Era - to "provide a full picture of China's achievements in energy development and its major policies and measures

for energy reform." It says China is committed to "driving an energy revolution".

Preliminary figures show that in 2019, coal consumption accounted for 57.7% of total energy consumption, a decrease of 10.8 percentage points from 2012, according to the white paper. Meanwhile, the consumption of clean energy (natural gas, hydropower, nuclear power and wind power) accounted for 23.4% of total energy consumption, an increase of 8.9 percentage points over 2012. Non-fossil energy accounted for 15.3% of total energy consumption, up 5.6 percentage points against 2012. It says China has reached its target of raising the share of non-fossil energy to 15% of total energy consumption by 2020.

Renewable energy sources have expanded rapidly, with cumulative installed capacities of hydropower, wind power, and solar photovoltaic power each ranking top in the world, the document says. As of the end of 2019, the total installed capacity of nuclear power plants under construction and in operation reached 65.93 million kW, the second largest in the world.

China's electricity supply capacity has risen to a cumulative installed capacity of 2.01 billion kW in 2019, up 75% since 2012, with electricity output up 50% to 7.5 trillion kWh. Renewable energy sources have expanded rapidly, with cumulative installed capacities of hydropower, wind power, and solar photovoltaic power each ranking top in the world, the document says. As of the end of 2019, the total installed capacity of nuclear power plants under construction and in operation reached 65.93 million kW, the second largest in the world.

China has launched a project in nuclear power technology to advance research into core technologies of a third-generation pressurised water reactor and a fourth-generation high-temperature gas cooled reactor. "The goal is to boost the country's independent innovation in nuclear power technology.

Since 2010, China has invested about USD818 billion in renewable energy generation, accounting for 30% of global total investment over the same period, the white paper says.

"China attaches equal importance to safety and the orderly development of nuclear power," says the document. "It has strengthened whole-life management and supervision of nuclear power planning, site selection, design, construction, operation and decommissioning, and adopted the most advanced technologies and strictest standards for the nuclear power industry."

China has mastered the technology to design and construct gigawatt-class nuclear power plants with pressurised water reactors, it adds. Breakthroughs have also been made in "multiple frontier technologies including those associated with fast reactors and advanced small modular reactors". The paper says China has launched a project in nuclear power technology to advance research into core technologies of a third-generation pressurised water reactor and a fourth-generation high-temperature gas cooled reactor. "The goal is to boost the country's independent innovation in nuclear power technology."

China says it will "fully leverage the decisive role of the market in allocating energy resources, and ensure the government better play its part in this regard." It says it will extend market-oriented reform in key areas and on vital issues to remove institutional barriers, solve the problem of an incomplete market system, provide strong institutional guarantees for China's energy security and boost the high-quality development of the energy sector. The country is "working hard to cultivate a variety of market entities, break up monopolies, ease market access, and encourage competition. It is building an energy market system that is unified, open, competitive and yet orderly, removing market barriers, and making the allocation of energy resources more efficient and fairer."

The white paper notes that China has lifted the restrictions for foreign investment to enter the

sectors of coal, oil, gas, electric power (excluding nuclear power) and renewable energy. "China is embarking on a new journey towards a modern socialist country in all respects," the paper says. "In this new development stage, it will remain committed to an energy revolution, and move faster to build a clean, low-carbon, safe and efficient energy system, to lay a solid foundation for basically achieving socialist modernisation in 2035 and becoming a great modern socialist country by the middle of the 21st century."

Source: https://world-nuclear-news.org/Articles/China-plans-clean-energy-future, 22 December 2020.

GERMANY

Polish Group Calls on Germany to Reverse Nuclear Phaseout

Polish climate and environmental activists are asking Germany to reconsider its 2011 decision to phase out nuclear power. On 18 December, activists from the FOTA4Climate initiative submitted to the German embassy in Warsaw an open letter signed by Polish scientists, intellectuals, activists and citizens.

Abandoning low-carbon nuclear power before the complete end to the burning of hard coal and lignite will result in technical and technological problems that will be very difficult to overcome in the short time and will require the continued use of other fossil fuels, mainly natural gas.

They argue that the climate emergency requires the continued operation of nuclear power plants in Germany and other countries "until effective, state-of-the-art technologies for the storage of electricity generated by renewables have been implemented". "Abandoning low-carbon nuclear power before the complete end to the burning of hard coal and lignite will result in technical and technological problems that will be very difficult to overcome in the short time and will require the continued use of other fossil fuels, mainly natural gas" they said.

In December 2019, FOTA4Climate and its supporters from Germany protested against the closure of the then fully operational Philipsburg nuclear power plant. In the letter, distributed by the Nuclear Energy Department of Poland's Ministry of Climate and Environment, they wrote: "We are aware of the on-going discussion on the place of nuclear energy in the long-term sustainable energy model and believe that it still needs to be complemented by complete scientific data. However, the abandonment of low-carbon nuclear energy before a complete shift away from coal and lignite combustion causes in the short term very difficult to overcome technical and technological problems, and leads to the need to use other fossil fuels, with natural gas at the forefront. This, in turn, does not give the expected results in the form of effective and rapid decarbonisation."

Citing the findings of scientists from around the world working within the Intergovernmental Panel on Climate Change, they wrote that only the rapid and effective elimination of the burning of fossil fuels offers a chance to maintain an increase in the Earth's atmospheric temperature of 1.5°C or slightly above this value. ...

Source: https://world-nuclear-news.org/Articles/Polish-group-calls-on-Germany-to-reverse-nuclear-p, 22 December 2020.

INDIA

BHEL Bags Order from Nuclear Power Corporation

State-owned engineering firm BHEL on 30 Dec said it has won an order from the NPCIL. It has bagged the order for supply of 32 Reactor Header Assemblies to NPCIL, a company statement said. The order has been won under NPCIL's Fleet Mode Procurement for India's highest rated indigenously-developed 700 MWe PHWR to be set up at four different locations in the country, BHEL said.

Significantly, this is the first equipment order placed by NPCIL under the Fleet Mode Procurement programme and will give an impetus to domestic manufacturing, it said. The

government had accorded approval for fleet mode implementation of 10 nuclear reactors of 700 MWe PHWRs in 2017. The setting up of these nuclear reactors will further energise the Prime Minister's Aatmanirbhar Bharat mission, the statement said.

BHEL has the distinction of being associated with all the three stages of the Indian Nuclear Power Programme and has been the primary supplier for reactor headers, steam turbines, steam generators, motors, etc, to NPCIL. Till now, all the Reactor Header Assemblies for 700 MWe PHWR based nuclear power projects have been supplied by BHEL.

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Source: PTI, https://www.moneycontrol.com/news/business/economy/total-government-liabilities-rise-to-rs-107-lakh-cr-in-q2-finance-ministry-report-6288391.html, 30 December 2020.

SOUTH KOREA

South Korean Artificial Sun Sets World Record, Runs for 20 Seconds at 100 Million Degrees

A working fusion reactor will allow scientists to harness the power of the sun here on Earth, potentially solving the planet's energy needs. Scientists in South Korea are now one step closer to realising this dream thanks to the KSTAR superconducting fusion device, which has been nicknamed Korea's artificial sun.

The Korea Superconducting Tokamak Advanced Research or KSTAR has taken a major leap forward in the development of a working nuclear fusion reactor. Unlocking the power of nuclear fusion has been the dream of scientists since the early 20th century but has proven a tough puzzle to crack. Nuclear fusion, which works by combining two atomic nuclei into a larger nucleus to release energy, promises to unleash more energy than it consumes. In essence, a working fusion reactor will allow scientists to harness the power of the sun here on Earth, potentially solving the planet's energy needs. Scientists in South Korea are now one step closer to realising this dream thanks to the KSTAR superconducting fusion device, which has been nicknamed Korea's artificial sun. Although not a working reactor, on November 24 this year the machine maintained a continuous stream of plasma for 20 seconds, while reaching an ion temperature of 100 million C. For comparison, the core of the Sun reaches about 15 million C. The latest achievement is the product of scientists at the Research Center at the Korea Institute of Fusion Energy (KFE), in partnership with National University (SNU) and Columbia University of the United States.

The research effort has been dubbed the 2020 KSTAR Plasma Campaign and it has beaten last year's eight-second plasma operation. The year before that, KSTAR achieved a plasma temperature of 100 million C but only retained it for about 1.5 seconds. And four years ago, in December 2016, KSTAR set another world record when it ran for 70 seconds at temperatures of about 50 million C. Tokamak devices like KSTAR recreate the fiery fusion reactions that occur in the Sun, but here on Earth. According to the Institute for Radiological Protection and Nuclear Safety (IRSN), there are some 250 tokamak devices across the world.

Tokamak is an acronym for the Russian term "toroïdalnaïa kameras magnitnymi katushkami" or "toroidal chamber with magnetic coils". Two Russian researchers in the late 1960s were the first scientists to attain plasma confinement and high temperatures in such a device. The KSTAR device uses isotopes of hydrogen to create a scorching stream of plasma - one of the four fundamental states of matter - where individual ions and electrons are separated. In order to hold

onto the ions, incredibly high temperatures need to be maintained. Although KSTAR is not the first device to reach plasma temperatures of 100 million C, it is the first to run for more than 10 seconds. Anything above 10 seconds and normal-conducting devices hit their operation limit. This year, KSTAR tackled some of these challenges by overcoming one of its plasma operation modes, the Internal Transport Barrier (ITB).

The KSTAR began operating last August and has conducted a total of 110 plasma experiments. The results will be presented at the IAEA Fusion Energy Conference in May next year. Ultimately, scientists want to flip the machine on and have it continuously operate for 300 seconds at temperatures exceeding 100 million C. The scientists aim to achieve this goal by the year 2025.

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Source: By Sebastian Kettley, https://www.express. co.uk/, 26 December 2020.

RUSSIA

Rosatom to Build Small-Scale Land-Based Arctic Nuclear Plant by 2028

Rosatom said it has reached an agreement with the government of the Republic of Sakha (Yakutia) setting out parameters for pricing energy that will be produced by the nuclear plant, which is expected to be completed by 2028. The nuclear plant, based on the RITM-200 reactor, will be able to produce up to 50 MW of power, for remote Arctic communities of Ust-Yansky ulus (district) of Yakutia, Rosatom officials said in a press release. The nuclear plant is expected to result in two-fold reduction in the cost of electricity in the region, officials said.

The nuclear plant, based on the RITM-200 reactor, will be able to produce up to 50 MW of power, for remote Arctic communities of Ust-Yansky ulus (district) of Yakutia, Rosatom officials said in a press release. The nuclear plant is expected to result in two-fold reduction in the cost of electricity in the region, officials said.

The exploitation of the nuclear plant will also result in phasing out of coal-based and diesel-based energy sources and a corresponding yearly reduction of up to 10,000 tons of greenhouse gas emissions in the region. In the future, the plant can also be used for the production of hydrogen for green energy sources, the statement said. ...

The nuclear plant is expected to operate for 60 years but the press release did not specify how Rosatom plans to deal with the nuclear waste produced by it. Rosatom officials said the small-scale nuclear plant is based on a proven technology that has already been tested in Arctic conditions. RITM-200 reactors are already being used on the recently commissioned Arktika nuclear-powered icebreaker and six other 22220 design heavy Russian icebreakers that are being built, Rosatom officials said.

... In 2019, Rosatom launched the world's first floating nuclear plant Akademik Lomonosov and towed it to the town of Pevek, on Russia's Arctic coast in Chukotka. Rosatom and Yakutia signed a letter of intent on the construction of a low-power nuclear power plant in September 2019. Rosatom plans to build another small-scale nuclear plant to power the operations of the Suroyamskoe iron ore mine in the Chelyabinsk region of central Russia. Rosatom is also actively marketing the technology for export overseas, Likhachev said.

Source: Levon Sevunts, https://thebarentsobserver.com, 25 December 2020.

USA

The Nuclear Energy that will Send Us to the Moon and Mars

President Donald Trump made a new directive to help push NASA back to the moon using nuclear energy. While chemical fuels are still considered best for launches, for example, and plenty of satellites and other intraspace applications are fine for solar power, the Trump administration has said the idea of stationing people on the moon requires a next-level energy system—and NASA agrees.

Space Policy Directive-6" is all about space nuclear power and propulsion (SNPP), an umbrella category that includes providing electrical and heat energy for planned installations on the moon as well as the propulsion system that will likely, eventually carry NASA to Mars.

For now, the agreement relies on well-established technology safely used all around the world and already in space.

"Space Policy Directive-6" is all about space nuclear power and propulsion (SNPP), an umbrella category that includes providing electrical and heat energy for planned installations on the moon as well as the propulsion system that will likely, eventually carry NASA to Mars. The White House explains on its fact sheet: "Space nuclear systems power our spacecraft for missions where alternative power sources are inadequate, such as environments that are too dark for solar power or too far away to carry sufficient quantities of chemical fuels. Space nuclear systems include radioisotope power systems (RPSs) and nuclear reactors used for power, heating, and/or propulsion."

That means by 2024, when NASA plans to land the next man and first woman on the moon, those astronauts will probably be using an entirely next generation of nuclear batteries for their different tasks. NASA is already doing research on the best nuclear power plant to use on the moon, adapting existing fission technology (what fuels all nuclear plants on Earth for now) to the specific conditions on the moon.

Radioisotope power systems (RPSs) have been used safely for decades, and their design has helped to inspire today's rising generation of nuclear micro-reactors, in fact. They're basically closed systems where an ongoing nuclear reaction creates energy, but without any moving parts.

Unlike Earthbound nuclear power plants, which in the current generation usually use nuclear energy to heat water into power-generating steam, these "nuclear batteries" use temperature difference alone to make current.

What does this directive mean, besides explaining in detail what SNPPs are? Well, the fact that some technologies are in use today as terrestrial nuclear fission plants or satellite-powering batteries doesn't mean they're ready to swap into lunar rovers or build on the surface of the moon.

The use cases are different, the environment is different, and even reliable technologies are always improving. That means by 2024, when NASA plans to land the next man and first woman on the moon, those astronauts will probably be using an entirely next generation of nuclear batteries for their different tasks. NASA is already doing research on the best nuclear power plant to use on the moon, adapting existing fission technology (what fuels all nuclear plants on Earth for now) to the specific conditions on the moon. This is a genuine challenge: the moon has different surface materials, a different temperature range, much lower gravity, and on and on. And whatever NASA designs must be carried to the moon in payload-friendly pieces. It's like suddenly deciding to put a nuclear plant at the peak of Mount Everest or on the ocean floor: a totally different use case.

Further down the road, NASA's interests include

experimental nuclear reactors that are popular for Earth research, too, like fusion or molten salt. It doesn't necessarily make sense to wait until fusion is mature before you start to examine how fusion might work on the surfaces of other planets or as the propulsion system for an intergalactic spacecraft. But for now, we have plenty of established technology to carry to the moon.

In recently released latest edition of "Uranium – Resources, Production and Demand" report, also known as the "Red Book", IAEA, together with the OECD Nuclear Energy Agency ("NEA"), showed that the global uranium resources have increased, but more modestly than in previous years.

Source: Caroline Delbert, https://www.popularmechanics. com/space/moon-mars/a35006021/nuclear-energy-moon-mars-missions-nasa-trump/, 21 December 2020.

URANIUM PRODUCTION

GENERAL

New IAEA Data Shows No Shortage of Uranium for Global Nuclear Energy Programs

The IAEA reported that the world has sufficient uranium resources to support the long-term use of nuclear energy. In recently released latest edition of "Uranium – Resources, Production and Demand" report, also known as the "Red Book", IAEA, together with the OECD Nuclear Energy Agency ("NEA"), showed that the global uranium resources have increased, but more modestly than in previous years.

Planned uranium production cuts in early 2020 were deepened by the onset of the COVID-19 pandemic, and its effects could be felt through 2021 and beyond. IAEA concluded that the uranium resource base described in the Red Book is more than adequate to meet low and high case uranium demand through 2040 and beyond.

According to the Red Book, the world's conventional identified uranium resources amounted to 8,070,400 tonnes of uranium metal (tU) as of 1 January 2019. Compared to the total reported in the 2018 edition, this is an increase of 1%. However, global uranium exploration expenditures decreased to approximately USD 0.5 billion in 2018, a significant drop from USD 2 billion in 2014. This trend could signal market issues in the longer-term. Global uranium mine production decreased by 10.8% from 2017 to 2018 due to production cuts resulting from poor market conditions but increased slightly by 1% to 54,224 tU in 2019.

Furthermore, planned uranium production cuts in early 2020 were deepened by the onset of the COVID-19 pandemic, and its effects could be felt through 2021 and beyond. IAEA concluded that the uranium resource base described in the Red Book is more than adequate to meet low and high case uranium demand through 2040 and beyond.

Source: Vladimir Basov, https://www.kitco.com/news/, 23 December 2020.

USA

US Uranium Miners Ready to Support Nuclear Power, Says AAPG

Campbell is the chairman of the Uranium (Nuclear & REE) Committee of AAPG's Energy Minerals Division.In the Uranium Committee's latest report for the AAPG, Campbell notes that, over the past 40 years, uranium typically has been imported to the USA from Russia, China, Uzbekistan, Kazakhstan, Niger, Namibia, among other countries, but adds that efforts are currently under way to produce more of the fuel locally for utilities from "more secure sources", such as in the USA and, if necessary, from Canada and Australia. In his report - Beyond Hydrocarbons? The Rest of the Story - Campbell explains the state of play for the USA's uranium needs and potential since the expiry in 2013 of the Megatons-to-Megawatts programme it had with Russia.

"The reason the American utilities have chosen overseas sources of uranium in the past is because

the uranium could be obtained at a lower price than that produced by American mining companies. Why? Because some of the countries produce uranium by their governments underwriting the production with direct and indirect financial support, allowing them to produce cheap uranium, relative to American uranium mines. If this sounds familiar, it should because China is doing something similar in rare-earth metals, although the federal government has also taken steps to increase mining and processing of rare earths in the US to meet strategic and industrial requirements," Campbell said.

The US Congress voted to approve appropriations for fiscal year 2021 that includes USD150 million to initiate the uranium reserve programme to address challenges to the production of domestic uranium.

"But the US has abundant sources of uranium in so-called roll-front deposits capable of being recovered by in-situ mining methods in the US mainland and in hard-rock deposits mined by open-pit methods, especially in Alaska and Virginia." The US Congress voted to approve appropriations for fiscal year 2021 that includes USD150 million to initiate the uranium reserve programme to address challenges to the production of domestic uranium. "The federal government is making an effort to set up a strategic reserve of uranium fuel to off-set imports of uranium and secure uranium supplies for utilities and, by doing so, support the American uranium mining industry in developing the numerous uranium deposits that are present in the US" Campbell said.

Uranium fuel costs represent only about 5% of the operating cost of nuclear electricity generation, whereas the fuel costs of power plants using natural gas are "much higher.

Speaking to World Nuclear News, he said that President-elect Joe Biden "will need to go much further" to encourage uranium and rare earth elements (REE) mining in the USA, with allowances for Canada and Australia mining imports. "We cannot depend on unreliable sources of uranium and REE to maintain our power grid and critical minerals," he said.

Competition: Regarding the cost of electricity, Campbell highlighted that uranium fuel costs represent only about 5% of the operating cost of nuclear electricity generation, whereas the fuel costs of power plants using natural gas are "much higher". He added: "The volume of fuel needed is the principal difference in that one kilogram of uranium contains the energy equivalent of 17,000 cubic feet of natural gas. And nuclear power is climate friendly (almost zero emissions) and business friendly (creating thousands of high- paying jobs)."

On the prospects for nuclear energy, Campbell said: "Let's face it, nuclear power is in competition with natural gas and renewables, [but] for pure climate-friendly grid-power, nuclear power has no equal."

"As subsidies and basic economics equilibrate over the years in favour of climate-friendly energy selections, a viable energy plan will come into focus that must be essentially nonpartisan. This need will become even more obvious when the small modular reactors (SMRs) and new nuclear technologies emerge from the growing nuclear industry," he said. "Even hydrogen is gaining attention for use in a variety of ways. It is interesting to note that nuclear power plants boil water as part of the designs of some of the plants. Only minor additions would be needed for them to not only produce electricity, but also hydrogen and oxygen as well."

He added: "SMRs are widely expected to replace many of the current wind and solar projects now operating and, in the future, will be installed and well-received in remote areas as well as in small towns and metropolitan neighbourhoods because of their safe designs, their lower cost to construct, their lower cost to operate than natural gas facilities and natural gas distribution

systems."

Under the Obama administration, renewables received "unrestrained support", he said. "This was manifested by significant tax incentives and subsidies that grossly exceeded that of other climate-friendly energy sources, such as nuclear power. Subsidies are still even higher for fossil fuels than climate-friendly nuclear power." The "unbridled enthusiasm" for renewables is changing, he said, as it becomes clear that wind and solar have "serious economic and other drawbacks". "The apparently 'free energy' from wind and solar is more costly and less reliable in generating electricity than the other widely available climate-friendly energy source, nuclear power. Both renewables (with back-up batteries) and nuclear power have their places in the energy plan. In areas away from the existing main power grids, such as in remote areas of the US, Alaska and Africa, either wind or solar might have a role, but they will need back-up power in the form of expensive batteries."

Over the past decades, uranium mining and some 95 nuclear power reactors in operation today in the US, and some 441 in operation worldwide (plus 54 under construction in China, Russia, India, etc.), all together have demonstrated safety records far exceeding those of natural gas, coal and renewables.

The operation and maintenance costs of renewables are "just recently becoming evident", he said, noting that California is experiencing increased consumer electricity costs but also black-outs and power interruptions because its renewable energy systems cannot produce sufficient power at critical times when needed. "As far as claims that competition is driving down the capital costs of wind and solar projects, it also follows that the quality of the equipment is decreasing. With this decrease in quality of the wind turbines and gear boxes, etc., operation and maintenance needs are also likely to rise, causing increased costs to the consumer," he said.

Safety: The proven safety of nuclear power cannot be overstated, he said. "Over the past decades, uranium mining and some 95 nuclear power reactors in operation today in the US, and some 441 in operation worldwide (plus 54 under construction in China, Russia, India, etc.), all together have demonstrated safety records far exceeding those of natural gas, coal and renewables" he said.

Despite this, "serious competition is now under way," he said, "to determine which energy source will dominate the grid of the foreseeable future". "With coal declining rapidly, only natural gas, uranium (and nuclear power), hydroelectric power and renewables (wind and solar) are in the running. Both natural gas and nuclear power are providing back-up to the power grid because of the inherent drawbacks of wind and solar. Because California has retired many of their nuclear power plants, natural gas has taken their place in the power grid in supporting California's renewable energy systems." These realities need to be backed by policies that support the development of nuclear energy, he told WNN.

"The direction of nuclear power is becoming clear now with SMRs and hydrogen recovery in making it climate and business friendly as it replaces natural gas and coal over the coming years as the main source of grid-power and industrial chemicals in the US and the developed world."Founded in 1917, Tulsa, Oklahoma-headquartered AAPG today has 40,000 members in 129 countries in the upstream energy industry.

Source: https://www.world-nuclear-news.org/, 24 December 2020.

NUCLEAR COOPERATION

UK–FRANCE

UK Set for Talks with France's EDF Over Nuclear Power Plant

Britain said it will hold talks with French energy giant EDF concerning the construction of a nuclear power plant on England's east coast, in a

project reportedly worth £20 billion ($26.4 billion, 22 billion euros). EDF had submitted an application in May to build the 3.2-gigawatt Sizewell C nuclear plant, which is situated in Suffolk, but it ran into criticism from environmental campaigners — while plans were delayed by the pandemic.

"The government has... confirmed that it is to enter negotiations with EDF in relation to the Sizewell C project in Suffolk as it considers options to enable investment in at least one nuclear power station by the end of this parliament" in 2024, it said in a statement.

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If the project proceeds, it could create thousands of new jobs during construction and operation. The statement said the negotiations will strive to reach conditions that would ensure value for any money invested and that all relevant approvals would be secured before any final decision is taken on whether to proceed. "The successful conclusion of these negotiations will be subject to thorough scrutiny and needs to satisfy the government's robust legal, regulatory and national security requirements," said the statement.

EDF is working alongside long-standing partner China General Nuclear Power Corporation (CGN) to build nuclear power plants in Britain. The French group said in May that Sizewell C will generate low-carbon electricity to power six million homes — but Greenpeace had argued that there were more cheaper and safer alternatives than nuclear.

Construction of the plant would create 25,000 jobs and 1,000 apprenticeships, while the operational power plant would employ 900 staff.

Construction of the plant would create 25,000 jobs and 1,000 apprenticeships, while the operational power plant would employ 900 staff. Britain, which will host the UN's next major climate summit COP26 in the Scottish city of Glasgow next year, announced the EDF talks in its Energy White Paper. The document set out the government's plans to meet its goal of net zero emissions by 2050. Business minister Alok Sharma stressed that EDF has not yet been given a "green light" for construction. "We are starting negotiations with EDF, which would be the developer at Sizewell C," Sharma told BBC Radio 4. "What this is not is a green light on the construction, so what we will be doing is looking to see whether we can reach an investment decision in this parliament on that particular project. "We will only do so if this delivers value for money for taxpayers and consumers." EDF is also working alongside China's CGN in the construction of a nuclear power plant at Hinkley Point, in southwest England. Sizewell comprises two power plants: Sizewell A, which opened in the 1960s and shut in 2006. Sizewell B, which opened in 1995, is still in operation.

Source: https://energy. economictimes. indiatimes. com/news/power/ uk-set-for-talks-with-frances-edf-over-nuclear-power-plant/ 79721179, 14 December 2020.

NUCLEAR SECURITY

USA

Excerpts from "IAEA Chief Says Nuclear Security Risks Increased under Trump, Urges Biden to Re-engage"

The head of the International Atomic Energy Agency, the global nuclear watchdog, told CBS News that the world has become a more dangerous place partly due to President Donald Trump's policies, and he urged Mr. Trump's successor to return to nuclear negotiations with adversaries.

IAEA Director General Rafael Mariano Grossi discussed the risks of both Iran and North Korea's nuclear programs to the world, and said Mr. Trump's unilateral withdrawal from the

international nuclear agreement with Tehran had intensified the danger. "From that moment, Iran, as a response to this [U.S. exit], decided to gradually start diminishing its compliance" with the nuclear pact, Grossi said in a wide-ranging interview, urging President-elect Joe Biden to reopen negotiations with Tehran.

Iranian President Hassan Rouhani said, meanwhile, that while his country is "not excited" by Mr. Biden's ascent to the White House, "we are happy to see Trump leave office... because he has no commitment even to moral and humanitarian principles.

Iranian President Hassan Rouhani said, meanwhile, that while his country is "not excited" by Mr. Biden's ascent to the White House, "we are happy to see Trump leave office... because he has no commitment even to moral and humanitarian principles." He expressed hope that the incoming administration would honor previous U.S. commitments, and insisted that Iran wants "security and stability in the entire world, and constructive dialogue with the countries willing to choose the path of dialogue."

The IAEA chief also told CBS News that his agency was helping more than 130 countries test their citizens for COVID-19, offering both capacity for the gold standard "real-time PCR" lab testing, which was developed using nuclear technology, and expertise. Grossi said that work could prove vital in helping to prevent the next pandemic, warning that a rising trend of animal-to-human virus transmission, seen years before COVID-19 emerged, could hit humanity with a new health crisis every couple of years.

The future will depend a lot on what the countries which are party to the, to this agreement, decide in the future, and I would say in the next few weeks and months, I'm sure there will be renewed activity around it once there is a new administration in Washington and some other factors converge to what we hope will be a negotiation.

Read excerpts of the interview below, which have been edited for clarity and to remove redundancy: IAEA Director General Rafael Mariano Grossi: Iran is moving on with its nuclear program. As you know, this is not working, or operating in a vacuum. This is done in the framework of an agreement, which was signed by the P5 [the five permanent members of the U.N. Security Council: U.S., U.K., France, Russia, and China] plus Germany [and] the European Union back in 2015. You remember that the United States withdrew from this agreement back in 2018, a couple of years ago, and then from that moment on, Iran, as a reply, as a response to this, decided to gradually start diminishing its compliance with this agreement.

So, I would say, on the one hand, of course, there is, there is forward moving in the Iranian nuclear program. The thing is that the IAEA is still there to say what's happening. The future will depend a lot on what the countries which are party to the, to this agreement, decide in the future, and I would say in the next few weeks and months, I'm sure there will be renewed activity around it once there is a new administration in Washington and some other factors converge to what we hope will be a negotiation.

CBS News' Pamela Falk: What is your message to the president-elect?

Grossi: I think he has indicated what his intentions are. A dialogue with us will be indispensable. Because since... the agreement was first signed, and the implementation of that agreement happened, to now, a lot has changed... The situation on the ground has changed. So, the negotiators, the policymakers in Washington and elsewhere, and in the other capitals including Tehran, will have to base themselves on the new situation on the ground....

Falk: How do you get [Iran] back to compliance?

Grossi: Well, I think the different sides have different expectations of what is going to happen, and I think I shouldn't speak for them.

It's clear what they expect, and it boils down, I think, to the philosophy of the original agreement, I guess, which is a reduction, under IAEA inspection and verification, and controlling a number of activities. It is a very comprehensive agreement. What they are doing, the original agreement specified a certain degree of enrichment, which was fixed at the time at 3.67, and now they are in, reaching up 4-point-something. Let me say, because everything should be taken in a certain context, that the military grade is about 90%. But, of course, once you start enriching and you move closer to 20% or figures around that, the process of getting your uranium enriched at that level, which is of military quality becomes easier, becomes faster.

So, this is why everybody who is interested in this is looking at this, is watching what's going on, but the reality is that the levels, at the moment, are low, but above what was agreed. And this is what is of some concern — there is a pattern that is a deviation. Of course, Iran has its explanations; they explain it to us here in Vienna and to the world. Because they say: "Others left, we leave."

Falk: Turning to another concern of the world: North Korea.

Grossi: Last time we were there was more than 10 years ago, in 2009, which does not mean that we are completely in the dark. We have been following what is going on there through analysis through satellite imagery. You know, all of these are techniques that are very sophisticated, quite developed, and allow you to have a pretty good idea of what's going on, [about] the kind of activity that is taking place, the outputs, the estimated amounts of material which are being produced. So, you're not completely in the dark....

Grossi (continued): The bilateral track, as it was the case over the past few, four years, with the current administration in the United States, that was the preferred course of action. In the past, you had a bigger table and more participants — Russia, China, Japan, some others were there around the table. So, we don't know what kind of format this negotiation will take. But one thing is for sure — once there is an agreement, we will have to go and inspect, otherwise that agreement has no value.

In the past, you had a bigger table and more participants — Russia, China, Japan, some others were there around the table. So, we don't know what kind of format this negotiation will take. But one thing is for sure — once there is an agreement, we will have to go and inspect, otherwise that agreement has no value.

We are in a constant state of alert. Non-proliferation is a never-ending business, because nuclear material is out there, and you can never relax. It's as simple as that... . We have to be there all the time checking that all nuclear material is in peaceful uses, and this takes a tremendous effort, and history shows, experience shows, that the temptation to have the ultimate weapon — a nuclear weapon is already there, will continue to be.

There is the bigger challenge... of disarmament, but we'll get there. And before we get there, we have to make sure that nuclear weapons do not proliferate and make our world simply unpredictable and terribly dangerous.

The Energy Department and National Nuclear Security Administration, which maintains the US nuclear weapons stockpile, has evidence of hackers accessing their networks as part of an extensive espionage operation that has affected at least half a dozen federal agencies, POLITICO said in an exclusive report.

Source: Pamela Falk, https://www.cbsnews.com/news/, 16 December 2020.

US Nuclear Weapons Agency Hacked in Massive Cybersecurity Breach

The Energy Department and National Nuclear Security Administration, which maintains the US nuclear weapons stockpile, has evidence of hackers accessing their networks as part of an extensive espionage operation that has affected at least half a dozen federal agencies, POLITICO

said in an exclusive report. The officials of the Department of Energy (DOE) and the National Nuclear Security Administration (NNSA) started coordinating notifications on the breach into their "congressional oversight bodies" after a briefing by Rocky Campione, DOE chief information officer.

According to the POLITICO report, They found suspicious activity in networks belonging to the Federal Energy Regulatory Commission (FERC), Sandia and Los Alamos national laboratories in New Mexico and Washington, the Office of Secure Transportation and the Richland Field Office of the DOE. The hackers have been able to do more damage at FERC than the other agencies, the officials said, but did not elaborate."

They found suspicious activity in networks belonging to the Federal Energy Regulatory Commission (FERC), Sandia and Los Alamos national laboratories in New Mexico and Washington, the Office of Secure Transportation and the Richland Field Office of the DOE. The hackers have been able to do more damage at FERC than the other agencies.

The investigators have been searching intricately through networks to know the extent to which the hackers were able to breach. POLITICO quoted the officials familiar with the case as saying that the officials at DOE still do not know whether the attackers were able to access anything and the probe is ongoing and they may not know the full extent of the damage "for weeks." Meanwhile, the DOE spokespeople have not responded on the matter.

The attack on DOE has affirmed that the hackers were able to access the networks of the US national security enterprise. The hackers are believed to have gained access to the federal agencies' networks by compromising the software company SolarWinds, which sells IT management products to hundreds of governments and private-sector clients, POLITICO opined.

The officials have informed that the DOE officials were planning to notify the House and Senate Energy committees, House and Senate Energy and Water Development subcommittees, House and Senate Armed Services committees, and the New Mexico and Washington State delegations of the breach.

On 16 December, the FBI, Cybersecurity and Infrastructure Security Agency, and Office of the Director of National Intelligence issued a public statement saying that they got to know about the incident in recent days. "This is a developing situation, and while we continue to work to understand the full extent of this campaign, we know this compromise has affected networks within the federal government," the statement read. According to POLITICO, the attack on the Federal Energy Regulatory Commission may have been an effort to disrupt the nation's bulk electric grid.

The FERC does not directly manage power flows, however, it stores sensitive data on the grid that can be used to identify the "most disruptive locations for future attacks".

"Hackers may have been casting too wide a net when they targeted DOE's Richland Field Office, whose primary responsibility is overseeing the cleanup of the Hanford nuclear waste site in Washington state. During World War II and the Cold War, the US produced two- thirds of its plutonium there, but the site hasn't been active since 1971," POLITICO opined.

Source: http://www.businessworld.in/article/US-nuclear-weapons-agency-hacked-in-massive-cybersecurity-breach/18-12-2020-355066/, 18 December 2020.

NUCLEAR PROLIFERATION

NORTH KOREA

Mysterious North Korea Site may be Building Nuclear Components: Report

A mysterious North Korean facility may be producing components for building nuclear bombs, a new report suggests, offering clues to understanding the site near the capital that has perplexed experts and policymakers.

The nondescript cluster of buildings called Kangson on the southwest outskirts of Pyongyang was first publicly identified in 2018 by a team of open-source analysts as the possible location of

a facility for secretly enriching uranium, a fuel for nuclear bombs. But the report by North Korea watchers at the 38 North project, reviewed by Reuters before its release, says satellite imagery points to the facility making components for centrifuges, the high-tech spinners used to enrich uranium, rather than enriching the fuel itself.

"The characteristics of the site are more consistent with a plant that could manufacture components for centrifuges," writes former IAEA official Olli Heinonen in the report. The imagery suggests the site lacks the infrastructure needed for enrichment, writes Heinonen, a distinguished fellow with the Stimson Center, the Washington think-tank that runs the project.

The report by North Korea watchers at the 38 North project, reviewed by Reuters before its release, says satellite imagery points to the facility making components for centrifuges, the high-tech spinners used to enrich uranium, rather than enriching the fuel itself.

Pyongyang has denied having secret nuclear sites, an issue that contributed to the failure of a 2019 Hanoi summit between U.S. President Donald Trump and North Korean leader Kim Jong Un. Denuclearisation talks have remained stalled in part over U.S. assertions that the North is not fully declaring the extent of its programme.

"If the issue of undeclared facilities is going to be a factor in U.S.-North Korea negotiations, as it was in Hanoi, the more we can learn about these suspected facilities, the better we can assess their role and value to North Korea's overall nuclear weapons development," said Jenny Town, deputy director of 38 North.

Kangson is enriching uranium but that the evidence is not conclusive. ... The IAEA says Kangson shows some characteristics of an enrichment site but the organisation cannot be sure.

Friday's report could advance the debate on whether the Kangson site is building machines or using them to create bomb material. Clandestine enrichment sites would complicate efforts to estimate the number of nuclear weapons produced by the North, which has pushed ahead with enlarging its nuclear deterrent in the absence of a denuclearisation agreement.

David Albright, one of the first analysts to reveal the site's existence, told Reuters it could be a covert enrichment facility but that the activity there is not convincing. "We still see anomalies that do not allow us to reach a high confidence level" that enrichment is taking place at Kangson, said Albright, president of the Institute for Science and International Security in Washington.

Similarly, a source familiar with U.S. intelligence reporting and analysis told Reuters they have reasons to believe Kangson is enriching uranium but that the evidence is not conclusive. ... The IAEA says Kangson shows some characteristics of an enrichment site but the organisation cannot be sure, as North Korea expelled its inspectors in 2009. IAEA Director General Rafael Mariano Grossi told Reuters the UN watchdog has "indications," which he would not specify, that the site has a role in North Korea's nuclear programme.

... Friday's 38 North report attempts to fill in some gaps. Satellite imagery from 2003, when the main building was being constructed, shows a concrete floor that appears to be like those built for workshops, rather than the concrete pads used in enrichment facilities to protect sensitive equipment from vibrations, the report says.

Kangson appears to lacking air conditioning units that are essential for enrichment plants, and its security perimeter is not as extensive as at other nuclear sites, Heinonen writes. He notes that the August U.N. report says an unnamed member state had spotted no cylinders used to transport uranium hexafluoride (UF6), a compound used in the enriching process. While commercial satellites might miss such transfers, he argues, it is unlikely that the intelligence services of foreign countries would fail to spot them.

Source: https://www.indiatoday.in/world/story/, 19 December 2020.

NUCLEAR NON-PROLIFERATION

INDIA–UK

India, UK Hold Bilateral Dialogue on Nuclear Disarmament, Non-Proliferation

The annual India-UK Bilateral Dialogue on Disarmament and Non-Proliferation was held virtually, wherein the two sides held discussions on several issues including nuclear disarmament and non-proliferation and conventional weapons, among other things. According to an official release, the discussions between two sides focused on a range of contemporary issues of mutual interest in the area of nuclear, chemical, biological disarmament and non-proliferation, conventional weapons, outer space security and export control.

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India and the UK recognised the importance of the dialogue for enhancing mutual understanding and appreciation on international security issues that contribute to the bilateral strategic partnership.

Source: http://www. businessworld. in/article/India-UK-hold-bilateral-dialogue-on-nuclear-disarmament-non-proliferation/17-12-2020-355000/, 17 December 2020.

IRAN

New Agreement Needed to Revive Iran Nuclear Deal Under Biden, IAEA Chief Says

Reviving Iran's nuclear deal under US President-elect Joe Biden would require striking a new agreement setting out how Iran's breaches should be reversed, UN atomic watchdog chief Rafael Grossi said. Biden, who takes office on Jan. 20, has said the United States will rejoin the deal "if Iran resumes strict compliance" with the agreement that imposed strict curbs on its nuclear activities in return for the lifting of sanctions. After President Donald Trump quit the deal and reimposed US sanctions, Iran responded by breaching many of the deal's restrictions. Tehran says it could quickly reverse those steps if Washington first lifts its sanctions. In an interview with Reuters, Grossi, who heads the International Atomic Energy Agency that polices Iran's compliance, said there had been too many breaches for the agreement to simply snap back into place.

After President Donald Trump quit the deal and reimposed US sanctions, Iran responded by breaching many of the deal's restrictions. Tehran says it could quickly reverse those steps if Washington first lifts its sanctions. In an interview with Reuters, Grossi, who heads the International Atomic Energy Agency that polices Iran's compliance, said there had been too many breaches for the agreement to simply snap back into place.

"I cannot imagine that they are going simply to say, 'We are back to square one' because square one is no longer there," Grossi said at IAEA headquarters. "It is clear that there will have to be a protocol or an agreement or an understanding or some ancillary document which will stipulate clearly what we do," he said. "There is more (nuclear) material, ... there is more activity, there are more centrifuges, and more are being announced. So what happens with all this? This is the question for them at the political level to decide."

Iran's stockpile of enriched uranium is more than 2.4 tons, 12 times the cap set by the deal, though still far below the more than eight tons Iran had before signing it. Iran has been enriching uranium up to 4.5% purity, above the deal's 3.67% limit though below the 20% it achieved before the deal. Iran is enriching uranium in places where it is not allowed under the deal, such as at Fordow, a site dug into a mountain. More recently it has started

enriching with advanced centrifuges at its underground plant at Natanz, where the deal says it can use only first-generation IR-1 machines. "What I see is that we're moving full circle back to December 2015," Grossi said, referring to the month before the deal's restrictions were put in place, after which large amounts of material and equipment were swiftly removed. "If they want to do it (comply), they could do it pretty fast. But for all of those things we had a charted course," he said.

Source: https://www.therahnuma.com/new-agreement-needed-to-revive-iran-nuclear-deal-under-biden-iaea-chief-says/, 27 December 2020.

VIETNAM

Vietnam Reaffirms Support for Non-Proliferation of Nuclear Weapons

Vietnam consistently supports disarmament and the non-proliferation of weapons of mass destruction, including nuclear weapons, Ambassador Pham Hai Anh, Chargé d'Affaires of the Vietnamese mission to the United Nations (UN), has said. The Vietnamese diplomat made the affirmation at a meeting of the UN Security Council (UNSC) on December 22 reviewing the implementation of the UNSC's Resolution No 2231, which endorsed the 2015 JCPOA on Iran's nuclear programme.

He stated that Vietnam supports Resolution No 2231 and the JCPOA, while calling on stakeholders to refrain from actions that undermine trust and escalate tensions and to promote dialogue and negotiations to resolve differences. The ambassador stressed the importance of continuing to seriously and fully implement these resolutions and agreements. Vietnam is willing to work with members of the UNSC to create the environment for dialogue and cooperation inside and outside of the council, for peace, stability, and development in the Middle East, he said.

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Reports presented to the meeting stated that the JCPOA and Resolution No 2231 are important achievements in multilateral diplomacy, and the non-proliferation effort is the best way to promote a long-term, comprehensive, and appropriate solution to the nuclear problem in Iran, contributing to peace and security in the region and the globe.

The speakers welcomed the continued commitment of JCPOA-participating countries to uphold and protect the agreement. Complying with and fully implementing Resolution No 2231 and the JCPOA is the best way to resolve differences between the parties on the nuclear issue in Iran and ensure regional stability, they said.

UNSC member countries affirmed the importance of Resolution No 2231 and the JCPOA in dealing with the nuclear issue in Iran and the obligations of the parties to fully implement resolutions and agreements. They also called for the curbing of actions that increase regional tensions and promoting respect for international law and dialogue to seek peaceful solutions to the non-proliferation of weapons in the region.

Source: https://en.vietnamplus.vn/vietnam-reaffirms-support-for-nonproliferation-of-nuclear-weapons/193640.vnp, 23 December 2020.

NUCLEAR DISARMAMENT

GENERAL

Excerpts from "Samoa Urges States to Join Campaign Against Nuclear Weapons"

Samoa is encouraging all Pacific Forum members not yet party to the Rarotonga Treaty to join the South Pacific Nuclear Free Zone pact. Member countries held a virtual meeting to mark the 35th anniversary of the Treaty.

Their efforts have been boosted recently by Tuvalu becoming the 50th country to ratify the Treaty on

the Prohibition of Nuclear Weapons at the United Nations. This milestone means nuclear weapon will be deemed illegal under international law as of next year. Speaking for Samoa, the country's High Commissioner-designate to Fiji, Aliioaiga Feturi Elisaia, encouraged all nuclear-weapons states to sign and ratify the UN Treaty, and the few Pacific territories not already on board the Rarotonga Treaty to join.

Samoa also called on nuclear shipping states to continue to engage in meaningful dialogue on key issues of prevention, response, liability and compensation. sAmbassador Elisaia said fragile Pacific economies already impacted by the pandemic could be further devastated by an incident in their waters, whether or not that incident resulted in a radioactive release.

Samoa also called on nuclear shipping states to continue to engage in meaningful dialogue on key issues of prevention, response, liability and compensation. sAmbassador Elisaia said fragile Pacific economies already impacted by the pandemic could be further devastated by an incident in their waters, whether or not that incident resulted in a radioactive release.

"Where there is a demonstrable link between an incident and economic loss, States Parties should not be left to carry such a loss unsupported," he said. This week's meeting, chaired by the Pacific Islands Forum, resolved to activate the Treaty of Rarotonga's provisions for convening the Consultative Committee, to consider pracical means of operationalising the Treaty.

"Disarmament is not a job we can leave to future generations," New Zealand's Minister for Disarmament and Arms Control, Phil Twyford, said. Twyford paid tribute to the work of Pacific Islands countries in exercising a strong voice on nuclear disarmament. According to Samoa, regional treaties like the Rarotonga Treaty play an important role in encouraging regional peace and stability, promoting global disarmament and non-proliferation efforts.

"We all want a future with peaceful societies, free from conflict and nuclear weapons. Samoa believes in the importance of multilateralism for countries to grow together, in peace and stability,' Ambassador Elisaia said. While there have been notable achievements in regional and global efforts to ensure peace and security, much work still needs to be done. Through our membership to disarmament and non-proliferation conventions, Samoa will continue to urge for a world without weapons of mass destruction, including the total elimination of nuclear weapons."

Source: https://www.rnz.co.nz/international/pacific-news/433074/samoa-urges-states-to-join-campaign-against-nuclear-weapons, 18 December 2020.

NUCLEAR SAFETY

ARMENIA

Excerpts from "Armenia's Nuclear Power Plant: A Delicate Solution to the 'Dark and Cold Days'"

A relic of the Soviet past, the ANPP is a symbol of economic recovery for the Republic of Armenia: overcoming its challenges, the country has become a net-producer of electricity. However, experts warn that the ANPP is among the most dangerous facilities in the world due to its many design flaws.

In view of the snowy peaks of Mount Ararat—believed to be the resting place of Noah's Ark—stands the Armenian Nuclear Power Plant. A relic of the Soviet past, the ANPP is a symbol of economic recovery for the Republic of Armenia: overcoming its challenges, the country has become a net-producer of electricity. However, experts warn that the ANPP is among the most dangerous facilities in the world due to its many design flaws.

The Soviet Union began construction of the ANPP in the 1970s, with its two reactors being activated in 1976 and 1980 respectively; while the facility seemed promising at first, it was shut down after

nine years of use due to a catastrophic earthquake near its vicinity, which had threatened a Chernobyl-level disaster.

When the Soviet Union dissolved in 1991, the Armenian people became independent for the first time in over 70 years. Unfortunately, the newly formed republic faced many challenges from the start, both in a political and economic sense. The compartmentalized nature of its formerly communist economy meant that it relied on its eastern neighbor—the oil-rich Republic of Azerbaijan—for energy; however, with the Soviet authorities out of the picture, there was no one left to facilitate this transfer. When a conflict between the two countries over the disputed region of Nagorno-Karabakh resulted in an Armenian victory, Azerbaijan imposed an economic embargo, cutting Armenia off from its previous energy network: the All-Union electrical grid. Despite their obligations under the WTO, Azerbaijan's ethnic kin in the Republic of Turkey imposed a similar embargo. These conditions culminated in the perfect storm for an energy crisis.

While the Armenian Ministry of Energy insisted that its upgrades were sufficient, critics directed attention to the fact that the ANPP was constructed near fault lines and lacked containment infrastructure. In 2004, the European Union's envoy called the facility "a danger to the entire region," while offering a 200-million-euro loan to finance the ANPP's shutdown.

Known to the Armenians as the "Dark and Cold Days," between 1991 and 1995, Armenia experienced a chronic shortage of electricity. With embargoes to the east and west, officials tried to direct a gas pipeline through their northern neighbor—Georgia; however, Georgia's internal unrest contributed to the failure of this endeavor. Armenia depended on its domestically produced hydroelectric power, which devastated the country's greatest natural resource: Lake Sevan. Despite their best efforts, by the winter of 1994, the Armenian people had electricity for 1-2 hours per day, leaving them to rely on candles and firewood to fulfill their needs. ...

Faced with mounting pressure, Armenian officials made the difficult decision to restart the Armenia-2 reactor of the ANNP by 1995, the first time in history that this had been accomplished. It quickly became a source of power for Armenia's cities and a source of hope for Armenia's citizens.

Unfortunately, the reopening of the ANPP brought renewed concerns over a multitude of disastrous design flaws. While the Armenian Ministry of Energy insisted that its upgrades were sufficient, critics directed attention to the fact that the ANPP was constructed near fault lines and lacked containment infrastructure. In 2004, the European Union's envoy called the facility "a danger to the entire region," while offering a 200-million-euro loan to finance the ANPP's shutdown; seeing no alternative to the operation of the ANPP, Armenia rejected the offer. Years later, citing the ANPP's "aging infrastructure," the United States government advocated the construction of a new facility.

However, of those calling for the closure of the ANPP, no voice has been louder than Turkey, which argues that the station poses a tremendous risk to the entire Caucasus. After all, if a Chernobyl-level disaster happened, the fallout would reach a large portion of the global community, most significantly impacting Turkey, Georgia, Azerbaijan, and Iran. Turkey argues that these countries did not agree to the risk that is being imposed on them, resulting in an externality: while Armenia is the only country to generate electricity from the ANPP, all of its neighbors are equally affected by the potential consequences.

The risk associated with operating the ANPP can be understood as a common-pool resource, since there is a finite amount of acceptable risk that countries are willing to take. As Turkey sees it, by operating the ANPP, Armenia has taken more than its fair share; however, for the Armenians, this choice is rational. To them, the risk-benefit ratio seems to skew in favor of operating the ANPP, seeing that the only alternative is to live in the dark. ...

In order to achieve an equitable solution to this issue, the ANPP must continue to attract multinational investment in its safety. Prior offers, such as the one made by the EU in 2004, have failed, since Armenia is unwilling to permanently decommission what it views as critical infrastructure. This scenario is unrealistic because, in the absence of the ANPP, Armenia has no means of delivering electricity to its citizens. Nuclear energy accounts for nearly 30% of the country's total production, so a viable solution must recognize its inevitable dependence on the ANPP. After a promising outcome in the International Atomic Energy Agency's "Safety Aspect of Long-Term Operation" inspection in 2018, Prime Minister Nikol Pashinyan expressed his intention to extend the ANPP's lifetime to 2040. Rather than immediately decommission the facility, Armenia is wise to pursue upgrades that will extend the operating lifetime of the ANPP, until the development of a replacement unit is complete.

Nuclear energy accounts for nearly 30% of the country's total production, so a viable solution must recognize its inevitable dependence on the ANPP. After a promising outcome in the International Atomic Energy Agency's "Safety Aspect of Long-Term Operation" inspection in 2018, Prime Minister Nikol Pashinyan expressed his intention to extend the ANPP's lifetime to 2040.

This approach benefits all parties by solving the issue of externalities. If the existing facility is properly upgraded, Turkey, Azerbaijan, Georgia, and Iran can rest assured that no transnational Chernobyl-level disaster will occur near their borders. The global community has a vested interest in the safe operation of the ANPP, so these countries are likely to welcome any changes that will reduce its risks. As for the Armenian people, this solution ensures that the "Dark and Cold Days" will never return.

Nuclear energy has the potential to supply power to Armenian cities for decades to come in a manner that is environmentally responsible. Unlike its neighbors, Armenia does not possess oil or natural gas reserves; however, this allows the country to justify investment into alternative, clean or renewable sources.

Nuclear energy has the potential to supply power to Armenian cities for decades to come in a manner that is environmentally responsible. Unlike its neighbors, Armenia does not possess oil or natural gas reserves; however, this allows the country to justify investment into alternative, clean or renewable sources. In addition to this, expanding the country's nuclear sector is likely to produce more opportunities for employment in the high-technology industry. Coupled with the use of clean energy, these employment opportunities would facilitate sustainable development in Armenia, which is vital for the long-term viability of the nation's economy.

While many have called to decommission the ANPP, a realistic solution to the issue must consider the interests of all parties, including the Armenian people. If the facility is taken offline, Armenia would experience a return to the much-dreaded "Dark and Cold Days;" however, by investing in the safety of the ANPP, the international community can ensure that Armenia has a reliable source of energy, while imposing minimal risk upon its neighbors.

Source: Kami Arabian, https://asbarez.com/199401, 22 December 2020.

JAPAN

Pandemic Delays Melted Nuclear Fuel Removal at Fukushima

The government and operator of the Fukushima No. 1 nuclear power plant announced they had abandoned plans to start removing melted nuclear fuel and other contaminated debris from the stricken facility within 2021, citing delayed development in Britain of a robotic arm crucial for the purpose. They explained that the novel coronavirus pandemic was chiefly to blame for the delay. The government and Tokyo Electric Power Co. had planned to start the hazardous task

in 2021 but said Dec. 24 that is no longer feasible.

In December 2011, nine months after the triple meltdown triggered by the March earthquake and tsunami disaster, the two parties set a goal of starting to retrieve the melted fuel "within 10 years" so reactor decommissioning could start. Since then, they have had to downsize the scale of debris that can be realistically be retrieved, mainly because the technology does not exist to accomplish such dangerous work. The No. 2 reactor, along with the No. 1 and No. 3 reactors, went into meltdown after tsunami generated by the 2011 Great East Japan Earthquake knocked out cooling systems at the plant. Debris retrieval constitutes the biggest obstacles to deciding how reactor decommissioning will progress in the years ahead. The debris is emitting extremely high levels of radiation, making it difficult to access the site even with robots. Little is known about the state of the debris or its composition.

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The government and TEPCO revised the timetable last December with the aim of retrieving a few grams of debris on an experimental basis in 2021 from the No. 2 reactor. The No. 2 reactor was chosen because the state of the containment housing is better understood than for the other reactors. Japan approached Britain to develop a special robotic arm because it has more experience in this field. But the work has experienced significant delays because of the COVID-19 pandemic. Trial tests for the robotic arm are planned to be held in Japan next spring or later with retrieval work postponed to 2022 or later.

However, many questions remain about the reactor decommissioning of the Fukushima No. 1 nuclear power plant as a whole due to a number of factors such as wrecked equipment at the site. For example, initial projections to complete the removal of used nuclear fuel from a fuel pool were delayed for 10 years. However, the government and TEPCO are sticking to their schedule to complete reactor decommissioning between 2041 and 2051.

With regard to debris retrieval, this is to be done on a "step-by-step" basis. The two parties on Dec. 24 also announced they will postpone the start of probing the interior of the No.1 reactor's containment vessel from the second half of fiscal 2020 to fiscal 2021. They have been working to secure a route that will allow robotic equipment to explore the interior but experienced huge hurdles because their current method caused radioactive substances to spread. The accumulated debris in the three reactors is estimated to total about 880 tons. Tentative plans call for increasing the amount of debris to be retrieved gradually after a few grams are collected with a metallic brush attached to the top of the robotic arm and analyzed.

Source: Yu Kotsubo, http://www.asahi.com/ajw/articles/14059716, 25 December 2020.

IAEA Ready to Send Monitor Team for Fukushima Water Release

The head of the IAEA said his body is ready to send a monitoring team upon request to check treated radioactive water set to be discharged from the crippled Fukushima nuclear plant to address concerns over the impact on the environment. "We can cooperate if the government of Japan so decides and invites us. We could cooperate in the whole spectrum of the operation, before, during and afterwards," IAEA Director General Rafael Grossi said ….

"We are in preparatory talks" with the Japanese government over how to deal with the accumulating water, Grossi said ahead of the 10th anniversary of the Fukushima Daiichi nuclear disaster on March 11, 2011. The Japanese government is considering the option of releasing the water used to cool reactors stored at the Fukushima power station into the sea, but has yet

to make a final decision amid strong opposition by the local fishery industry due to concerns about the reputation of marine products. Neighboring countries such as China and South Korea have also expressed wariness over discharging the water from the Fukushima plant into the environment.

The Japanese government is considering the option of releasing the water used to cool reactors stored at the Fukushima power station into the sea, but has yet to make a final decision amid strong opposition by the local fishery industry due to concerns about the reputation of marine products. Neighboring countries such as China and South Korea have also expressed wariness over discharging the water from the Fukushima plant into the environment.

Grossi...said the IAEA can play "an extremely constructive role" in addressing concerns about the release of the water into the environment, such as by sharing information based on scientific facts. When Prime Minister Yoshihide Suga visited the plant in September, he said the government wants to make a decision "as soon as possible" on how to dispose of the water. Chief Cabinet Secretary Katsunobu Kato said during his visit to Fukushima Prefecture that the government can no longer put off the decision.

Two municipalities in Hokkaido recently signed up for preliminary research into their land to gauge its suitability for hosting a deep-underground disposal site for high-level radioactive nuclear waste. But Hokkaido Gov. Naomichi Suzuki and local fishermen are among those opposed to the idea.

The power plant suffered core meltdowns due to the massive earthquake and tsunami, in the world's worst nuclear crisis since the 1986 Chernobyl accident. The water has been treated using an advanced liquid processing system, or ALPS, to remove most contaminants other than relatively less toxic tritium. It is stored in tanks on the facility's premises but space is expected to run out by the summer of 2022.

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Evaporating the water from the plant was also among options discussed as methods to dispose of the water. "Regulated discharge to the open sea or evaporation, are technically feasible" and "in line with the current practice and best practices internationally," the IAEA chief said. Reflecting back on his visit to the Fukushima Daiichi nuclear complex in February, "I feel humbled and impressed by the devotion, the effort of all the operators there and the technical people, the national regulation agency everybody who is involved in the decommissioning and reconstruction efforts," Grossi said. He said the IAEA plans to organize an international conference to mark the 10th anniversary of the Fukushima nuclear crisis where participants including experts from Japan can discuss nuclear safety. Grossi also said the construction of a final disposal site for high-level radioactive waste from nuclear power plants, under discussion in Japan, is technically feasible, citing the case of Onkalo, the world's first spent nuclear fuel repository in Finland.

"The solution of deep geological permanent depository exists — it is there. Of course one has to make an assessment of the types of rock one is working on," he said. Two municipalities in Hokkaido recently signed up for preliminary research into their land to gauge its suitability for hosting a deep-underground disposal site for high-level radioactive nuclear waste. But Hokkaido Gov. Naomichi Suzuki and local fishermen are among those opposed to the idea.

Source: *https://japantoday.com/category/national/, 21 December 2020.*

NUCLEAR WASTE MANAGEMENT

JAPAN

Neighbors in Hokkaido Object to Plans to Store Nuclear Waste

Opposition has sprung up in communities near two municipalities in Hokkaido that intend to host final disposal sites for highly radioactive nuclear waste. However, the town of Suttsu and the village of Kamoenai have shown no signs that they will even listen to the arguments of their neighbors. At least two ordinances have been adopted to oppose their waste plans, although they are not legally binding.

Suttsu and Kamoenai have applied to the economy ministry to host final storage facilities for nuclear waste generated at the various power plants across Japan. The ministry had been searching desperately for years for candidate sites. After the ministry dangled out financial incentives, Suttsu and Kamoenai, both cash-strapped governments, applied. Eager to move forward, the ministry for the first time approved the start of the first stage in the selection process, which involves about two years of studying documents and maps of seismic activity around the candidate sites. An applicant for the first 2-year research phase of the 20-year process will receive up to 2 billion yen ($19.4 million) in subsidies.

In Shimamaki, a village west of Suttsu, the assembly on Dec. 15 adopted an ordinance to ban nuclear waste from entering the village. Five of eight Shimamaki assembly members, including its president, submitted the ordinance. The vote was four in favor of the ban and three against, with the assembly president not casting a ballot.

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... The second stage in the selection process is about four years of research, including taking boring samples, to ensure the sites meet general conditions for a storage facility. "It has to be stopped completely before moving from the first stage to the next," Hamano said. After Kataoka in August announced that Suttsu will consider applying to become a nuclear waste facility site, town officials of Kuromatsunai and Rankoshi, which are also near Suttsu, joined Shimamaki in asking the mayor to rethink that plan. But Kataoka did not slow down.

The three opposing municipalities are all larger than Suttsu, and plans have been broached to use strength in numbers to block Kataoka's move. "It is possible to scrum with other local governments that express the same determination," Masaru Fujisawa, mayor of Shimamaki, said. The third stage of the selection process includes the construction of a test facility. Opposing town officials fear that municipal borders will mean nothing after highly radioactive materials are buried deep under Suttsu, and that people and the environment in the surrounding three municipalities will be affected by the waste.

People in the fishing industry in the region are also concerned about damage caused by false rumors about radiation. The town assembly of Kuromatsunai has been deliberating a similar ordinance that was proposed in December. The assembly is expected to vote on the ordinance early next year. The town assembly of Rankoshi will likely adopt a similar ordinance. The waste-storage plan has also been opposed in Suttsu. Some town assembly members plan to submit an ordinance against the mayor's idea on Dec. 17.

However, the majority of assembly members have agreed with the mayor, and the ordinance will likely be voted down. The first stage in the selection process has also started in Kamoenai, a town that borders Tomari village, which hosts Hokkaido Electric Power Co.'s Tomari nuclear plant. In Furubira, east of Kamoenai, the town assembly on Dec. 15 approved an opinion paper

that says nuclear waste should not be brought into the northern main island of Hokkaido.

In Shakotan, a town north of Kamoenai, some assembly members plan to submit an ordinance in March. However, the ordinance will likely not affect Kamoenai's plan to host a nuclear waste storage facility. The Hokkaido government in 2000 approved an ordinance that said bringing nuclear waste to the island is "unacceptable."

In Shakotan, a town north of Kamoenai, some assembly members plan to submit an ordinance in March. However, the ordinance will likely not affect Kamoenai's plan to host a nuclear waste storage facility.

Hokkaido Governor Naomichi Suzuki on Nov. 17 released a statement saying he opposed Suttsu and Kamoenai's decisions, citing the ordinance. But the first stage can still be carried out without the consent of local governments. The second and third stages cannot move forward if the prefectural governor or a local municipal leader opposes the idea.

The entire selection process will take an estimated 20 years. ...

Source: Kenji Izawa and Yasuo Sakuma, http://www.asahi.com/ajw/articles/14025336, 16 December 2020.

Centre for Air Power Studies

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

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