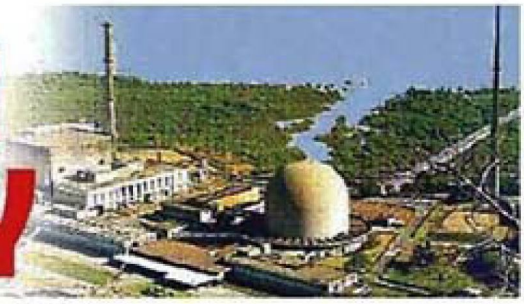
NUCLEAR SECURITY



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

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OPINION – Sitakanta Mishra

Now the World Needs Nuclear Power, More than Ever

Fossil fuels that emerged during the Iron Age are a major cause of environmental degradation. But these non-renewable energy sources are still powering civilization in the 21st century. Of course, the world has limited options to replace fossil fuel which is fast depleting; but humanity cannot rely indefinitely on non-renewable sources for most of its energy needs.

The emphasis on renewables is prudent but their intermittent nature and low baseload factor circumscribe their heavy usage. Meanwhile, nuclear energy with a much higher capacity factor and lesser stress on climate has unfairly not been appreciated enough. Safety concerns, rather than absolute facts, have often governed national nuclear energy policies. The world needs to reconcile with the fact that advancement in reactor technology has made nuclear energy safer, feasible and more sustainable than fossil fuel.

The emphasis on renewables is prudent but their intermittent nature and low baseload factor circumscribe their heavy usage. Meanwhile, nuclear energy with a much higher capacity factor and lesser stress on climate has unfairly not been appreciated enough. The world needs to reconcile with the fact that advancement in reactor technology has made nuclear energy safer, feasible and more sustainable than fossil fuel.

On the basis of sporadic nuclear disasters that caused relatively small fatalities during the last seven decades, a negative perception on nuclear technology has been built. Undeniably, fatal incidents in the nuclear sector have resulted in the loss of precious lives but the sensitive nature of the nuclear sector has earned it more negative attention in comparison to other industries.

At present, nuclear power supplies about one-sixth of global electricity requirements and has the potential to provide electricity on a large scale with practically no greenhouse gas emissions. Post-Fukushima, there has been a visible drive for phasing out of nuclear projects in some European countries, who plan a major shift towards natural gas, although ignorant of the fact that natural gas usage will cause more emissions.

As per the research findings by Pushker Kharecha and James Hansen, "If nuclear power never existed, the energy it supplied certainly would have been generated through fossil fuels instead, which would have caused much higher pollution-related mortality and GHG emissions per unit energy produced."

Their findings further suggested that nuclear power prevented an average of 1.8 million net deaths worldwide and an average of 64 gigatonnes of CO2-equivalent net green-house-gas emissions between 1971 and 2009. If a complete nuclear energy phase-out is undertaken, it would lead to an average of 420,000 to 7 million deaths and 80-240 GtCO2-eq emissions globally.

Nuclear power prevented an average of 1.8 million net deaths worldwide and an average of 64 gigatonnes of CO2-equivalent net green-house-gas emissions between 1971 and 2009. If a complete nuclear energy phase-out is undertaken, it would lead to an average of 420,000 to 7 million deaths and 80-240 GtCO2-eq emissions globally.

In order to minimize the impact of climate change, while also meeting the increasing demand for cheaper but sustainable energy, nuclear energy needs to be rapidly expanded. This cannot be achieved without addressing the safety concerns involved with nuclear technology. With seven decades of operational experience and lessons from past few disasters, nuclear technology is maturing with innovations.

One such engineering innovation is the use of liquid sodium, instead of water, to cool the reactor at a lower pressure, which helps avoid meltdowns. Other technologies like the small modular reactor (SMR), generation IV variants (molten-salt reactor), advanced fission and fusion reactors, etc. have the potential to revolutionize the nuclear industry. In America, China, Europe, India, Japan, Russia, and elsewhere, a dozen new nuclear reactor designs are at advanced stages of planning or construction, while several others are at the primitive research and development stage.

If sincere patronage is given, the emerging nuclear technologies will herald a paradigm shift in the nuclear industry. Such reactor variants have been licensed or deployed in Russia and China only. Indian nuclear establishment was reportedly in the final throes of developing a (conceptual) design for Advanced Heavy Water Reactor (AHWR) as the stepping stone to its third stage of the nuclear energy program.

Safety is touted as the key factor in any country's nuclear programme. Furthering its commitment towards the peaceful use of nuclear energy, India has strengthened its collaboration with Russia. The two countries have collaborated well on the setup of the Kudankulam nuclear power plant. Work on units 3 and 4 of Kudankulam NPP has progressed significantly with the undeterred cooperation from Rosatom, the Russian state energy corporation. Six VVER-1000 reactors are to be built at Kudankulam with Russian support.

The VVER-1000 reactors meet enormous safety standards. It combines various active safety systems and passive safety systems, which have resulted in the maximum protection of the plant from internal and external risks. Modern VVER units also feature active heat removal systems, hydrogen combiners and core catchers, which are all instrumental in ensuring the safety of the units during natural or man-made hazards.

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Apart from the safety aspects, nuclear energy is being used for other important tasks such as

desalination, production of hydrogen, space heating, process-heat applications, extraction of carbon from CO2 to combine with hydrogen to create synthetic liquid fuels, etc. The need of the hour, therefore, is to hasten the process of innovation in nuclear technology and not abandon or demonize it. After all, we need to introspect whether nuclear technology failed us or we failed nuclear technology.

For the Admiral, strategic deterrence is the holy of holies. If it fails, "we are prepared to deliver a decisive response, decisive in every possible way." This decisiveness will be achieved "with a modern resilient, equipped, and trained combatant-ready force.

Source: https://www.cnbctv18. com/views/view-now-the-world-needs-nuclear-power-more-than-ever-9296391.htm, 14 May 2021.

OPINION – Binoy Kampmark

Spending More on Nukes: STRATCOM's Nuclear Death Wish

Being sufficiently able at your job is a good thing. But beware the trappings of zeal. When it comes to the business of retaining an inventory for humanity's annihilation, the zealous should be kept away. But…Admiral Charles Richard was in April this year, with his siren calls, urging the US Senate to consider a simple proposition. "Sustainment of modernization of our modern nuclear forces…has transitioned from something we should do, to something we must do." As Commander of the United States Strategic Command (STRATCOM), he was aching to impress the Senate Committee on Armed Services that the nuclear deterrent was there to be polished and improved.

We must account for the possibility of conflict leading to conditions which could very rapidly drive an adversary to consider nuclear use as their least bad option." The unanswered question here is what would make such an adversary behave in that way.

Much of his address as part of the Posture Statement Review should be treated as the conventional lunacy that comes with that cretin-crusted field known as nuclear deterrence. "Peace is our profession" remains the somewhat obscene motto of STRATCOM, and it is a peace kept by promising the potential extinction of the human species.

For the Admiral, strategic deterrence is the holy of holies. If it fails, "we are prepared to deliver a decisive response, decisive in every possible way." This decisiveness will be achieved "with a modern resilient, equipped, and trained combatant-ready force." To avoid the failure of such deterrence also required revisiting "a critical forgotten lesson that deterrence operates continuously from peacetime, through the gray zone, worldwide, across all domains, and into conflict" [Richard's emphasis].

The fate of the US (Richard humourlessly calls it safety and security) is indelibly linked to an "effective nuclear triad; a reliable and modern nuclear command, control and communications (NC3) architecture; and a responsive nuclear weapons infrastructure."

Deterrence is a fetish, an idol. "Strategic deterrence," he explained, "is the foundation of our national defense policy and enables every US military operation around the world." Linking the nuke to impunity and roguish behaviour (the Admiral would see this as preserving freedom, of course), he makes an ominous observation. "If strategic deterrence fails, little else…no plan or capability, works as designed" [Richard's emphasis].

According to the Admiral, the fundamentals of deterrence had not changed in this century. Principles keeping terror in play remained. Adversaries had to be assured they would suffer greater loss than any gain derived from their offensive actions. "The spectrum of conflict today, however, is neither linear nor predictable" [Richard's emphasis]. In a candid revelation, Richard showed his worldview with jaw dropping sharpness. "We must account for the possibility of conflict leading to conditions which could very rapidly drive an adversary to consider nuclear use

as their least bad option." The unanswered question here is what would make such an adversary behave in that way.

Part of the concern is a fear of old age in the weapons department and what Richard accusingly calls underinvestment. The nuclear mechanisms that have been in place are suffering gout and rot, though the military-industrial complex is always bound to exaggerate the ills. The presence of old computer systems is being frowned upon despite the obvious advantages these have in the face of misfiring or cyber security.

The message to lawmakers is clear: spend more on nuclear weapons. If system capabilities are eroded such that ICBMs are cut from the triad, the commander recommends returning to that maniacally dangerous formula of keeping nuclear armed US Air Force bombers airborne and on permanent alert. The world can look forward to more nuclear accidents occasioned by pilot error and technical fault.

The capabilities of both powers meant that the US was "facing two nuclear-capable peer adversaries at the same time" for the first time in its history. Much in the spirit of the Cold War "missile gap" between the US and the USSR, Richard takes it upon himself to inflate Beijing's credentials in order to woo the Senators.

Central to the latest update is the continuing concern shown towards Russia and China. Russia slots into the role of old adversary, being the "pacing nuclear strategic threat," given its aggressive modernisation drive, which was 80% complete. China, however, was proving a menace. The capabilities of both powers meant that the US was "facing two nuclear-capable peer adversaries at the same time" for the first time in its history. Much in the spirit of the Cold War "missile gap" between the US and the USSR, Richard takes it upon himself to inflate Beijing's credentials in order to woo the Senators. China was "already capable of executing any plausible nuclear deployment strategy within their region and will soon be able to do so at intercontinental ranges as well."

In his oral testimony, the Admiral was beside himself regarding weekly revelations about China's capabilities. The stock of current intelligence information on China's nuclear arsenal, given a month's lag, was probably dated by the time it reached STRATCOM. He could only conclude that "China's stated 'No First Use' policy declaration and implied minimum deterrent strategy" should be questioned. Richard was also convinced that Beijing had moved a number "of its nuclear forces to a Launch on Warning (LOW) posture and are adopting a limited 'high alert duty' strategy."

Richard is gloomy in warning, and duly italicises for his audience. "If we find out we were wrong, decisions to divest or delay could take ten to fifteen years to recover and render the nation unable to respond to advancing threats." He continues in italics. "Any decision to delay or defer recapitalization requires us to be absolutely sure for the next 40 years, that we don't need the capability to deter threats, many of which we can't predict."

Through social media, US Strategic Command proved laidback in discussing prospective Armageddon. Richard's words on war being neither linear, nor predictable, and the possibility that adversaries might consider nuclear use as their least bad option, was tweeted as a taster on April 20. *Newsweek* considered it "bizarre". Those at STRATCOM evidently did not.

Source:https://www.eurasiareview.com/06052021-spending-more-on-nukes-stratcoms-nuclear-death-wish-oped/, 06 May 2021.

OPINION – Shabbir H. Kazmi

Saudis and Israelis Don't Approve of JCPOA Talks

According to media reports, with Iran and world powers resumed nuclear talks, Saudi Arabia and Israel also have intensified consultations. Washington and Tel Aviv on the one hand and Washington and the Persian Gulf Cooperation Council on the other hand are having extensive talks.

Both, Israel and Saudi Arabia want to influence any US move to return to the 2015 Iran nuclear deal, which they have publicly opposed right from the beginning. As the Iranian negotiating team head to the Austrian capital of Vienna, a senior Israeli delegation comprising of Mossad Chief Yosef Cohen, Head of Military Intelligence Tamir Hayman, and National Security Adviser Meir Ben-Shabbat also arrived in Washington for talks. Chief of Staff of the Israeli Army Aviv Kochavi was also supposed to join the delegation but the recent hike in Israel-Gaza tensions forced him to cancel his trip to Washington.

Following the meeting of Sullivan and Ben-Shabbat, the White House said the US and Israel agreed to establish a new group to counter Iran's drones and missiles. The United States and Israel agreed to establish an inter-agency working group to focus particular attention on the growing threat of Unmanned Aerial Vehicles and Precision Guided Missiles produced by Iran.

The visiting delegation met with several high-level Biden officials including National Security Adviser Jake Sullivan, Chairman of the Joint Chiefs of Staff Mark Milley and senior US military and intelligence officials. The focus of the conversations is squarely on the terms of the US return to the 2015 nuclear deal.

If the Biden administration is really keen to revive the JCPOA, it needs to be aware of any possible unconstructive efforts on the part of the Saudis and Israelis because they have never been proponents of the deal and they are unlikely to change their mind just because there is a new president in the White House.

Sullivan and Ben-Shabbat held their first in-person meeting since Joe Biden entered the White House. The US and Israeli officials discussed their serious concerns about advancements in Iran's nuclear program in recent years. The United States updated Israel on the talks in Vienna and emphasized strong US interest in consulting closely with Israel on the nuclear issue going forward. The US and Israel agreed on the significant threat posed by Iran's aggressive behavior in the region.

Following the meeting of Sullivan and Ben-Shabbat, the White House said the US and Israel agreed to establish a new group to counter Iran's drones and missiles. The United States and Israel agreed to establish an inter-agency working group to focus particular attention on the growing threat of Unmanned Aerial Vehicles and Precision Guided Missiles produced by Iran, claiming that these weapons are being provided to proxy groups in the West Asia region.

Also US Special Envoy for Iran Robert Malley held talks with Saudi Foreign Minister Prince Faisal bin Farhan alongside officials from the countries of the Persian Gulf Cooperation Council (GCC). Malley said he discussed the Arab officials the situation around the JCPOA and the Vienna nuclear talks.

The US discussions with Saudi Arabia aim to persuade them the US return to the 2015 nuclear deal will not harm their own interests. But this is exactly what the Obama administration told the Saudis and the Israelis after signing the JCPOA in 2015. Instead of supporting the deal, the Saudis and Israelis joined forces to kill the deal and the Trump came into power, they saw a new opportunity to scrub the deal. They may have even thought that the JCPOA would never be revived given the blows the Trump administration delivered to it. This may explain why they are so anxious about the JCPOA being revived after four years of anti-JCPOA rhetoric from Washington.

If the Biden administration is really keen to revive the JCPOA, it needs to be aware of any possible unconstructive efforts on the part of the Saudis and Israelis because they have never been proponents of the deal and they are unlikely to change their mind just because there is a new president in the White House. Of course, they may stop short of calling on the Biden administration to refrain from rejoining the JCPOA but they will certainly ask the US to at least make some

amendments to the original deal, something that will be opposed by other signatories to the JCPOA namely Russia and Iran.

Mikhail Ulyanov, Russia's permanent representative to international organizations in Vienna, has recently said that the negotiators in Vienna have come to conclude that regional security and missile production are different from curbing Iran's nuclear program.

Curbing Iran's nuclear program is a different matter from regional security and missile production. At the end of two rounds of talks in Vienna to revive the JCPOA, it was clear to all participants that only by reviving the original agreement could achieve the goals. No new terms or clauses needs to be added. Iran has strongly rejected any attempt to expand the JCPOA, while calling on the US to remove its sanctions.

Source:https://www. eurasiareview.com/ 03052021-saudis-and-israelis-dont-approve-of-jcpoa-talks-oped/, 03 May 2021.

OPINION – Shanto Kairy

Why the West Want to Stop Iran Becoming a Nuclear Power?

Iran is a regional powerhouse in the Middle East only rivals Saudi Arabia, Egypt and Turkey. The rivalry between Saudi Arabia and Iran is centuries old in terms of sectarian differences of Shiite Iran and Sunni Saudi Arabia. The thousand year of schism of Islam presents in the Middle East. Moreover, the Islamic Revolution made Iran a fundamentalist impulsive state hostile to the West and Sunni neighbors. Iran is trying to be a nuclear power since 2007 following the great powers and other nuclear states. Iran has always interpreted its nuclear ambition as only to acquire energy and always express against use it as weapon. But this is not true at all as it is going to acquire it to show power against the rival Saudi Arab, the West and USA. There are convictions that the Western Powers let India, Pakistan and Israel to be a nuclear power but they are now against Iran. But this is not the case as several Reasons are behind to stop Iran to be a nuclear power.

Firstly, if Iran becomes a nuclear power, it will simply emerge as the sole regional superpower in the Middle East. Saudi Arabia, the ally of the West will not be a match for Iran. The Middle Eastern 'balance of power' will not be maintained. This will lead to very severe repercussions and the chance of maintaining future 'balance of power' in the reason will be in disarray. As a result, Saudi Arabia will want to acquire nuclear weapon to counter Iran in the region. As Saudi Arabia has money, either it can acquire nuclear weapon by researching or to buy weapons or technology from Pakistan.

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From 1990s, Pakistan is selling nuclear technology to Iran, Libya and North Korea. As the economy of Pakistan is in great disarray, it might sell its nuclear technology to Saudi Arabia for billons of dollar. Turkey might try to acquire nuclear weapon to counter Saudi Arabia and the Egypt will want to acquire nuclear weapon to counter Turkey. It will start a sick competition in the Middle East to acquire the nuclear weapons which later may spread throughout the world. The efforts of Nuclear Proliferation will be null and void in a decade.

Another problem will arise if Iran becomes a nuclear power in terms of the failure of calculating nuclear deterrence. It is not unknown that USA acquired nuclear power first, then USSR acquired to counter or balance the power of USA, then it was the beginning of arms race. India acquired nuclear weapon to balance China in the region after the loss of 1962 war. Pakistan countered Indian nuclear power as it is unable to fight and win a war against a mighty power like India.

Western powers primarily imposed sanctions on them but later withdrew. But if Iran acquired it, the nuclear deterrence or the calculation of nuclear war threats will be complicated. Who will counter who, who will attack who the probability or the calculation of the probability will be huge. There will be miscalculations and chances of total devastating war will be huge. Nuclear power Israel might attack Iran as preemptive action. In this indicating situation, Waltzs' nuclear deterrence does not work.

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Secondly, Iranian world view and ideology does not support the idea of Westphalia world order. The leaders of Iran and its revolution including Ayatollah Khomeini declared in 2013, they want to unite the believers (Muslim Ummah); they want to vanquish the dominance of the Western powers, USA and its allies. Iran is now influenced by Radical Islamist Syed Qutb according to Henry Kissinger, and working both with Shiite and Sunni Radical organization. According to Kissinger, Iran has connection to Al-Qaeda and Taliban as they armed them. Iranian leadership thinks that they are on a Holy War (Jihad) against the unbelievers and these ideas are making the nuclear program even threatening. If Iran has nuclear weapon, can be in the hands of terrorist organizations or the radical and impulsive leadership might be threat to the nearby states, US allies, Russia, China or Israel. Any impulsive leadership can use it to wipe out the unbelievers in fighting a Jihad. Even they can use the nuclear arms as bargaining chip with the West or neighboring countries as North Korea did.

So the only way to inhibit the nuclear capability of Iran is to reduce its capability to enrich Uranium. Iran has thousands of Uranium centrifuges and they wanted to reduce capacity of the half of the centrifuge to only 5 percent Uranium.

Thirdly, Iran already has its own nuclear delivery system and missile technologies. This made Iran a more ready nuclear power than previous nuclear powers like India and Pakistan, have been. So the only way to inhibit the nuclear capability of Iran is to reduce its capability to enrich Uranium. Iran has thousands of Uranium centrifuges and they wanted to reduce capacity of the half of the centrifuge to only 5 percent Uranium. According to Iran they will not enrich Uranium to 20 percent. This 20 percent Uranium is not important as 5 percent Uranium as this 5 percent Uranium is the threshold from where in a few months Iran can produce weapon category Uranium which make Iran as more unreliable.

In 2015 Iran signed JCPOA, a nuclear treaty with the five members of United Nations Security Council (P5) plus Germany which is called P5+1. As a result sanctions were withdrawn from Iran by the West. Ex-President Donald Trump declared withdrawal from the deal in 2018 and imposed the sections on Iran. Iran in 2019, Iran breached the limit set on the deal and IAEA confirmed it. After the Baghdad Airstrike killed Qasem Solaimani, Iran wanted to increase its nuclear capability. The good news is, in December 2020, America desired to rejoin the deal, and the new Biden administration is working on it.

Iran is a pivotal country in the Middle East. Anything Iran does may echo in the region. Middle East is already a complicated region with a lot of conflict and potential problematic issues. To sustain peace in the region including the balance of power, world powers are working on it. Time will tell how fruitful the initiatives are. The West must ensure that Iran respect and be a part of the Westphalia order which is a good start.

Source: https://moderndiplomacy.eu/2021/05/12/why-the-west-want-to-stop-iran-becoming-a-nuclear-power/, 12 May 2021.

NUCLEAR STRATEGY

RUSSIA

Russia to Hold Three Test Launches of its Newest Sarmat ICBM this Year

Russia will carry out three test launches of its advanced Sarmat ICBM this year, sources in Russia's defense industry and close to the Russian defense ministry have told TASS. "Three launches of the Sarmat ICBM will be carried out as part of flight development tests in 2021," one of them said. "The first launch of the Sarmat ICBM within the framework of flight development tests will be carried out tentatively in the third quarter of 2021, a field at the Kura testing range on Kamchatka will be a target," another source said.

Sarmat has completely new means to counter missile defense. Its active flight stage, when the missile accelerates and is visible and vulnerable to missile defense, has been reduced. The shorter acceleration section is important for the breakthrough of missile defense, as the separation of reentry vehicles and discharge of dummy targets are possible only after the boost.

The sources told TASS that all the three launches would be performed from a silo at the Plesetsk space center in northwestern Russia. One of those missiles will probably be fired at its maximum range. State trials of Sarmat are due to begin in 2022, with first regiment entering combat service at the end of the year, the sources said. "The defense ministry is already purchasing serially produced missiles," one of them added.

Sarmat is to replace R-36M2 Voevoda missiles, which have been the most powerful in the world and operational since 1970s. Sarmat considerably exceeds the predecessor. Some of its characteristics were disclosed at Army-2019 forum. The new missile weighs 208.1 tons, the payload is close to 10 tons and the fuel is 178 tons. The range of Sarmat is 18 thousand kilometers.

Open sources said Sarmat has completely new means to counter missile defense. Its active flight stage, when the missile accelerates and is visible and vulnerable to missile defense, has been reduced. The shorter acceleration section is important for the breakthrough of missile defense, as the separation of reentry vehicles and discharge of dummy targets are possible only after the boost. Sarmat engines rapidly boost the missile to the safe zone and make it invulnerable for the missile defense until it reaches the main flight trajectory.

It can fly by unpredictable routes and bypass missile defense areas. It can fly over the North and South Pole and approach targets from directions that are not envisaged for interception. Sarmat can carry a line of reentry vehicles, including hypersonic Avangard gliders.

Source:https://tass.com/defense/1286447?mkt_tok=MDk1LVBQVi04MTMAAAF84 Im45ouPz 4B wK60s pqXyFWeUU 9RbyapWjYd_8LKySNZso Lk2k Qdgc4SQu33xWE0ggzj-caEeFXPM wSaZ 3IMFf8 VKlo4JFfx4hjYDUHkBKe4, 05 May 2021.

USA

Biden will Review Nuke-Modernizing Plan

High-ranking US officials said the administration of President Joe Biden will re-examine and possibly save on the costs of upgrading nuclear weaponry, a departure from his predecessor. ... "Certainly that's the objective of the president, is to find ways to reduce the role of nuclear weapons, and so we look forward to examining those issues, as part of our Nuclear Posture Review," said Leonor Tomero, deputy assistant secretary of defense for Nuclear and Missile Defense Policy in the Office of the Secretary of Defense.

Tomero was explaining Biden's intention to develop its NPR, or the government's midterm atomic policy. The *Asahi Shimbun* on 07 April 2021 conducted phone interviews with officials responsible for nuclear policy in the US Department of Defense and the State Department.

The interviewees said the Biden administration will

review the plan to replace outdated atomic weapons. The plan is estimated to cost a total of $1.2 trillion (131 trillion yen) over the next 30 years. They stressed that the US will discuss the issue with Japan and other allies that fall under the nuclear umbrella provided by Washington to retain deterrence.

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The US views its ICBM, strategic nuclear bombers and SLBM as its three pillars in the nuclear policy. The transport means and atomic warheads introduced during the Cold War are falling behind the changing times. For that reason, the administration of former President Obama approved the modernization plan to replace them with the latest ones. His successor, former President Trump, then boosted the role of nuclear weaponry, by increasing the budget for the program and announcing the development of a smaller and easier-to-use warhead with a low yield as well as a nuclear-armed sea-launched cruise missile in the NPR.

The US understands and shares the desire to advance disarmament goals, and we're committed to those goals. We don't believe the Treaty on the Prohibition of Nuclear Weapons (TPPNW) is the right way to go about that, but we understand because we have these shared goals. We'd like to prioritize what we do agree on.

Tomero cited the ballooning costs and suggested the Biden administration will re-examine the nuclear modernization plan in its NPR, noting that "several programs are very costly." She stated that Washington will "look at schedules and priorities" in determining the allocation of funds for defense.

Showing consideration for US allies, Tomero said: "Providing credible extended deterrence, including with our nuclear forces, to Japan and our allies, will remain one of the highest priorities for us…. As Biden has expressed that "the sole purpose of the US nuclear arsenal should be deterrence," a possibility is pointed out that his administration may vow to never launch a pre-emptive strikes using those kinds of arms unless it comes under an attack.

"I fully expect that the declaratory policy will be reviewed and looked at as part of our reviews," Tomero said of the likelihood. "I think the sense is, 'Is it time and are the conditions ripe for changing declaratory policy?'"...

Meanwhile, Alexandra Bell, the deputy assistant secretary of state in the Bureau of Arms Control, Verification and Compliance, reiterated the conventional US stance over the Treaty on the Prohibition of Nuclear Weapons, which went into effect in January 2021. "It won't have an impact on US nuclear weapons policy or our extended deterrence relationships," Bell said.

Bell argued, "The US understands and shares the desire to advance disarmament goals, and we're committed to those goals. We don't believe the Treaty on the Prohibition of Nuclear Weapons (TPPNW) is the right way to go about that, but we understand because we have these shared goals. We'd like to prioritize what we do agree on." She told The Asahi Shimbun that the US will seek discussions with non-nuclear nations toward the review meeting for the TPPNW scheduled for this summer.

Source: Takashi Watanabe and Ryo Takano, http://www.asahi.com/ajw/articles/14337991?, 11 May 2021.

US Nuclear Weapons Upgrade to See Delay on Old Silos, Tech

Upgrading America's nuclear missile arsenal will likely take longer than expected because of the

complexities of pulling 1970s-era ICBMs out of aging silos and testing and installing replacement missiles and technology to run the system for decades to come, according to a congressional audit.

The Air Force faces the complicated challenge of removing a total of about 400 Minuteman III intercontinental ballistic missiles and their command-and-control electronics at the rate of about 50 per year from silos and support buildings in various states of deterioration, some with water damage, the Government Accountability Office said in a report....

Upgrading America's nuclear missile arsenal will likely take longer than expected because of the complexities of pulling 1970s-era ICBMs out of aging silos and testing and installing replacement missiles and technology to run the system for decades to come, according to a congressional audit.

The difficulties which include extracting the missiles and nuclear payloads from the silos, repairing any structural decay, and installing customized electronics and the new weapon, all while maintaining other nuclear systems on alert mean the new ICBM won't likely meet an initial 2029 deadline, the declassified GAO report warned.

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...The upgrade schedule for the new land-based missiles "is contingent on inheriting the launch facilities in a suitable condition" but "these facilities are currently facing a number of issues, such as water intrusion and structural deficiencies," the GAO report said. "Air Force documentation also states that further remediation of any deterioration that has occurred at launch facilities will be accomplished as they are converted" to the configuration needed for the new missiles, it added.

...Modernizing the nation's Cold War-era capacity to deliver nuclear weapons by air, land and sea — the so-called nuclear triad — remains a key Pentagon priority under the Biden administration after it was jumpstarted by President Barack Obama and continued by President Donald Trump. The effort is expected to cost as much as $1.2 trillion through 2046 for development, purchase and long-term support, the Congressional Budget Office estimated in 2018.

The GAO report is a primer on the risks inherent in the effort as US officials say the nation faces a modernizing Russian nuclear arsenal and a burgeoning one from China, which in the "very near-term" will "possess a credible nuclear triad," Admiral Charles Richard, the head of US Strategic Command, told Congress last month in April 2021.

Despite the urgency of the upgrades, "we found that every nuclear triad replacement program" including the B-21 bomber, new air-launched nuclear cruise missile, Columbia class submarine, "and every ongoing bomb and warhead modernization program faces the prospect of delays," the report said.

Both the Pentagon and the Department of Energy "face challenges with sustaining existing nuclear triad systems," GAO said. Specifically, "the Navy and Air Force face difficulties in meeting some of STRATCOM's operational requirements to be able to deploy additional quantities of systems above day-to-day requirements" and "some current triad systems have operational capability limitations that will only be mitigated once replacement systems are fielded."

Northrop's Ground Based Strategic Deterrent — the land-based portion of the triad — is at the heart of congressional debate over the Pentagon's longer term spending plans. ...GAO report is likely to increase scrutiny, even among supporters, of Air Force plans to field the weapon. Civilian Pentagon acquisition officials told GAO auditors

the "schedule is aggressive and compressed compared to prior ICBM programs."

Air Force documents acknowledge the step-by-step process needed to extract, upgrade and replace the missile system "introduces additional complexity to the schedule" as the service "will need to coordinate GBSD deployment activities with Minuteman III operations, depot maintenance, and sustainment activities to ensure that ICBM operations are not interrupted," according to GAO.

The Air Force plans to put 57 launch facilities, including silos, annually through a programmed depot maintenance process in advance of GBSD fielding, with a plan to refurbish all over an 8-year period, said GAO.

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Air Force documents indicate "it could take up to six months to complete the necessary restoration and conversion processes at each launch facility," said the agency. "However, the Air Force has yet to evaluate all of the launch facilities and, accordingly, the full scope of work necessary to prepare the facilities" for use by a new missile "has yet to be determined." If the Air Force doesn't resolve the issues with the launch facilities "in advance of the transition to GBSD, additional time could be needed for construction, which could result in delays to fielding."

Source: Anthony Capaccio, https://www.bloomberg.com/news/articles/2021-05-11/asian-stocks-set-for-muted-open-after-u-s-drop-markets-wrap, 06 May 2021.

NUCLEAR ENERGY

BULGARIA

Nuclear Energy to Still be Main Source of Electricity in Bulgaria in 2030

Nuclear power will remain the dominant source of power generation in Bulgaria by 2030, despite the government's plans to shift toward renewable power. The Bulgarian government is collaborating with the United States and Russia in the development of new nuclear power plants. It is preparing the construction of a seventh unit at the Kozloduy nuclear power plant and the deployment of NuScale's small modular reactor (SMR) technology.

Nuclear power generation share in total power generation was 44% in 2020, and it is expected to remain above 40% until 2030. "Nuclear power generation was 15.9 TWh in 2020, making its share 44% in total power generation in the country and this is expected to remain above 40% until 2030," said Pavan Vyakaranam, Practice Head at GlobalData.

Nuclear power will remain the dominant source of power generation in Bulgaria by 2030, despite the government's plans to shift toward renewable power. The Bulgarian government is collaborating with the United States and Russia in the development of new nuclear power plants.

Electricity demand in Bulgaria stood at 30.9 TWh in 2020. The share of renewables was 22.1% in 2018. According to the draft Sustainable Energy Development Strategy of Bulgaria until 2030 with a projection until 2050, electricity generation from renewable sources is seen growing to 30.33% from 22.1%, registered in 2018.

Nuclear power will remain the dominant source for power generation in the country at least until 2030, estimated at 14.1 TWh per year, despite the government's plans to replace it with renewable power capacity, according to analytics

company GlobalData. Vyakaranam said Bulgaria's electricity market is currently in transition, with the government slowly decreasing its coal power capacity in order to replace it with renewable power.

Country Plans Investments with Russia, and US: Bulgaria has only one nuclear power station, Kozloduy nuclear power plant (NPP), with two units in operation after the decommission of units 1 and 2 in 2002 and units 3 and 4 in 2006. In January 2021, the Bulgarian government approved plans for the construction of a seventh unit, using Russian-supplied equipment purchased for the Belene project. However, according to GlobalData, the schedule is still uncertain due to financial issues.

Planned retirements of nuclear plants represent "the single greatest loss of clean power in world history" and that without additional capacity and investment into the sector, the need to reach net-zero could be derailed. The groups estimate that more than 100GW of nuclear capacity will retire globally within 20 years.

Bulgaria has also taken multiple steps toward the development of nuclear power in recent times including joining the Nuclear Energy Agency (NEA) in January 2021 while Kozloduy NPP also signed a memorandum of understanding (MoU) with US-based NuScale Power for the deployment of its small modular reactor (SMR) technology.

Source: https://balkangreenenergynews.com/nuclear-energy-to-still-be-main-source-of-electricity-in-bulgaria-in-2030-globaldata/, 13 May 2021.

CHINA

China Grid-Connects Tianwan 6

Unit 6 at the Tianwan nuclear power plant in China's Jiangsu province was connected to the grid for the first time...according to the China Nuclear Energy Association. The milestone - at 8.27pm local time - marked the unit's entry into the grid-connected commissioning phase.

Units 5 and 6 at Tianwan - Tianwan Phase III - both feature ACPR1000 reactors. First safety-related concrete was poured for unit 5 on 27 December 2015, with that for unit 6 poured on 7 September 2016. Tianwan 5 entered commercial operation in September last year and unit 6 is scheduled to enter commercial operation by the end of this year (2021).

Grid-connection of unit 6 potentially heralds the start of construction this month of unit 7. On 29 April 2021, Ma Mingze, director and general manager of China Nuclear Power, said that the schedule in its contract with Russia's Rosatom anticipates construction of units 7 and 8 in May this year. The Tianwan plant is owned and operated by Jiangsu Nuclear Power Corporation, a joint venture between CNNC (50%), China Power Investment Corporation (30%) and Jiangsu Guoxin Group (20%).

Source: World Nuclear News, https://world-nuclear-news.org/Articles/China-grid-connects-Tianwan-6, 12 May 2021.

GENERAL

Nuclear Industry Warns that Planned Closures could Derail Global Net-Zero Transition

The Canadian Nuclear Association, FORATOM, the Japan Atomic Industrial Forum, the Nuclear Energy Institute, the Nuclear Industry Association and the World Nuclear Association have jointly called on countries to accelerate nuclear investment as part of the net-zero movement.

The groups warn that planned retirements of nuclear plants represent "the single greatest loss of clean power in world history" and that without additional capacity and investment into the sector, the need to reach net-zero could be derailed. The groups estimate that more than 100GW of nuclear capacity will retire globally within 20 years.

Specifically, the letter calls for equal access to climate finance for nuclear technologies alongside low-carbon and renewables and for new nuclear plants to replace retiring capacity to maintain current generation levels. The groups are

also calling for nuclear to be included in national emission reduction plans in the build-up to COP26.

The Nuclear Industry Association's chief executive Tom Greatrex said: "Nuclear is absolutely vital if we are to hit net zero as a planet. Nuclear delivers reliable clean power, new opportunities for industrial decarbonisation and good, well-paying jobs for a green economy. The retirements of existing stations right across the world mean we need to act today, or we will lose jobs and see higher emissions. We are calling on policymakers to make the right choices."

UK Focus: The UK currently generates about 20% of its electricity from nuclear, which has helped low-carbon sources account for the majority of the UK's energy mix. However, almost half of the UK's nuclear capacity is set to be retired by 2025. Hunterston B, Hinkley Point B, Heysham I and Hartlepool nuclear power stations are all scheduled to retire by the end of 2024, representing more than 4GW of nominal generating capacity. Another two large facilities are planning to come offline by 2030.

Atkins predicts that the power share in 2050 will consist of nuclear (11%); wind and solar (58%); combined cycle gas turbines with carbon capture storage (22%); and bioenergy with carbon capture storage (6%). To accommodate nuclear's share, the organisation claims that six nuclear power stations will be required for a net-zero UK.

The Energy Networks Association - the industry body representing all major energy network operators in the UK – notes that nuclear is crucial to the UK's net-zero target. Indeed, the Government's Ten-point plan includes a £525m package for the sector – some of which is expected to go to Rolls Royce, for its work to develop 16 mini modular reactors across the UK. But the UK Government has been accused of failing to support nuclear at an appropriate scale, and of failing to plan ahead for the impending 'nuclear gap'.

Elsewhere, Atkins predicts that the power share in 2050 will consist of nuclear (11%); wind and solar (58%); combined cycle gas turbines with carbon capture storage (22%); and bioenergy with carbon capture storage (6%). To accommodate nuclear's share, the organisation claims that six nuclear power stations will be required for a net-zero UK.

The Climate Change Committee's (CCC) recommendations on the sixth carbon budget, designed to deliver a 78% reduction in absolute national emissions by 2035 against a 1990 baseline, include measures to build enough new nuclear to replace the current fleet as a minimum. But critics of nuclear power say that more must be done to minimise risks associated with radioactive waste releases and to prevent weapons proliferation.

There are also arguments around the costs associated with nuclear power. While some facilities are coming offline as they reach the end of their working life, others have closed prematurely, citing financial reasons. BEIS estimates that Levelized costs for nuclear projects commissioning in 2025 will average £95m per MWH, compared to £63m for large-scale solar and £61m for large-scale onshore wind.

Source: https://www.edie.net/news/6/Nuclear-industry-warns-that-planned-closures-could-derail-global-net-zero-transition/, 14 May 2021.

INDIA

India to Build Six Nuclear Reactors with the Help of France's EDF

French multinational energy company EDF has submitted its offer to provide assistance in the construction of some six nuclear reactors in the Indian province of Maharashtra. The French binding techno-commercial offer has been submitted to NPCIL and includes EDF providing the Indian nuclear electricity generator with engineering studies and equipment for the construction of the Jaitapur Nuclear Power Plant.

Once complete, the 9.6 GWe Jaitapur Nuclear Power Plant would be the most powerful in the world, will generate up to 75TWh per year and cover the annual consumption of 70 million Indian households while avoiding the emission of 80 million tons of CO2 per year. The development follows the Indian and French governments signing the Industrial Way Forward Agreement on 10 March 2018 to enable cooperation between the two countries, thereby improving the energy sector and economies through knowledge and technology sharing.

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Discussions between EDF, partners and the NPCIL will soon take place enabling the development and signing of a binding framework agreement.

The offer submitted by EDF includes: A detailed technical configuration of the reactors, the associated comprehensive commercial terms and conditions for the supply of engineering studies and equipment for six nuclear reactors. EDF will be partnering with Framatome and GE Steam Power to provide the engineering studies and equipment required for the nuclear plants. EDF will also provide training services for the operation and maintenance of the nuclear reactors whilst NPCIL will be responsible for the construction and the commissioning of each of the six units.

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EDF is partnering with the International Institute of Nuclear Energy and Veermata Jijabai Technological Institute to establish a centre of excellence in India aiming to train engineers and technicians for the project.

NPCIL will also be responsible for obtaining all necessary permits and consents in India, including the certification of the nuclear technology by the Indian safety regulator, as the owner and future operator of the plant.

The project will create approximately 25,000 local jobs during the construction phase and tens of thousands of indirect and induced jobs. Moreover, the operation of the six nuclear reactors would create around 2,700 permanent jobs. This is in line with the 'Make in India' and 'Skill India' initiatives designed to create more jobs in India through the participation of local industrial and technology companies in project developments.

Jean-Bernard Lévy, chairman and CEO of the EDF Group, said: "This is yet another significant step towards the materialisation of this flagship project for our great nations, and the establishment of a long-term partnership in the civil nuclear field between both our leading nuclear industries. [This project] illustrates the Indian government's determination to achieve 40% CO2-free energy in its mix by 2030, which resonates perfectly with the Group's company purpose."

Source: https://www.powerengineeringint.com/nuclear/india-to-build-six-nuclear-reactors-with-the-help-of-frances-edf/, 11 May 2021.

UK

UK Launches Regulatory Assessment of Advanced Nuclear

The UK's Department for Business, Energy and Industrial Strategy (BEIS)...opened the Generic Design Assessment (GDA) to advanced nuclear technologies. BEIS has also published a policy paper stating that the advanced nuclear sector has

the potential to play an important part in the UK's Industrial Strategy.

GDA is a process carried out by the Office for Nuclear Regulation (ONR) and the Environment Agency (EA) to assess the safety, security, and environmental protection aspects of a nuclear power plant design that is intended to be deployed in Great Britain. Successful completion of the GDA culminates in the issue of a Design Acceptance Confirmation (DAC) from the ONR and a Statement of Design Acceptability (SoDA) from the EA. An applicant for GDA is known as the Requesting Party (RP).

In the foreword to the report - Entry to Generic Design Assessment for Advanced Nuclear Technologies Instructions and Guidance for Requesting Parties - Minister of State for Business, Energy and Clean Growth Anne-Marie Trevelyan noted that in the Ten Point Plan for a Green Industrial Revolution, which the government unveiled last November, nuclear power, whether large-scale, small-scale, or advanced, will have a key role to play in meeting the country's net-zero by 2050 goal. The plan also set target milestones for the first nuclear power plants using small modular reactors (SMRs) to be built in the UK by the early 2030s, alongside an advanced modular reactor (AMR) demonstration plant.

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With the publication of the GDA guidance for advanced nuclear technologies, BEIS is "unlocking a key step on the path to their deployment" in the UK, Trevelyan said. "Opening GDA to advanced nuclear technologies this year, as the UK prepares to host COP26, showcases continued UK leadership in tackling climate change and the important role that nuclear has in our future net-zero energy mix," she added….

The report says that regulators have introduced "new flexibilities" to the GDA process to ensure the UK's readiness for advanced nuclear technologies. This "modernised" GDA has three steps. Step 1 initiates GDA and is where matters such as the scope and timescales are agreed. The regulators' knowledge of the design and the RP's safety, security and environment cases increase, and the RP identifies any immediate gaps in meeting regulatory expectations and proposes how these will be subsequently resolved. The outcome is a Step 1 Statement which sets out the agreed scope and expectations for the subsequent GDA steps.

Step 2 is the fundamental assessment of the generic safety, security and environment protection cases, to identify any potential 'show-stoppers' that may preclude deployment of the design. The outcome of Step 2 is a formal statement of the regulators' findings.

Step 3 is the detailed assessment of the generic safety, security, and environment protection cases on a sampling basis. The outcome of Step 3 can be either DAC & SoDA as available in previous GDAs for nuclear power plants, or a Step 3 Statement of Regulators' findings depending upon the GDA scope agreed in Step 1, or an interim DAC and interim SoDA. Importantly, RPs may choose to exit from GDA at the end of Step 2, after receiving their GDA Step 2 Statement. This would be agreed in advance as part of the scope in Step 1.

BEIS anticipates the GDA process will following this approximate timetable: RPs submit a Notice of Intention to apply for GDA Entry to BEIS (three months before application); BEIS begins the evaluation process; RPs receive notification of their application result within three to four months; for successful applicants, this would be followed by a short period to agree cost recovery agreements with the regulators, before initiating the first stage of GDA.

The RP needs to produce four "readiness plans" - Programme Plan, Resource Plan, Finance Plan, and Security Plan. In a Business Plan Summary, RPs are asked to summarise and explain their longer-term commercial plan. "If an RP intends to build commercial power plants, the RP should

include information demonstrating how their design will be developed from its current position to commercial power plant deployment. Alternatively, if the RP's plan is to develop a saleable product for others to build in the UK, the RP should include information demonstrating how they plan to achieve this," the document says.

...In the policy paper on advanced nuclear technologies, BEIS said the Ten Point Plan and the 2020 Energy White Paper had confirmed the government's commitment to developing large, small and advanced nuclear projects.

The Ten Point Plan announced the Advanced Nuclear Fund of up to GBP385 million to invest in the next generation of nuclear. This includes up to GBP215 million for SMRs to develop a domestic smaller-scale power plant technology design, and up to GBP170 million for a research and development programme to deliver an AMR demonstrator by the early 2030s. An additional up to GBP40 million will be invested in developing the regulatory frameworks and supporting UK supply chains to help bring these technologies to market.

The Ten Point Plan announced the Advanced Nuclear Fund of up to GBP385 million to invest in the next generation of nuclear. This includes up to GBP215 million for SMRs to develop a domestic smaller-scale power plant technology design, and up to GBP170 million for a research and development programme to deliver an AMR demonstrator by the early 2030s.

The paper defines advanced nuclear technologies by their "common attributes" - smaller than conventional nuclear power reactors, and designed so that much of the plant can be fabricated in a factory environment and transported to site, reducing construction risk and making them less capital-intensive. Generally advanced nuclear technologies fall into one of two groups, it says. These are Generation III water-cooled SMRs, similar to existing nuclear power reactors but on a smaller scale, and Generation IV and beyond AMRs, which use novel cooling systems or fuels to offer new functionality (such as industrial process heat) and potentially a step change reduction in costs.

Source: World Nuclear News, https://world-nuclear-news.org/Articles/UK-launches-regulatory-assessment-of-advanced-nucl, 12 May 2021.

NUCLEAR PROLIFERATION

NORTH KOREA

South's Moon Hopes to Restart N. Korean Diplomacy with Biden

South Korea's leader said ...he'll use his upcoming summit with President Joe Biden to push to restart diplomacy with North Korea, saying that the US has opted for a diplomatic, phased approach to resolve the North Korean nuclear crisis. The White House recently said officials completed a review of North Korea policy and suggested the Biden administration would seek a middle ground between Donald Trump's "grand bargain" and Barack Obama's "strategic patience" approaches as a way to curb the North's nuclear ambitions.

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In a nationally televised news conference, President Moon Jae-in said he welcomes the direction of the Biden administration's North Korea policy, which he said was finalized after consultations with South Korea. Moon said Biden's North Korea policy aims to achieve "the Korean Peninsula's complete denuclearization through diplomacy with a flexible, gradual and practical approach."

The Biden administration hasn't disclosed details of its North Korea policy review. But administration officials have signaled they are

trying to set the stage for incremental progress, in which denuclearization steps by the North would be met with corresponding actions, including sanctions relief, rather than a Trump-style push for an immediate, comprehensive deal through a leader-to-leader summit.

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Some experts oppose a step-by-step denuclearization process because North Korea could derail negotiations while keeping much of its nuclear arsenal, after some of the most crippling international sanctions are lifted. Moon said when he meets Biden for their first summit talks in Washington on May 21, he'll try to bolster the bilateral military alliance, boost policy coordination on North Korea and find ways to resume stalled talks between Washington and Pyongyang and between Seoul and Pyongyang.

Moon, whose single five-year term is to end next May 2022, said he'll focus on establishing lasting peace on the Korean Peninsula during his final year in office. ...Moon, who champions a greater reconciliation with North Korea, once shuttled between Pyongyang and Washington to facilitate the now-dormant nuclear diplomacy between North Korean leader Kim Jong Un and Trump. Inter-Korean exchanges and cooperation programs also flourished.

Moon said he doesn't believe North Korea is rejecting talks with the Biden administration. He said North Korea will likely soon have a final review on its policy on the new US government. In January 2021, Kim said the fate of ties between North Korea and the US would depend on whether Washington would abandon what it considers a hostile policy on Pyongyang.

But the Kim-Trump diplomacy eventually fell apart during their second summit in Vietnam in early 2019 due to wrangling over US-led sanctions on North Korea. Pyongyang later suspended communications with Seoul and halted all major joint cooperation programs.

Kim's government hasn't made an official response to the Biden administration's North Korea policy review. But his Foreign Ministry...warned Washington of "a very grave situation" while criticizing Biden for calling North Korea's nuclear program a serious security threat in his address to Congress.

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Source: Hyung-Jin Kim, https://apnews.com/article/donald-trump-diplomacy-government-and-politics-, 10 May 2021.

NUCLEAR NON-PROLIFERATION

IRAN

Flurry of Diplomatic Contacts Fuel Iran Deal Speculation

A flurry of diplomatic contacts and reports of major progress suggest that indirect talks between the US and Iran may be nearing an agreement. That's despite efforts by US officials to play down chances of an imminent deal that would bring Washington and Tehran back into compliance with the 2015 nuclear deal.

With the negotiations in Vienna on hiatus, the US and Britain denied Iranian reports that any agreement was at hand with Iran for a swap of American and British prisoners. Such an exchange could be a confidence-building measure to revive the nuclear deal.

A US return to the deal would be the biggest and most controversial foreign policy initiative in the early months of Joe Biden's presidency. It would revive a deal that top Biden aides put together during their years in the Obama administration, only to see President Donald Trump pull out and try to prevent the US from ever returning. Rejoining it — and making the concessions required to do so — would enrage Republicans and likely unsettle Israel and Gulf Arab allies.

A US return to the deal would be the biggest and most controversial foreign policy initiative in the early months of Joe Biden's presidency. It would revive a deal that top Biden aides put together during their years in the Obama administration, only to see President Donald Trump pull out and try to prevent the US from ever returning. Rejoining it — and making the concessions required to do so — would enrage Republicans and likely unsettle Israel and Gulf Arab allies.

Even as Secretary of State Antony Blinken and British Foreign Secretary Dominic Raab rejected the prisoner swap reports at a news conference…in London, senior American diplomats were in the Middle East meeting Gulf Arab leaders. And two of the nuclear deal's biggest proponents in Congress Democratic Sens. Chris Coons and Chris Murphy were touring the region.

Those discussions follow a week of top-level meetings in Washington between Biden; his national security adviser, Jake Sullivan; Blinken; his deputy, Wendy Sherman; special Iran envoy Rob Malley; and others with the head of Israel's spy agency and Israeli PM Netanyahu's top national security aide.

The Israelis are adamantly opposed to any US rapprochement with Iran, which they regard as an existential threat to the Jewish state. At least three separate meetings were held with the Israelis…including one…with Mossad chief Yossi Cohen at which Biden made an appearance. White House press secretary Jen Psaki said Cohen was briefed on the Vienna discussions "and the progress being made there."

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…Reports emerged from Iran and Iran-linked media outlets that an agreement had been struck on what the US would provide in return for Iran returning to compliance with the 2015 deal, which had given billions of dollars in sanctions relief in exchange for curbs on its nuclear program…reports of the prisoner swap deal emerged. US officials were quick to bat those reports down as premature and inaccurate, although the broad contours of potential sanctions relief are well-known and Washington has made no secret of its eagerness to free Americans held in Iran.

Administration officials have allowed that limited progress has been made at the talks in Vienna, where Malley is heading the US delegation. Malley was a key figure in the Obama administration's negotiation of the original nuclear deal in 2015, as were Sherman and Sullivan, who respectively led those talks and took part in secret meetings that paved the way for the agreement.

The Biden administration reacted sharply to the Iranian reports. The State Department said "we are not at the cusp of any breakthrough" and dismissed the prisoner swap claim as false. "Unfortunately, that report is untrue," White House chief of staff Ron Klain said

Sullivan himself has been cautious in public comments about the talks, stressing that things stand at a "unclear place in Vienna." At a virtual meeting of the Aspen Security Forum…he underscored that the talks were a "real negotiation" while acknowledging the indirect nature of the discussions have made the undertaking somewhat "inefficient."

"I guess good faith is always in the eye of the beholder and we believe the Iranians have come in a serious way to have serious discussions about details and the teams are working through those details now," he said. Thus, the surge in diplomatic activity as negotiators prepare for a fourth round of talks in Vienna has given supporters of the deal that Trump withdrew from in 2018 reason for hope. And it has caused deal opponents great angst.

Complicating any potential resolution either in the short- or medium-term is the significant array of opponents lined up to try to frustrate a deal. In addition to the Gulf Arabs and Israel, there is strong opposition from Republican members of Congress who are already trying to pass legislation to block it. In Iran, elements of the hard-line Islamic Revolutionary Guard Corps appear to be using the Vienna talks to thwart a candidacy of Foreign Minister Mohamed Javad Zarif in presidential elections this year (2021).

Deal critics have taken issue with the negotiating tactics of Malley and his colleagues, alleging that they are giving away the leverage on Iran that Trump created when he pulled out of the deal and imposed sweeping new sanctions. In fact, any US return to the deal would require the easing of many of those sanctions, including possibly ones that were imposed for non-nuclear reasons, such as terrorism, ballistic missile activity and human rights abuses.

Deal supporters, on the other hand, have lashed out at that criticism, accusing the other side of rejecting diplomacy and cheerleading for war. They argue that sanctions relief is the only way to bring Iran back into compliance with the agreement and shut down its pathways to a nuclear weapon.

Source: Mathew Lee, and Aamer Madhani, https://apnews.com/article/europe-middle-east-iran-iran-nuclear-government-and-politics-, 04 May 2021.

Latest JCPOA Meeting Signals Progress, Cautious Optimism

JCPOA's Joint Commission wrapped up its third round of negotiations on the revival of the 2015 nuclear deal in Vienna, Austria, ...with participants expressing "cautious optimism". The delegates reviewed the work of the three expert groups on sanctions lifting, nuclear implementation and sequencing, and are expected to return to their capitals for consultations...again...ISNA reported. Experts will also continue to draft elements of the agreement related to the above-mentioned issues.

Iran's top negotiator Abbas Araqchi said Iran will continue negotiating until all sides reach a common understanding and the Islamic Republic's demands based on the country's stated policy are satisfied. "If our demands are met, there will be an agreement; if not, naturally there won't be any," he said.

According to the Russian envoy Mikhail Ulyanov, there is no deadline, but participants are working for the successful completion of talks in approximately three weeks. The meeting was chaired by Deputy Secretary-General of the European External Action Service Enrique Mora and attended by representatives from France, Germany, Britain, Russia, China and Iran.

Iran's top negotiator Abbas Araqchi said Iran will continue negotiating until all sides reach a common understanding and the Islamic Republic's demands based on the country's stated policy are satisfied. "If our demands are met, there will be an agreement; if not, naturally there won't be any," he said.

As agreed in the previous meeting, the bilateral and multilateral discussions were pursued in a more intensified manner and the negotiating sides tried to minimize their differences on the text of draft documents. All sides agreed that the next round of the talks should gain further momentum and seriousness. Ulyanov said in a tweet that participants in the...meeting noted the "indisputable progress" made at the Vienna talks.

He added that it is too early to be excited, but "we have reasons for cautious and growing optimism." Negotiations are aimed at reviving the nuclear, known as the JCPOA, which has been on

shaky ground since the United States pulled out and restored sweeping sanctions on Tehran, forcing it to scale back its commitments in response.

The US is not taking part in the Joint Commission meetings, but an American delegation is present in Vienna for informal talks with the other JCPOA members. Although both Iran and the US are ready to resume compliance, there are differences over what measures need to be taken by each side and in what order.

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Two working groups of experts have been tasked with making a list of sanctions to be lifted by the US and nuclear measures to be implemented by Iran. A third groups is in charge of working out the sequence of these steps.

Long Way Ahead: Ahead of the latest Joint Commission talks, Araqchi held separate meetings with Mora and the Russian representative. The Iranian and Russian sides discussed the latest developments and agreed to continue coordinating their stances. Ulyanov reiterated Moscow's support for JCPOA and the need for the full removal of American sanctions. Russian President Putin had also said…that he expects the entire package of measures under JCPOA will be restored in the previous framework. JCPOA participants also held informal consultations with the US delegation without Iran that refuses to engage in direct dialogue with American diplomats.

Representatives have described the talks as making progress, but maintain that there's still a long way to go before an understanding is reached. US National Security Adviser Jake Sullivan said … that the negotiations are "in an unclear place" at this point. "We've seen willingness of all sides … but it is still uncertain as to whether this will culminate in a deal in Vienna," he was quoted as saying by Reuters.

US State Department Spokesman Ned Price also said … that some progress has been made, but "there's still a great distance to travel". Nevertheless, two European sources have said that negotiators are working to restore the agreement in the middle of May 2021, before a deadline agreed by Tehran and the IAEA expires, according to Bloomberg.

The sides made a deal in February 2021 that permits IAEA cameras installed at key facilities to record activities. Inspectors will only gain access to the material, if an accord is reached. Otherwise, Iran says it will erase the material. One of the officials said the aim was to wrap up a deal at least several days before the May 22 deadline. A person close to US State Department officials said that is ambitious, adding that an agreement by mid-June is more likely.

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Source: https://financialtribune.com/articles/national/108452/latest-jcpoa-meeting-signals-progress-cautious-optimism, 02 May 2021.

Vienna Nuclear Talks Hit a Snag Over Iran's Centrifuges

Big gaps between the U.S. and Iran over the measures needed to roll back and limit the Iranian nuclear program are stalling the Vienna talks…. The Biden administration has said any deal to restore the 2015 nuclear accord must include a return by Iran to full compliance with its previous commitments. But that's complicated by the fact that Iran's nuclear program has advanced since 2015.

The U.S. and European signatories on the deal agree that Iran's "breakout time" — the time needed to produce enough enriched uranium for a bomb — must be at least a year. They also have a common position on what it would take to get there, a European diplomat tells me.

But Iran's position is much different. One key disagreement is over what will happen to the new, more sophisticated centrifuges Iran has installed that allow Tehran to enrich uranium much more quickly, the diplomat says. Any new deal will have to determine whether Iran can still use those centrifuges and, if not, whether they would need to be taken out of the country or simply disconnected and stored in Iran.

But Iran's position is much different. One key disagreement is over what will happen to the new, more sophisticated centrifuges Iran has installed that allow Tehran to enrich uranium much more quickly, the diplomat says. Any new deal will have to determine whether Iran can still use those centrifuges and, if not, whether they would need to be taken out of the country or simply disconnected and stored in Iran.

Between the Lines: Much of the discussion around the nuclear talks has focused on disagreements over which sanctions the U.S. would have to lift. There has been substantive progress on that front in Vienna, but a separate working group handling the nuclear side of the equation has made almost no headway. The state of play: The latest round of talks over the weekend did not produce any major progress, and were placed on hold while many attended a G7 meeting. They are expected to resume in Vienna.

On 20 May 2021, a temporary deal that allows the IAEA to monitor some Iranian nuclear sites expires. The Iranians are threatening to shut down IAEA cameras in those sites and thus severely diminish the international community's visibility into Iran's nuclear program. On June 18, Iran will hold presidential elections that could have a dramatic influence on the nuclear talks….

Source: Barak Ravid, https://www.axios.com/vienna-nuclear-talks-progress-iran-centrifuges-f4473058-86d5-4927-8e57-954f646d7cff.html?, 05 May 2021.

NUCLEAR SECURITY

INDIA

ATS Seizes 7kg Uranium Worth Rs 21 Crore from a Scrap Dealer; Here's What Happened

Two persons, Jigar Pandya (27) and Abu Tahir (31), were arrested by Maharashtra ATS…. Both were trying to illegally sell off 7 kg uranium for around Rs 25 crore online when the ATS team sent a dummy customer and got a sample. The sample was sent to BARC which…in its report, said the material sent was natural uranium following which the duo were placed under arrest under the Atomic Energy Act of 1962 for possessing uranium without licence.

…Tahir's father owns a scrap shop in Mankhurd. It is suspected that nearly two years ago, a truck with factory refuse had been sold to them. It also contained uranium that was heavy and looked different than the usual industrial waste. Tahir then stored it and spoke about it with Pandya during the ongoing lockdown. Pandya is believed to have used his contacts to confirm that the material was uranium and commanded a high value in the grey market. As they were trying to sell the 7kg uranium online for Rs 25 crores online, the ATS found out about it. While initially the ATS thought it was a case of fraud, it was after the BARC report it was confirmed the material was actually uranium. …

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Source: Mohamed Thaver, https://indianexpress.com/article/explained/explained-ats-seizes-7kg-uranium-worth-rs-21-crore-from-a-scrap-dealer-heres-what-happened-7305856/, 11 May 2021.

NUCLEAR SAFETY

UKRAINE

Chernobyl Staff Record Rise in Nuclear Activity within Safe Limits

Scientists have recorded a rise in nuclear activity in the destroyed nuclear reactor at the Chernobyl power plant in Ukraine since it was covered over in 2017, but the rise has levelled off and does not exceed safety standards, staff said.... Staff at the plant said the rise in "neutron flux density", which if significant could indicate an uncontrolled nuclear reaction, did not pose a threat of such an event based on their mathematical models.

High levels of radiation and damage mean it is not possible to determine precisely the situation under the destroyed block. "After the establishment of a new safe confinement which has been in the designed position for more than four years, an increase in the neutron flux density is actually observed," scientists at Ukraine's Institute for Safety Problems of Nuclear Power Plants said in a statement.

Scientists have recorded a rise in nuclear activity in the destroyed nuclear reactor at the Chernobyl power plant in Ukraine since it was covered over in 2017, but the rise has levelled off and does not exceed safety standards the rise in "neutron flux density", which if significant could indicate an uncontrolled nuclear reaction, did not pose a threat of such an event based on their mathematical models.

"At present, the readings of the sensors in all rooms have stable values without an upward trend. The current levels do not pose a threat of a self-sustaining chain reaction," the Chernobyl plant said in a separate statement.

Scientists say the increase in neutron flux was recorded in a unit that nuclear fuel from the destroyed reactor had got into, possibly during the installation of a new shelter over the reactor.

The fourth reactor at Chernobyl, 108 km (67 miles) north of the capital Kyiv, exploded in April 1986 during a botched safety test, in the world's worst nuclear accident. Clouds of radiation were sent out across much of Europe, and tens of thousands of people were forced to evacuate.

Scientists say the increase in neutron flux was recorded in a unit that nuclear fuel from the destroyed reactor had got into, possibly during the installation of a new shelter over the reactor. Scientists at Ukraine's Institute for Safety Problems of Nuclear Power Plants said that before work on installing the new shelter began in late 2016, fuel was cooled by rainwater, which had since disappeared....

Source: https://www.livemint.com/news/world/chernobyl-staff-record-rise-in-nuclear-activity-within-safe-limits-11620831532351.html, 12 May 2021.

NUCLEAR WASTE MANAGEMENT

GENERAL

The World's Nuclear Fleet is Aging — How Do You Recycle a Nuclear Power Plant?

... The world's nuclear fleet is aging. According to data from mid-2020, 440 reactors operate worldwide, spread across 30 countries, with the United States (95 reactors), France (57) and China (47) topping the list. About 270 are more than 30 years old. When you consider that, with the exception of the latest generation of power plants, nuclear plants originally were designed for a service life lasting around 30 years, you will understand the magnitude of the matter at hand.

Experts from IAEA provide us with some more precise data: "Over 190 power reactors in 20 countries are in a state of shutdown. Of those, 17 reactors have been fully decommissioned, while more are approaching the final stages of decommissioning. Up to 100 more power reactors may be shut down for decommissioning by the end of next decade."

In other words, regardless whether we want to

continue along the path of nuclear power, it's certain we must deal with the legacies of the first season of atomic energy. Legacies that, in reality, are made up of radioactive waste in only a small percentage (5 percent) and the non-dangerous large part instead could be recovered for other uses. Thus opening the door, even in the field of nuclear decommissioning, to circular economy. ...

(Almost) Nothing is Thrown Away from a Nuclear Power Plant: What, in practice, can be recovered from the dismantling of a nuclear power plant? The first thing to know "is that only 5 percent of the material decommissioned from a plant is radioactive. Of the remainder, about 90 percent can be recovered or recycled, while another 5 percent is disposed of as conventional waste," Bruno explained.

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Much of the decommissioned material is concrete and metal, separated through a process of iron removal from concrete. Smaller amounts of other materials, especially plastics, are more difficult to handle. "The main reason is that there isn't only one type of plastic and each has a different line of management. Not to mention that, since the plants are quite old, in some cases the used plastics no longer have a reference chain," Bruno said. "In addition to this, the minimum quantities present do not allow us to achieve economies of scale and the process therefore becomes inefficient. However, we are working on improving the recycling percentage further." ...

What, in practice, can be recovered from the dismantling of a nuclear power plant? The first thing to know "is that only 5 percent of the material decommissioned from a plant is radioactive. Of the remainder, about 90 percent can be recovered or recycled, while another 5 percent is disposed of as conventional waste.

Radioactivity and Safety: Coming back to the topic on recyclable materials, the first doubt that arises when talking about the circular economy applied to the nuclear field is, of course, safety. In reality, this is only a layman's doubt, because it is fairly obvious to insiders that the "released" material must be subjected to scrupulous checks to verify its levels of radioactivity. The procedure actually begins well before starting the dismantling process.

Bruno Explained: "Preliminary analyses and chemical-physical and radiological characterizations are carried out in order to understand exactly how to manage all material flows. In fact, it's necessary to adopt punctual segregation methods to separate radioactive waste from 'conventional' materials. As soon as we disassemble a component, if we know that it can be released for recycling, it will be managed separately to avoid cross-contamination. The segregation of material already takes place at the logistic level through separate storage areas, similarly to what is being done now with COVID waste in hospitals. The basic concept is the same: to separate the flows to be able to manage the material in a manner that will be consistent with what will be its end."

Release, Reuse, Recycle: Once the material has been safely released, for what and in what areas can it be reused and recycled? The destination depends on the standards and laws in place in each country. "In Italy, for example, unconditional release or free release is enforced," Bruno points out. "It means that what comes out of the radiological control system and is therefore releasable can be reused without conditions of use." In fact, the decommissioning company's responsibility extends even beyond the moment of release. "For metals, according to the law, Sogin is responsible up to the moment of remelting in the smelter. The smelter, which is obliged to dilute by 10 times the metal we provide, must then send us back a certificate attesting to the correct procedure." Only

then will the recycled metal actually be free to re-enter the production cycle.

Despite the existence of European and international standards on the management of these materials, the national law always overpowers them, so you can find substantial differences in management even among neighboring countries. For example, in France no release of material from the decommissioning of power plants is allowed. For a country that derives more than 70 percent of its electricity from nuclear power, the decision to lock up all the materials produced by decommissioning initially seemed strategic in order to keep public opinion at ease.

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In Germany, on the contrary, there are wider standards of reuse than in Italy. In fact, the unconditional release of "clean" materials is allowed, meanwhile a conditional release with various levels, and in specific industrial areas, for those slightly contaminated (which in Italy would not be released) is in place. "Generally, these are slightly contaminated metals that are still reused in the nuclear field," Bruno pointed out.

Our problem is mainly about the distribution of the collection centers, which is not widespread. It is therefore often difficult to find a nearby collection center where we can bring the material we release and this involves economic costs that must be taken into account. A more widespread and structured system at national level would allow us to be more effective.

It's more difficult to make a comparison with extra-European countries, which do not refer to EU directives that tend to standardize many approaches. "For example, in the United States there is a difference in some management aspects, mainly due to the geographical configuration of the country: Many of their plants are in desert areas or, in any case, far from inhabited centers and therefore their approach can be more 'relaxed'. For us Europeans, who have a highly anthropized situation, the management of materials is more delicate because it must always take into account the impact on the local territorial system."

Obstacles and Best Practices: The Future of Circular Decommissioning: If nuclear decommissioning is a field full of difficulties in itself already, the road to making it more circular has its own peculiar obstacles. When it comes to Italy, these are often gaps in the national waste management system, as Bruno explained: "Our problem is mainly about the distribution of the collection centers, which is not widespread. It is therefore often difficult to find a nearby collection center where we can bring the material we release and this involves economic costs that must be taken into account. A more widespread and structured system at national level would allow us to be more effective."

More broadly, standing in the way of a circular economy in the field is the same factor that will make this decade the era of nuclear decommissioning: the age of the plants. "Older facilities were designed and operated with little consideration of this issue, and their sustainable decommissioning poses specific challenges," explained the IAEA experts surveyed by Renewable Matter. "On the other hand, new nuclear facilities are now being planned from the start with decommissioning, waste management and circular economy in mind, which presents the opportunity for using innovative solutions. For example, reactor building components can be constructed in a modular fashion for easier dismantlement or construction materials can be used which are easier to decontaminate."

Surely exchanging best practices with other industry fields considered further along in the circular economy will also help with improvements. "The oil and gas industry, conventional demolition industry and others offer valuable experience in terms of technology

availability, cost evaluation, risk assessment and other aspects of decommissioning," IAEA commented. "Remote handling and robotic technologies and digitalization used for complex project management are some of the newly available technologies which the nuclear industry and other sectors can use and apply. New digital techniques enable, for example, 3D physical and radiological surveys which support building information management for decommissioning purposes."

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Source: Excerpted from article by Giorgia Marino. https://www.greenbiz.com/article/worlds-nuclear-fleet-aging-how-do-you-recycle-nuclear-power-plant, 13 May 2021.

USA

DOE Receives Six Pointers on Waste Management

The Nuclear Waste Technical Review Board (NWTRB) has produced a report on how the Department of Energy can develop a robust, safe and effective nuclear waste management programme for the USA, including laying the groundwork for a successfully implemented geological repository. It says the lack of progress on developing and operating a geologic repository impedes the associated potential benefits of having nuclear energy as part of a zero-carbon future for mitigation of climate change, as well as the advancement of US nuclear technology and commerce.

However, timely progress toward the long-term solution - disposal in an underground geologic repository - is still required as the lack of a solution to dispose of existing radioactive waste is costly and one of the major impediments to the nation's further development of nuclear energy.

NWTRB was established by Congress to evaluate the technical and scientific validity of the DOE's work related to the management and disposal of used nuclear fuel and high-level radioactive waste.

In its report, it makes six recommendations concerning: an integrated organisational approach; required infrastructure and personnel needs; the DOE's research approach; an iterative, adaptive waste management programme approach; engaging with the international community; and building public trust. "We strongly believe the progress the nation is making in developing its waste management capability, as well as public and stakeholder acceptance, could be improved with regard to both timeliness and effectiveness by adopting these recommendations as core principles of the nuclear waste management programme," the NWTRB says in the report, which was published on 30 April.

The USA has accumulated one of the largest inventories of spent nuclear fuel (SNF) in the world, the report notes, from both the operation of commercial nuclear power plants and government operations related to research and development, and defence programmes, with the commercial inventory continuing to grow. In addition, there is a large inventory of government high-level waste (HLW), derived mainly from defence programmes, with some stored as liquid in tanks and the remainder encapsulated in glass.

"Studies have shown that SNF and HLW can be safely stored on the surface for an extended period of time if associated recommendations and programmes are followed, such as processing liquid HLW stored in underground tanks to a vitrified waste form," the reports says. "However, timely progress toward the long-term solution - disposal in an underground geologic repository - is still required as the lack of a solution to dispose of existing radioactive waste is costly and one of the major impediments to the nation's further development of nuclear energy."

Its recommendations are:

- Inform and engage the public and other affected stakeholders early in the planning and

review of all aspects of the nuclear waste management programme;

➢ Be transparent in decision-making and provide support for meaningful stakeholder participation;

➢ Take account of lessons learned in other countries about listening to and informing the public, in order to improve communications, better understand community perspectives, and avoid unnecessary delays of the programme;

➢ Though not a licence requirement for any new site selected for a repository, DOE should develop and make available a clear characterisation of the facility early in the process that describes the waste management concept and its multiple barriers and other attributes that contribute to safety. DOE must also clearly acknowledge and communicate its commitment that the safety concept will be revised to update it as new information and input are received;

➢ Develop site-suitability criteria prior to the start of site selection so as to minimise any ambiguity and latitude in their interpretation, thus helping to ensure the objectivity of the process and public confidence in its outcome. If, at any point during the siting process, the criteria need to be changed, a transparent and meaningfully participatory process to do so needs to be followed.

If the USA develops one or more underground research laboratory, these laboratories, in addition to their research function, should be utilised for outreach and public engagement, in order to provide access to the subsurface and to build public confidence and trust in the science and engineering behind the safety concept as well as in the operational capabilities for remote handling of waste underground.

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Source: World Nuclear News, https://www.world-nuclear-news.org/Articles/DOE-receives-six-recommendations-on-waste-manageme, 05 May 2021.

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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