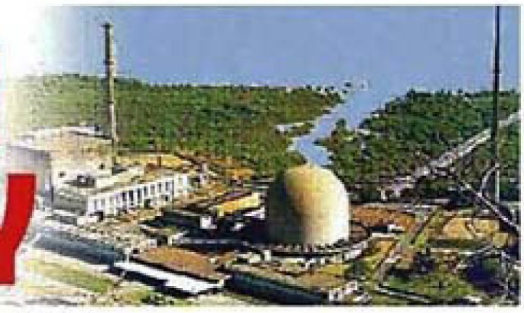
NUCLEAR SECURITY



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

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OPINION – Ibrahim Karatas

A New Era in Nuclear Armament

Countries with atomic bombs continue to increase their nuclear weapon stockpiles. Needless to say, this is not good for the world. It is estimated that Russia already has 4,489 atomic bombs, the United States 3,708, China 410, France 290, Britain 225, Pakistan 170, India 164, Israel 90 and North Korea 30. On the other hand, last year alone, China produced 60 new atomic bombs, Russia 12, Pakistan five, North Korea five and India four. While the United Kingdom plans to increase its stockpile by 45 to 260, China has already started production to produce 1,000 new atomic bombs by 2035.

Undoubtedly, this mobilization will trigger other nuclear powers such as the United States, France and Israel. It would also be an incentive for countries like Iran, which is trying to produce atomic bombs, and some other countries that aspire to do so, to put their plans into practice. There is a theory/doctrine, namely MAD, arguing that the existence of nuclear weapons prevents nuclear war. According to the theory, countries prefer not to fight each other because they know that in a nuclear war, they would perish together.

It is estimated that Russia already has 4,489 atomic bombs, the United States 3,708, China 410, France 290, Britain 225, Pakistan 170, India 164, Israel 90 and North Korea 30. On the other hand, last year alone, China produced 60 new atomic bombs, Russia 12, Pakistan five, North Korea five and India four. While the United Kingdom plans to increase its stockpile by 45 to 260, China has already started production to produce 1,000 new atomic bombs by 2035.

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Perhaps it sounds reasonable, but if one country catches the other off guard, or if one of them has unwise mad rulers, no one can prevent a war. Also, this theory applies to countries with nuclear weapons. Nuclear power is not afraid of a country that does not have an atomic bomb and will not hesitate to detonate the bomb if necessary. Thus, the theory does not apply to every country. The theory also recognizes that not every country can ensure its own security without having atomic bombs.

The only solution is that the nuclear powers must

neutralize the atomic bombs, but this is no longer possible. In fact, these countries do not hesitate to escalate the situation. The U.S. and the U.K., in particular, have not hesitated to provoke Russia, the country with the largest stockpile of nuclear weapons (the Russians are not innocent, either). The very same two countries are also pushing China into a corner over Taiwan. Countries like China and Russia seem to have decided to increase their nuclear stockpiles because they do not trust Western powers.

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Bad for Non-nuclear Nations: The resumption of nuclear armament is not good news for countries without nuclear weapons. While countries with atomic bombs fight each other through other countries or proxies, they do not show any mercy toward non-nuclear countries. However, technology is changing fast, facilitating the production of the most difficult items including nuclear weapons. When Robert Oppenheimer and his team detonated the first U.S.-made atomic bomb, it changed the course of warfare on account of the U.S. dramatically. Nevertheless, the Soviet Union caught the U.S. in this race within 10 years, followed by other countries with either the help of the U.S. or the Soviet Union. While collaboration was the key factor to have a nuclear bomb in the second half of the last century, the new millennium's technological developments almost enable the self-production of nuclear bombs.

Currently, almost all physicians know how to produce an atomic bomb theoretically. Even a curious ordinary person can get enough information from the internet. The only but biggest missing part is to put it into practice, in other words, to enrich Uranium, but given that poorer countries (e.g. Pakistan, North Korea and India) achieved it in one way or another, it is not difficult for a middle power to produce a nuclear bomb.

Physicians argue that if there is no hindrance by great powers, many countries can produce atomic bombs, though the timing may differ. Thus, if an ordinary European, Middle Eastern, Latin American or Far Eastern country decides to produce a nuclear bomb, they will certainly do it. Also, since nuclear powers are at different international political poles, nuclear bomb-seeking countries can easily get know-how from either of them. As current circumstances provoke countries to take precautions for their security, more states may attempt to have nuclear stockpiles whether covertly or overtly. Also, some of them will probably reach the capacity to produce but wait for an imminent threat.

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Source: https://www.dailysabah.com/opinion/op-ed/a-new-era-in-nuclear-armament. August 17, 2023.

OPINION – Andrea S. Wright & Taco Niet

All Technologies — including Nuclear — should be Evaluated by Evidentiary Merit, not by Myth or Meme

B.C. Premier David Eby recently rejected the Canadian Energy Regulator's findings indicating that nuclear power would be a necessary

component of Canada's climate change response. His proclamation that the province would remain nuclear-free and would not need the energy appeals to the no-nuke environmentalist vote. However, with the recent heat waves, no one knows (or cares) that we are frying. Faced with an existential climate crisis, we are still debating and squaring off rather than executing well-thought-out policy. Our leaders, ever wedded to their roles, continue to appease popularist memes rather than evaluate the hard evidence and form policy of meaningful consequence.

Nuclear power is vilified as expensive and dirty and roundly rejected by populist enviro rhetoric. Yet, more humans have died from coal power airborne particulates and in artisanal mines than have ever been affected by nuclear power, including those impacted by well-known and major incidents. The costs of nuclear are roughly equivalent to wind and solar when the required batteries for equitable grid performance are included.

The push for renewable energy sources and achieving net-zero via widescale electrification has seen the emergence of wind, solar and biofuels being presented as the great saviours of our time. But adoption of these technologies invokes dark consequences, replete with moral and ethical dissonance. Crop-based biofuels rob arable land in a fuel-for-food tradeoff — further threatening food security for the world's poorest — while ancient forests in B.C. are being liquidated for wood pellets in a misguided belief this wood-for-coal replacement is somehow renewable.

But wind and solar come with particularly pernicious ethical issues: to be effectively integrated into the grid, they need to be complemented with storage to provide reliable, firm power. Lithium-ion batteries are the storage technology of choice, but this technology requires cobalt to function — and the world has only one substantive source: the Democratic Republic of Congo (DRC). Anything but democratic, DRC is overrun with foreign exploitation and government corruption.

In the DRC, where 70 per cent of the world's cobalt is sourced, 30 per cent is mined by "artisanal" miners .... The profits of the global supply chains from dirt in the DRC, to batteries, have created massive wealth at the expense of enslaved children. This is the repugnant conclusion that every EV driver, cellphone or lithium-ion fuelled device user must face. Lithium-ion is a technology mired in exploitation and tragedy. Forget conflict diamonds, welcome to the age of selective ignorance as conflict batteries become ever-present in our lives.

Against this backdrop, nuclear power is vilified as expensive and dirty and roundly rejected by populist enviro rhetoric. Yet, more humans have died from coal power airborne particulates and in artisanal mines than have ever been affected by nuclear power, including those impacted by well-known and major incidents. The costs of nuclear are roughly equivalent to wind and solar when the required batteries for equitable grid performance are included.

We advocate for nuclear power development in Canada because we are self-sufficient in uranium, and we can and should develop small modular reactors and exploit the technology and domestic resources. In Canada, uranium is mined in an environmentally responsible manner with appropriate regulatory oversight because we are blessed with a functional democracy. And it is a little-appreciated fact that nuclear has the smallest environmental footprint of any energy-generating technology in almost any impact category one chooses.

Energy system design is extraordinarily complex, because human well-being, land (food), water and air are all intrinsically linked and affected when energy generation is commissioned. Indeed, eight of the United Nations' 17 key development goals are directly impacted by energy developments, both positively and negatively. The negative impacts often fall upon the world's most impoverished. It is repugnant that local populist policies designed to appeal and attract voters

ignore global consequences — especially when children are enslaved at gunpoint to service entitled energy-rich lives.

Repugnant conclusions are the consequence of narrow minds born of narrow streets where we "care for kin but not for kind." We argue ethical energy development that considers the global consequences of local energy policy should be enshrined in B.C. law and culture. And as such, all technologies, including nuclear, should be evaluated by evidentiary merit, not by myth or meme.

We applaud the Canada Energy Regulator for utilizing an informed modelling approach, because it escapes emotional policy guidance. Its work echoes our modelling efforts and that of other researchers and laboratories. Dual-expert decision-making by machine modelling with human guidance provides powerful insights and informed policymaking. Fossil fuel may be Canada's heritage, but truly clean and ethical energy should be our aspirational future.

Source: https://www.nationalobserver.com/2023/08/14/opinion/all-technologies-including-nuclear-should-be-evaluated-evidentiary-merit-not-myth. August 14, 2023.

OPINION – Alessia Canuto

Uranium and Nuclear Energy: Kazakhstan's Journey Towards Powerful Global Alliance

Kazakhstan holds a valuable resource that is becoming increasingly crucial in the world's transition away from hydrocarbons: uranium. With 12% of the world's uranium resources, the nation has emerged as a dominant player in the uranium market, garnering attention from the west and the wider international community. In 2021 alone, Kazakhstan produced approximately 21,800 tones of elemental uranium (tU), solidifying its position as a vital uranium supplier. Over the past two decades, the uranium industry has experienced significant growth. In 2009, the nation surpassed all others to become the world's leading uranium producer, accounting for nearly 28% of global production. By 2019, Kazakhstan's share had surged to an astonishing 43% of the world's uranium output. Despite a slight decline in production due to low uranium prices and the impact of the COVID-19 pandemic, Kazakhstan's uranium sector remains resilient, with production reaching 21,819 tU in 2021.

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Driving Kazakhstan's uranium industry is the National Atomic Company Kazatomprom, the world's largest producer and seller of natural uranium. Out of the country's thirteen uranium mining projects, three are wholly owned by Kazatomprom, and ten are joint ventures with foreign equity holders. In 2020, Kazatomprom's share of uranium production reached 10,736 tU, outperforming major global competitors such as Orano, Cameco, and Uranium One.

Out of the country's thirteen uranium mining projects, three are wholly owned by Kazatomprom, and ten are joint ventures with foreign equity holders. In 2020, Kazatomprom's share of uranium production reached 10,736 tU, outperforming major global competitors such as Orano, Cameco, and Uranium One.

Kazakhstan's strategic partnerships with international entities have been instrumental in extending its reach in global markets. In October 2015, Kazatomprom signed an agreement with Centrus Energy, facilitating the marketing of Kazakh uranium in the U.S. This collaboration not only opened new market opportunities but also diversified Kazakhstan's supply options. Furthermore, in April 2016, Kazatomprom forged a vital partnership with U.S.-based Converdyn. This agreement allowed the Central Asian country to offer uranium for sale in the form of natural uranium hexafluoride (UF6), providing customers with increased supply options and solidifying its

position as a reliable and versatile uranium supplier.

Looking ahead, Kazakhstan is ambitiously charting its course towards nuclear power development. The government's draft master plan of power generation development until 2030 targets a nuclear electricity share of approximately 4.5%, necessitating an estimated 900 MWe of nuclear capacity. As its current generating capacity stands at around 20 Gigawatt electrical (GWe), the plan aims to meet projected 2030 energy needs of 150 terawatt-hour (TWh).

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To realize its nuclear ambitions, Kazakhstan has been evaluating various suppliers. In February 2022, the country's Energy Director revealed a shortlist of six suppliers being considered, including NuScale Power, the U.S.-Japanese consortium of GE Hitachi, and prominent players such as Korea Hydro & Nuclear Power, China National Nuclear Corporation, Russia's Rosatom, and Britain's EDF Energy. These partnerships are key to advancing Kazakhstan's nuclear power aspirations and contributing to global efforts for sustainable energy.

Kazakhstan's commitment to responsible nuclear practices, its adherence to safeguards agreements with the IAEA, and its non-nuclear weapons status under the NPT provide reassurance to the global community. Strengthening ties with Kazakhstan in the uranium market reinforces the shared commitment to upholding international nuclear safety standards.

As a party to the NPT, Kazakhstan has demonstrated its commitment to responsible nuclear practices. The country adheres to robust safeguards agreements with the IAEA, ensuring the responsible management of its nuclear facilities and the exported uranium. Furthermore, the nation's role in dismantling approximately 1,300 nuclear warheads after gaining independence showcases its dedication to global security and non-proliferation. An integrated nuclear infrastructure review (INIR) mission was conducted at the government's request in 2016 to assess various aspects, including legal and regulatory frameworks, radioactive waste management, and stakeholder involvement. Such cooperation underscores Kazakhstan's dedication to upholding international standards and best practices in its nuclear endeavors.

The EU and Western countries also place great emphasis on nuclear safety and non-proliferation concerns. Kazakhstan's commitment to responsible nuclear practices, its adherence to safeguards agreements with the IAEA, and its non-nuclear weapons status under the NPT provide reassurance to the global community. Strengthening ties with Kazakhstan in the uranium market reinforces the shared commitment to upholding international nuclear safety standards. The EU and Western countries are major consumers of energy, and their nuclear power infrastructure is a cornerstone of their efforts to reduce carbon emissions and combat climate change. With nuclear power offering a low-carbon energy option, securing a stable supply of uranium is vital to maintain the continuous operation of their nuclear reactors.

Kazakhstan's position as a leading uranium producer makes it an attractive partner for long-term supply contracts, ensuring these nations' energy security and diversification. Western countries are pioneers in the development of advanced nuclear technologies, including small modular reactors and next-generation reactors. As these technologies progress, the demand for specific uranium compositions may rise. Collaborating with Kazakhstan in exploring and investing in innovative nuclear technologies can provide a win-win scenario for both sides, with the EU and

Western countries benefiting from Kazakhstan's uranium resources and Kazakhstan gaining access to cutting-edge nuclear expertise. By engaging in uranium-related partnerships with Kazakhstan offers Western countries a chance to foster stronger diplomatic ties and influence regional dynamics. Finally, Western companies' investments in Kazakhstan's uranium mining and exploration can stimulate economic growth and support Kazakhstan's nuclear energy aspirations, contributing to the development of local expertise and infrastructure by fostering a sustainable and mutually beneficial uranium industry.

Big Greens told us that shuttering 2,000 MW of nuclear power capacity on the Hudson River, at the Indian Point power plant, could be replaced by renewables, but that turned out not to be true. After 2021, all of Indian Point's capacity (25% of New York City's electricity) was replaced by fossil-fueled power.

Source: https://astanatimes.com/2023/08/uranium-and-nuclear-energy-kazakhstans-journey-towards-powerful-global-alliance/ August 15, 2023.

OPINION – Garu Abraham

NY Can't Rely on Wind and Solar. Our Zero-Carbon Future is Nuclear

New York bases its energy policy on the views of major environmental organizations — the "Big Greens" — that wind and solar energy can power the economy without any other sources of power. New York's Scoping Plan (at p. 123) adds about 20% hydropower, but no nuclear power. Otherwise, we are to rely on wind and solar. Unlike other forms of energy, wind and solar can't provide power by themselves. Intermittent generators cannot operate without having inefficient gas plants to back them up. As the penetration of intermittent renewables into the New York grid increases, more and more wind and solar must be curtailed (ordered to stop operating) to avoid damage to transmission lines. Battery technology to store the wasted energy at a utility scale does not exist.

Big Greens told us that shuttering 2,000 MW of nuclear power capacity on the Hudson River, at the Indian Point power plant, could be replaced by renewables, but that turned out not to be true. After 2021, all of Indian Point's capacity (25% of New York City's electricity) was replaced by fossil-fueled power. There was no other way, because renewables do not provide the reliable power once generated by Indian Point. Intermittent sunlight and wind could never power New York City. As a result, Downstate electricity went from 27% carbon-free to 9%. New York's energy policy went backward.

Nevertheless, New York continues to lavish public money on wind and solar. New property tax valuation rules provide a steep discount on local taxes and ensure that the local tax bill for wind and solar installations declines steadily over time. Popular "payment-in-lieu-of-taxes" agreements with host towns exempt wind and solar projects from mortgage recording taxes (needed for each parcel leased for the wind or solar farm) and sales taxes for materials purchased locally. These discounts deprive host communities of millions annually they would otherwise receive. The projects themselves generate virtually no jobs, since (unlike a nuclear power plant) no one actually runs a wind farm or a solar farm. Large-scale renewables rob rural communities of necessary funds, even as the state's accelerated siting law forces them to host industrial solar and wind projects despite local laws opposing this buildout.

Downstate pays for Upstate renewable power too, even though it gets none of it. The central financing mechanism for large-scale renewables is RECs, or renewable energy credits. NYSERDA gives RECs to renewable energy project sponsors for nothing, and the law requires utilities Downstate and Upstate to purchase RECs from the project sponsors. These payments are passed on to ratepayers.

RECs purchased by utilities are termed "compliance payments" under New York's "Clean Energy Standard," meant to show compliance with the state's emissions reduction goals. But no emissions reduction occurs Downstate because

no renewable energy can get past the complex of transmission congestion points between here and there. And very little emissions reduction occurs Upstate because, as noted, electricity there is already 91% carbon-free (6% is wind power; the rest is split roughly evenly between hydro and nuclear power). There is very little carbon in the Upstate grid to displace.

At the federal level, large-scale renewables get tax credits that exceed by multiples on an energy-generated basis all subsidies provided to fossil fuels. We should expect to get lots of electricity for that but we don't. Renewables do not make money by selling electricity. Almost everything they make comes from government funding. They bid below-market, sometimes negative numbers into the auction for the next day's electricity just to get the right to generate. Tax credits exceed the income from sales of electricity against which they could be applied, so the tax credits are transferred to oil and gas subsidiaries. New York law requires that by 2030, 70% of our electricity will be from renewables. But grid operator NYISO recently reported that in 2030, at least 70% of our electricity will need to be generated by fossil fuels.

Nuclear power requires a tiny fraction of the land, far fewer materials and minerals, and, shy of extremely rare cases like Chernobyl and Fukushima, is as safe as solar or wind. Let's use existing and emerging next-generation technology — nuclear power — to decarbonize New York, the USA and the planet.

Sierra Club is typical of the Big Greens. Local Sierra chapters do a lot of good work in other areas like solid waste, but the group's support for a colossally ineffective 100% renewables policy is leading us off a cliff. Let's change course. Nuclear power requires a tiny fraction of the land, far fewer materials and minerals, and, shy of extremely rare cases like Chernobyl and Fukushima, is as safe as solar or wind. Let's use existing and emerging next-generation technology — nuclear power — to decarbonize New York, the USA and the planet.

Source: https://www.syracuse.com/opinion/2023/08/ny-cant-rely-on-wind-and-solar-our-zero-carbon-future-is-nuclear-guest-opinion-by-gary-abraham.html. August 17, 2023.

NUCLEAR STRATEGY

USA

Inside STRATCOM, the Core of US Nuclear Deterrence

The motto for the U.S. Strategic Command, the military branch responsible for America's nuclear arsenal, ends with an ambiguous ellipsis. "Peace is our profession ..." is written on the walls of the command's headquarters in Omaha, Nebraska. The slogan is a reminder that its ultimate mission is to deter any adversary and to maintain peace. But should it have to, the U.S. will not hesitate to use its assets, the three dots signal. Nikkei Asia was recently allowed access to the headquarters of STRATCOM, as the command is known, at Offutt Air Base, a roughly 20-minute drive from downtown Omaha. Geographically, it is at the center of the continental U.S. On display were strategic bombers — the B-1, B-2 and B-52 — along with a special purpose vehicle to transport intercontinental ballistic missiles and an E-6B airborne command post aircraft that sends orders to ballistic nuclear submarines (SSBNs).

"Welcome to our newest combatant command facility," STRATCOM chief Gen. Anthony Cotton told visitors, which included starred generals from Japan, South Korea, Norway and Latvia. The building, constructed in 2019, houses the global operations center in the basement, from where America's triad of land-, air- and sea-based nuclear weapons is managed. This summer, it added a new Joint Electromagnetic Spectrum Operations Center, which manages the military's use of radio waves, microwaves and gamma rays. "Our capabilities are second to none," Cotton said. "They are not like an artist's rendition of our adversaries. This is what physical deterrence looks like. Metal and composite."

In reality, however, STRATCOM is increasingly preoccupied with projections and satellite photos of China's military buildup. This includes hundreds of ICBM silos in the country's western desert, hypersonic missiles, stealth fighters and SSBNs with longer-range missiles that can target the continental U.S. from greater distances. For decades, the U.S. had only had to worry about one peer competitor: Russia. Both are restricted to the deployment of 1,550 nuclear warheads by the New START arms-reduction treaty. China is estimated to have around 410 warheads but has openly professed to seek more than 1,000 warheads by 2030. The U.S. has never had to face two near-peer nuclear competitors. China now exceeds the U.S. in the number of ground-based ICBM launchers. And unlike the U.S. and Russia, China is not bound by any arms control measures.

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Offut Air Base is where Enola Gay and Bockscar, the planes that dropped atomic bombs over Hiroshima and Nagasaki in World War II, were built. From this location, Cotton oversees the nuclear triad so that the American president has a range of strategic options to choose from at any given time. The fastest delivery would be by ICBM, 400 of which are deployed in underground silos in Montana, North Dakota, Wyoming, Colorado and Nebraska. A Congressional Research Service report last updated in December found that an ICBM could be launched as soon as two minutes after the president's order is transmitted through the chain of command. The submarine-launched missiles, which could be closer to the target, would require 15 minutes to fire.

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The strategic bomber is the most visible form of nuclear deterrence. The presence of a Boeing B-52H Stratofortress — with a wingspan of 56 meters — at a nearby air base instills fear in an adversary. The deployment strategy has changed from Continuous Bomber Presence missions, whereby an aircraft typically stays at a forward base for six months, to Bomber Task Force missions, involving shorter and less predictable deployments. The most closely guarded of the bombers was the Northrop Grumman B-2 Spirit. The jagged-triangle shaped stealth bomber was protected by a red line on the tarmac, which visitors were not allowed to cross.

STRATCOM officials said that whenever a B-2 arrives at Offutt, it attracts the attention of drivers nearby, sometimes resulting in accidents. "Often, drivers are more interested in the B-2 in the air than the bumper ahead," one official said. The B-1 Lancer, or "Bone," is the fastest of the strategic bombers and carries the largest payload. Originally built by Rockwell International, which was folded into Boeing, the jet can reach a supersonic speed of Mach 1.2 with its variable wings swept back, altering the plane's center of gravity. Built for low-altitude missions, the B-1 was responsible for most of the conventional weapons dropped during the war in Afghanistan.

Every combatant command "likes to have a bomber in their region," Cotton revealed. The most survivable part of the triad is the SSBN. Virtually impossible to track once deep underwater, each of the 14 SSBNs in the U.S. Navy carries 20 submarine-

launched ballistic missiles. Each missile is considered 30 times more powerful than the atomic bomb that leveled Hiroshima. But each leg of the triad is aging. The U.S. is carrying out an expensive, decadeslong process of replacing legacy assets with new ones. The land-based ICBM program is replacing the Minuteman III with Sentinel missiles. This entails digging up all 400 ICBMs currently in the ground and replacing them with new ones, an endeavor that requires negotiations with thousands of landowners.

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The bomber program will add the Northrop Grumman B-21, most specifications of which remain classified. As for submarines, the current Ohio-class SSBNs will be replaced by the Columbia-class set to enter the force in the 2030s. With the Ohio-class boats soon reaching 50 years of service, there is little room for delay. The massive costs required to maintain the triad have faced opposition in Congress.

... The purpose of the Biden administration's nuclear posture review is to "reduce the role of nuclear weapons in our defense strategy," Warren told Richard. "It is incompatible with that staggeringly high level of spending," she said, reminding Richard that it was the responsibility of elected leaders, not military officials, to determine the force structure. Critics like Warren would prefer to allocate funds to domestic issues such as education rather than nuclear weapons, which have not been employed since World War II.

Yet, one could argue that "the United States uses its nuclear deterrent every day to maintain peace around the globe," as a Pentagon report notes. As China employs new technologies, the U.S. will be pressured to keep up with the developments.

Yet, one could argue that "the United States uses its nuclear deterrent every day to maintain peace around the globe," as a Pentagon report notes. As China employs new technologies, the U.S. will be pressured to keep up with the developments. In a March congressional testimony, Cotton said emerging technologies include hypersonic weapons, fractional orbital bombardment capabilities, anti-satellite capabilities, artificial intelligence, autonomous systems, advanced computing, quantum information sciences, biotechnology, and advanced materials and manufacturing. China's capabilities continue to grow "at an alarming rate," Cotton told lawmakers.

Source: https://asia.nikkei.com/Politics/Defense/Inside-STRATCOM-the-core-of-U.S.-nuclear-deterrence. August 23, 2023.

BALLISTIC MISSLE DEFENCE

ISRAEL-GERMANY

Israel Says US Approves Record-breaking Arrow Missile Defense Deal to Germany

The US has approved Israel's request to sell the Arrow-3 missile system to Germany, the Israeli defense ministry said Thursday, in what will become Israel's largest ever defense deal. The approval paves the way for Israel and Germany to sign a landmark $3.5 billion defense agreement, according to the Israeli defense ministry. Israeli officials had been informed of the approval by the US Department of State, according to a spokesperson for Israel's Ministry of Defense. Israel and the United States have been jointly developing the multi-billion-dollar Arrow missile defense system since 1986.

The Arrow 3 system is designed to intercept exo-atmospheric ballistic missiles, enabling

interceptions at high altitudes above the atmosphere. Senior Israeli and German officials will sign a letter of commitment worth $600 million to enable immediate work on the project, the Israeli ministry spokesperson said. A full contract will be signed once the agreement has been approved by both countries' respective parliaments. Defense Minister Yoav Gallant called the US approval "an expression of confidence in the excellent capabilities of Israel's defense industries" and a reflection of US-Israeli "powerful defense ties." Gallant added that the decision would "contribute to Israel's force buildup and economy" and that Germany acquiring Israeli defense systems was "meaningful to every Jewish person."

The Arrow 3 system is designed to intercept exo-atmospheric ballistic missiles, enabling interceptions at high altitudes above the atmosphere. Senior Israeli and German officials will sign a letter of commitment worth $600 million to enable immediate work on the project, the Israeli ministry spokesperson said.

The US and Japan agreed in January to consider developing the interceptor at a meeting of Secretary of State Antony Blinken and Defence Secretary Lloyd Austin with their Japanese counterparts, Foreign Minister Yoshimasa Hayashi and Defence Minister Yasukazu Hamada.

Source: https://www.albanyherald.com/news/israel-says-us-approves-record-breaking-arrow-missile-defense-deal-to-germany/article_94e5024b-6d84-573b-86ac-3f589626f8d1.html. August 17, 2023.

USA–JAPAN

US, Japan to Develop Hypersonic Missile Interceptor after President Biden, PM Kishida meeting

Japan and the US will agree this week to jointly develop an interceptor missile to counter hypersonic warheads being developed by China, Russia and North Korea, Japan's Yomiuri newspaper said on Sunday. The agreement on interceptors to target weapons designed to evade existing ballistic missile defences is expected when President Biden meets Japanese Prime Minister Kishida in the US, the report said, without giving any source for the information. Officials at Japan's Ministry of Foreign Affairs could not be reached for comment outside business hours. Unlike typical ballistic warheads, which fly on predictable trajectories as they fall from space to their targets, hypersonic projectiles can change course, making them more difficult to target.

Biden and Kishida are to meet the sidelines of a trilateral summit with South Korea's President Yoon at the presidential retreat at Camp David, Maryland, the Yomiuri said. The US and Japan agreed in January to consider developing the interceptor at a meeting of Secretary of State Antony Blinken and Defence Secretary Lloyd Austin with their Japanese counterparts, Foreign Minister Yoshimasa Hayashi and Defence Minister Yasukazu Hamada. An agreement would be the second such collaboration in missile defence technology. Washington and Tokyo developed a longer-range missile designed to hit warheads in space, which Japan is deploying on warships in the sea between Japan and the Korean peninsula to guard against North Korean missiles strikes.

Source: https://www.scmp.com/week-asia/politics/article/3229904/can-japan-south-korea-seal-historic-security-alliance-us-summit-amid-china-north-korea-threat?module= perpetual_scroll_ 1_RM&pgtype= article & campaign= 3229904. August 13, 2023.

EMERGING TECHNOLOGIES AND DETERRENCE

RUSSIA

Russia to Equip its Advanced Submarines with Hypersonic Missiles

Russia plans to equip the Yasen-class submarines with its Zircon hypersonic missiles, *Reuters* reported. Also known as Project 885M, the Yasen-

class is the most advanced Russian submarine powered by nuclear energy, and the addition of hypersonic missiles will strengthen its capabilities. Russia is one of the few countries that is not only working on developing hypersonic missiles but has also successfully demonstrated their development on more than one occasion. These missiles can travel at speeds five times faster than sound and are considered the next frontier of weapons technology since they cannot be countered with conventional missile defense systems.

The Zircon missile has been further developed and now boasts a range of 560 miles (900 km). In a recent interaction with state media, Alexei Rakhmanov, chief executive officer of the United Shipbuilding Corporation (USC), added that the Zircon missiles would be a regular feature on the Yasen-M submarines and work in this direction was already underway.

Russia's Hypersonic Missile: Russia first tested the Zircon (also written as Tsirkon) back in 2021. The weapon demonstrated its hypersonic abilities by traveling at Mach 7 and then hitting a target nearly 200 miles away. For the first demonstration, Russia fired the Zircon from its multi-purpose frigate Admiral Gorshkov. Later that year, though, it fired the missile from a submarine on two occasions, including one when it was at a depth of 131 feet (40 m). Back then, *Interesting Engineering* had reported that the test fire was carried out from the nuclear-powered submarine of the Severodvinsk class, which is the NATO nomenclature for the Yasen-class submarines. The Zircon missile has been further developed and now boasts a range of 560 miles (900 km). In a recent interaction with state media, Alexei Rakhmanov, chief executive officer of the United Shipbuilding Corporation (USC), added that the Zircon missiles would be a regular feature on the Yasen-M submarines and work in this direction was already underway.

What are Yasen-M Submarines? Weighing 13,800 tons, the Yasen class submarines are built at the Sevmash Shipyard in Severodvinsk, hence the NATO name. These submarines are regarded as "crown jewels" of the Russian Navy and were further upgraded with advanced noise reduction technology and a nuclear reactor in the Yasen-M variant. This class of submarines is equipped with Oniks (3M55) missiles which can hit targets 320 nautical miles (593 kms) out in the sea. For land-based attacks, it uses the Kalibr (3M14K) missiles which have a range of 1,600 nautical miles (2,963 kms). A Yasen-M submarine in the mid-Atlantic can potentially hit a target on the US eastern coast.

Although the Zircon has a relatively shorter range than the Kalibr missiles, its ability to evade missile defense systems makes it a bigger threat to the US. Currently, Russia only has one 885 vessel and two more of the 885M submarines, although reports suggest that as many as six more vessels are in various stages of production. By inducting hypersonic missile technology into these upcoming vessels, Russia intends to keep its most-advanced submarines tactically agile for future use. The first of the 885M submarines with Zircon missiles could be floated by 2026, *Eurasian Times* reported. US attempts at developing similar technology have so far met limited success, even as adversaries like China and North Korea boast about having developed their own hypersonic missiles. Earlier this year, Russia sent hypersonic missiles on a frigate to missions in the Indian and Atlantic Oceans.

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Source: https://interestingengineering.com/innovation/russia-advanced-submarines-hypersonic-missiles. August 14, 2023.

USA

USS Zumwalt to be Retrofitted with Hypersonic Missiles

The guided-missile destroyer *USS Zumwalt* (DDG-1000) is back in the news, with yet another obstacle to overcome. However, this time it is to make her even deadlier as she is scheduled to replace her guns with hypersonic missile tubes, *USNI News* reports. The ship arrived at the Ingalls shipyards in Pascagoula, Mississippi, on Saturday (August 19, 2023) to start the two-year process that the US Navy wants to be completed by 2025.

Guns for Hypersonics: "USS *Zumwalt* (DDG-1000) arrived in Pascagoula, Miss., today to enter a modernization period and receive technology upgrades including the integration of the Conventional Prompt Strike weapon system," explains a statement from the Navy provided to *USNI News*. "The upgrades will ensure Zumwalt remains one of the most technologically advanced and lethal ships in the US Navy," it continues. "To the crew and families of the guided-missile destroyer *USS Zumwalt* (DDG-1000), we would like to extend the warmest welcome to the newest members of our shipyard community. It is an honor for us to serve you and the Navy by doing this important work," Ingalls president Wilkinson said in another statement.

The warship weighing 16,000 tons, docked at Ingalls Shipbuilding to replace the 155mm Advanced Gun Systems twin with four 87-inch missile tubes. Each tube will hold three Common Hypersonic Glide Bodies (C-HGB) for twelve missiles on the ship. C-HGB is a hypersonic missile developed jointly by the US Army and Navy. The Department of Defense is developing multiple conventional prompt strike platforms like the C-HGB to target any location in the world without warning. Additionally, the Navy intends to upgrade *USS Michael Monsoor* (DDG-1001) and *USS Lyndon B. Johnson* (DDG-1002) at Ingalls. The former is in San Diego, while the latter is undergoing combat system installation and activation at the yard.

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The Navy originally planned to deploy the destroyer with the Long-Range Land Attack Projectile (LRLAP) to support troops ashore. Still, the cost of the rounds became unaffordable when the class was reduced to three ships. To this end, the Navy has decided to install hypersonic weapons on *USS Zumwalt* and shifted its focus from close to shore to blue water. "We're talking about deploying this system on DDG-1000 in 2025, that's three years from now," Vice Admiral Johnny Wolfe, the head of the Navy's strategic systems programs, told reporters at the Naval Submarine League's annual symposium in November 2022.

Tubes, No Missiles: However, there are doubts about whether the missiles will be ready to be installed once the works are complete. "The CPS program office noted that significant scope and challenges associated with the first-time integration of CPS may present risks to achieving DDG 1000's installation schedule. In reviewing CPS program office information on critical technologies, we found that significant work remains for the program to demonstrate technology maturity," reads a Government Accountability Office report released in June. "If the hypersonic weapon is not ready for integration on the DDG 1000 at the time of the aforementioned maintenance period, the Navy may have to extend the duration of the planned maintenance period or wait for the next scheduled period to incorporate the system on the ship," the report adds.

Source: https://interestingengineering.com/innovation/uss-zumwalt-hypersonic-missiles. August 22, 2023.

NUCLEAR SECURITY

RUSSIA–BELARUS

Poland's Duda: Russian Nuclear Arms in Belarus Alters Security

Poland's President Duda confirmed that Russia has begun shifting some short-range nuclear weapons to neighboring Belarus. This move, he said, will change "the architecture of security in our part of Europe," affecting the region's security dynamics and the NATO alliance, as reported by ABC News. Both Russian President Putin and his Belarusian counterpart Alexander Lukashenko stated last month that Moscow had already transported some of its tactical nuclear weapons to Belarus. This action was initially announced in March. However, the U.S. and NATO have not verified the relocation.

Officials in Moscow and Minsk suggested that Belarusian Su-25 ground attack aircraft could potentially carry the warheads, or they might be fitted onto short-range Iskander missiles. ...He refrained from providing further details but emphasized that the ongoing changes were visibly altering the security landscape in their part of Europe.

NATO Secretary-General Jens Stoltenberg criticized Moscow's rhetoric as "dangerous and reckless." Nonetheless, he stated in July that the alliance hadn't observed any shifts in Russia's nuclear posture. Tactical nuclear weapons, with their limited range and lower yield compared to those on long-range missiles, are designed for battlefield use. Russia confirmed its intent to maintain control over the weapons transferred to Belarus.

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Lukashenko stated that hosting Russian nuclear weapons in his country aims to discourage aggression from NATO member Poland, even though Poland has not made such threats. Poland is providing military, humanitarian, and political support to Ukraine in its conflict against Russia's invasion. Additionally, Poland is involved in international sanctions against Russia and Belarus. Duda also commended the recent approval by the U.S. State Department for the possible sale of 96 Boeing AH-64E Apache helicopters to Poland. This sale would significantly enhance Poland's and NATO's defense capabilities and demonstrate the special relationship between Washington and Warsaw, as reported by ABC News.

The UK government will provide loan guarantees in the amount of GBP 192 million (EUR 225 million) to strengthen Ukraine's energy security and help the nation rid of nuclear fuel dependence on the Russian Federation.

De Sousa pledged ongoing support for Ukraine's struggle and for other countries in the region, underlining that developments on Eastern Europe's borders are as important to Portugal as those closer to home. ...

Source: https://www.newsmax.com/newsfront/poland-belarus-nuclear-security/2023/08/22/id/1131675/. August 22, 2023.

UKRAINE

UK to Allocate EUR 225M for Ukraine's Nuclear Security

The UK government will provide loan guarantees in the amount of GBP 192 million (EUR 225 million) to strengthen Ukraine's energy security and help the nation rid of nuclear fuel dependence on the Russian Federation. That's according to Sky News, referring to a statement by UK Energy Secretary Grant Shapps, who is visiting Ukraine, Ukrinform reports. "The UK will provide a £192m loan guarantee to Ukraine's national nuclear company, Energoatom via the UK's export credit agency, UK Export Finance," the report reads.

As part of the agreement, UK's Urenco will provide the Ukrainian national nuclear operator, Energoatom, with uranium enrichment services that are vital for nuclear fuel. The British government believes this will strengthen Ukraine's energy security and help end the country's dependence on nuclear services and nuclear fuel from the Russian Federation, as well as further isolate Russian President Putin. ...

... According to the Department of Energy Security, the new loan will bring the UK's non-military financial aid to Ukraine close to GBP 5 billion. During his visit to Ukraine, Grant Shapps met with senior Ukrainian government and energy officials and visited a power plant that is being repaired after sustaining damage from Russian shelling. As Ukrinform reported earlier, the UK will send an additional GBP 60 million ($77 million) to NATO's Ukraine Support Fund.

Source: https://www.ukrinform.net/rubric-economy/3751865-uk-to-allocate-eur-225m-for-ukraines-nuclear-security.html. August 24, 2023.

NUCLEAR ENERGY

CHINA

How China is Using Nuclear Power to Reduce its Carbon Emissions

China recently approved the construction of six more nuclear reactors, cementing its status as the world's fastest-growing nuclear power producer. Despite only starting to develop the technology in the mid-1980s, decades later than some other major economies, China is expected to have the world's largest nuclear fleet by 2030. Electricity generation from nuclear power plants has already increased nearly fourfold in the past decade, with China overtaking France to become the world's second-largest producer. China is also looking to export its nuclear power technology – despite setbacks to these plans in the UK and Argentina – with Pakistan seen as the latest "springboard" for further growth. In this Q&A, Carbon Brief looks at the trajectory of China's nuclear development and what's driving its strategy for the technology.

How Much Nuclear Power is China Building? China began building its first nuclear plant in 1985. The Oxford Institute for Energy Studies (OIES) estimates that it will have the world's largest nuclear fleet by 2030. For now, China is now the world's second largest nuclear energy producer behind the US, having overtaken France in 2020. By the end of June 2023, China had an installed capacity of 57 GW, according to official data. China remains behind the 96GW installed in the US – for now. The IAEA says China is the "world's fastest expanding nuclear power producer". It has 23 nuclear units under construction, totalling more than 21GW of additional capacity. In addition, China approved 10 new reactors in 2022 and another six units in early August 2023.

China is now the world's second largest nuclear energy producer behind the US, having overtaken France in 2020. By the end of June 2023, China had an installed capacity of 57 GW, according to official data. China remains behind the 96GW installed in the US – for now.

China accounted for two of the six reactors completed globally in 2022, as well as five of the eight units where construction was started, according to the World Nuclear Association (WNA). This meteoric rise has seen China's nuclear output increase more than fourfold in the past decade, from 98 TWh in 2012 to 418TWh in 2022, shown in the figure below (red line). China is one of only a handful of countries along with Russia (+60TWh), South Korea (+25TWh), the United Arab Emirates (+20TWh) and Pakistan (+17TWh) to see significant growth in the period. Despite this growth, nuclear still makes up only 5% of China's electricity mix. This is below nuclear's 9% share of global supplies in 2022. China has also become a leading nuclear innovator. It is the first country to build a Generation IV reactor, connecting a demonstration project to the grid in 2021. Small-scale nuclear-powered district heating projects are running in Shandong and Zhejiang. Dr Shengke Zhi, director for growth and development at consulting

firm Wood, tells Carbon Brief that China's Generation IV technology still has a long way to go. "Generation III is still the primary choice for China's mega-rollout of nuclear capacity," he says.

Is Nuclear Power an Important Part of China's Climate Plans? China's nuclear capacity is expanding, but there are question marks over how fast it will grow. China could add as many as 10 reactors a year, reaching a capacity of 300GW by 2035, according to China Nuclear Energy Association forecasts reported by Bloomberg last autumn. The OIES cautions that a total of 100GW by 2030 is "more likely". Dr Philip Andrews-Speed, senior research fellow at the OIES, described nuclear energy to Carbon Brief as a "fuel of convenience" for China, pointing out that it meets the country's concerns around energy security and the need to decarbonise. "Beyond net-zero considerations,", Zhi says, "nuclear energy is necessary to develop a diversified energy mix, create more jobs and upgrade its supply chain".

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China has been able to build new nuclear plants much more cheaply than many other countries. Analysts put the costs per kilowatt of installed nuclear capacity in China at around one-third of those in the US or France, Bloomberg reported. (The International Energy Agency estimates that electricity from nuclear power costs $65 per MWh compared with $105/MWh in the US and $140/MWh in the EU.)

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... The WNA points out that safety questions have slowed China's nuclear ambitions. Following the Fukushima Daiichi accident, China temporarily suspended approvals of new power plants, to review concerns over safety and river pollution, according to Andrews-Speed. However, the Chinese government called for "actively developing nuclear power" – with a "steady pace" of construction – as part of its 2021 action plan on peaking CO2 before 2030.

Is China Exporting its Nuclear Power Technology? In 2019, Reuters reported one senior industry official saying China aims to build as many as 30 overseas nuclear power units by 2030. ...The UK, Argentina and other countries had signed deals to cooperate with China on domestic nuclear reactors, but security concerns in the UK and significant delays in Argentina have limited full cooperation.

In Pakistan, eight reactors built with Chinese assistance are either in operation or under construction, boosting generation capacity in a country that has been beset with shortages. China is aiming to use its nuclear projects in Pakistan as a "springboard" to further export growth for the technology, Nikkei Asia reported in July. Nevertheless, China's ambitions to increase its nuclear technology exports are limited, Andrews-Speed writes, by Russia's influence in the sector, the fact that China is not yet a party to the IAEA Vienna Convention, and the fact that it does not take back used fuel.

Source: https://www.carbonbrief.org/qa-how-china-is-using-nuclear-power-to-reduce-its-carbon-emissions/. August 14, 2023.

China's State Council Approves Six New Power Units

State Council of China, chaired by Premier Li Qian, has approved the construction of six nuclear power units: units 5&6 of the Ningde NPP in Fujian Province; units 1&2 of the Shidaowan

NPP in Shandong Province, and units 1&2 of the Xudabao NPP in Liaoning Province. The total investment in the construction of the six approved power units is estimated at 120 billion yuan ($16.8 billion), according to China Daily. These decisions were the first approvals of Chinese nuclear energy projects in 2023. In 2022, a total of 10 new nuclear power units were approved. the State Council said in a statement: "Safety and quality will be the top priority in the construction of these projects."

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China General Nuclear (CGN), in a statement to the Hong Kong Stock Exchange, said that China's HPR1000 (Hualong One) pressurised water reactors will be installed at Ningde 5&6. Currently CGN and Ningde Second Nuclear Power Co Ltd are carrying out various preparatory works for the construction of the units, the report says. "Construction will begin after obtaining permission…from the National Administration for nuclear security." CGN noted that the Ningde NPP was the first nuclear plant to be built and put into operation in Fujian Province. The station currently consists of four 1018 MWe CPR1000 power units, which began commercial operation between April 2013 and July 2016. As of 30 June, the total electricity generation by the four units (Stage I) totalled 257.9TWh," the report notes. CGN also said that the construction permit had been received for two Hualong One units for Shidaowan NPP 1&2 "under the management of the Huaneng Group, which is fully involved in the construction of the CGN project".

The HTR-PM project consists of two small reactors that drive one 210 MWe turbine. It is owned by a consortium led by China Huaneng (47.5%), a subsidiary of China National Nuclear Corporation (CNNC) – China Nuclear Engineering Corporation (32.5%) and the Institute of Nuclear and New Energy Technologies of Tsinghua University (20%), who is the head of research and development.

China Huaneng noted that the two new units have already "passed through a comprehensive safety review and are included in the national plan". The company added: "The Shidaowan Phase 1 Expansion Project is the second large-scale pressurised water reactor NPP project developed by China Huaneng Holdings after the second phase of the Changjiang NPP." The Shidaowan site currently hosts two HTR-PM small high temperature gas-cooled micro-pebble reactors, which first reached full capacity in December 2022. The HTR-PM project consists of two small reactors that drive one 210 MWe turbine. It is owned by a consortium led by China Huaneng (47.5%), a subsidiary of China National Nuclear Corporation (CNNC) – China Nuclear Engineering Corporation (32.5%) and the Institute of Nuclear and New Energy Technologies of Tsinghua University (20%), who is the head of research and development.

Meanwhile, CNNC's subsidiary, China Nuclear Power Co Ltd, announced to the Shanghai Stock Exchange that it had received permission to build units 1&2 of the Xudabao NPP, without disclosing the design of the planned reactors but noted that the capacity of each of them will be 1291 MWe. "CNNC Liaoning Nuclear Power Co Ltd, controlled by our company, is the owner of the approved project and is responsible for project investment, construction and operation management," CNNC noted." The Xudabao NPP project was originally envisioned to consist of six Chinese-designed CAP1000 reactors, with units 1&2 to be built in the first phase. Site preparation began in November 2010. The National Development & Reform Commission approved the project in 2011 and in 2014, the National Nuclear Safety Administration approved the site selection.

However, the construction of these units has not yet begun. A change in plans, in July 2021 and May 2022, led to the start of construction of two Russian VVER-1200 units as Xudabao 3&4.

Source: https://www. neimagazine. com/news/newschinas-state-council-approves-six-new-power-units-11074626. August 15, 2023.

GENERAL

Nuclear Power Reliance Seen to Grow as Countries Embrace Alternatives to Fossil Fuels

Experts expressed belief that the reliance on nuclear power is expected to grow following some countries move to shift towards the use of fossil fuels. A report on Associated Press said that a number of the 30 countries, which are depending their nuclear energy from some 440 plants, are importing radioactive materials from Russia's state-owned energy corporation Rosatom, including the firm's subsidiaries. The said company is known to lead the global landscape when it comes to uranium enrichment, and it has also secured the third spot in terms of uranium production and fuel fabrication. Some nuclear energy advocates have remarked that the United States as well as other European countries would face difficulty when it comes to cutting off imports of Russian nuclear products.

An entry posted on Energy Monitor stated that some of the European countries' reliance and dependency over Russia for nuclear energy is forecasted to considerably increase. It said that by 2040, up to 78 percent of Hungary's electricity could be acquired from Russian-made reactors. On the other hand, Bulgaria is facing the prospect of a 37 percent Russian reactor-dependent electricity grid by the same date.

Nuclear Power Reliance: An entry posted on Energy Monitor stated that some of the European countries' reliance and dependency over Russia for nuclear energy is forecasted to considerably increase. It said that by 2040, up to 78 percent of Hungary's electricity could be acquired from Russian-made reactors. On the other hand, Bulgaria is facing the prospect of a 37 percent Russian reactor-dependent electricity grid by the same date. Meanwhile, in terms of nations outside the EU, Armenia and Sudan are also gearing towards up to 111 percent and 96 percent electricity dependency on Russian-made reactors, respectively, by 2040. Aside from nuclear energy, Russia is known to be the world's largest exporter of natural gas, second-largest exporter of oil, and third-largest exporter of coal.

Research has shown that Russia's portfolio of foreign orders, which include reactor construction, fuel provision and other services, was massively distributed among 54 countries. With this, Rosatom has claimed this to be worth more than US$139 billion over a ten year period, noting that these have not been covered by Western sanctions. At present, experts see that nuclear energy could be Russia's "overlooked trump card" in a decarbonizing world. The dependency on their nuclear energy could actually be traced years ago. Meanwhile, there have been observations that the positive assessments of Rosatom's international nuclear energy engagements have gone more naive after Russia's invasion of Ukraine, at least in European nations that are known to be heavily dependent on Russian fossil fuels. "For most Western-aligned states, it will be inconceivable to enter into any type of new dependence or even non-dependent cooperation with Russia in the nuclear energy sector. Consequently, alternative sources and supply chains will need to be found that eventually will lead to a reduction of the global dependency on Rosatom's nuclear fuel-production capacity," an entry posted over Nature Energy indicated.

Importation: An ABC News report recently disclosed that the US and some European allies are importing huge amounts of nuclear fuel and compounds from Russia. These purchases are seen to give Moscow with hundreds of millions of dollars at a time that they need revenues as they continue to engage war with Ukraine. The sales, which are legal and unsanctioned, have raised concerns from nonproliferation experts and elected officials as they believed that these would

go against efforts to curb Russia's war-making abilities.

Source: https://www.natureworldnews.com/articles/57857/20230810/nuclear-power-reliance-seen-grow-countries-embrace-alternatives-fossil-fuels.htm. August 10, 2023.

INDONESIA

Indonesia is Preparing Nuclear Power Plant Development Strategy

The National Research and Innovation Agency (BRIN) is currently preparing a strategy for the development of nuclear power plants in Indonesia. "One that can also provide a very stable supply of electricity, which can then have a fairly long life, is nuclear energy," Deputy for Development Policy at BRIN Mego Pinandito said on August 21, 2023. The government has discussed nuclear technology as one of the sources of new and renewable energy, he noted. According to him, currently, his side is preparing all the necessary things such as human resources, technological capabilities, and zoning for nuclear energy development.

Kazakhstan's Energy Ministry has provided an update on previously conducted studies related to the choice of reactor technologies and siting for Kazakhstan's first NPP. The Ministry said that, based on studies, Ulken village in the Zhambyl district of Almaty region was chosen as the most preferred locality.

In addition, the involvement of foreign parties is very much needed in the development of nuclear power in Indonesia. The agency is awaiting policies that could encourage this, he added. Pinandito said that Indonesia, as the fifth largest country in the world, needs nuclear power plants to meet its huge electricity needs. Apart from being capable of supplying electricity in large amounts, nuclear power plants are also considered to be more environmentally friendly. "Almost very little air pollution or gas emissions are produced (by nuclear power plants), very little," he pointed out.

Source: https://en.tempo.co/read/1762680/indonesia-is-preparing-nuclear-power-plant-development-strategy-says-brin. August 22, 2023.

KAZAKHSTAN

Kazakhstan Confirms Site for First NPP

Kazakhstan's Energy Ministry has provided an update on previously conducted studies related to the choice of reactor technologies and siting for Kazakhstan's first NPP. The Ministry said that, based on studies, Ulken village in the Zhambyl district of Almaty region was chosen as the most preferred locality. The Ministry also recommends choosing a technology "proven by the experience of construction and successful operation of a similar plant". As a result, a shortlist has been compiled consisting of the following potential suppliers of nuclear technologies: China National Nuclear Corporation's HPR-1000 (Hualong One) reactor; Korea Hydro & Nuclear Power's APR1400 reactor; Rosatom's VVER-1200 and VVER-1000 reactors; and EDF's EPR-1200 reactor.

The Ministry said the research results were reviewed and approved at the meeting of the Interdepartmental Commission for the Development of the Nuclear Industry in May 2022. In accordance with Kazakhstan's law "On the Use of Atomic Energy", the decisions on construction and siting of nuclear installations are made by the Government with the consent of the local representative bodies on whose territory the installation is planned to be built. In this case the local representative body is the Almaty city Maslikhat – legislative branch.

The Almaty Maslikhat in November 2022 agreed to construction, of the plant subject to the support of local residents. As a result, the Akimat (local government) of Almaty region has initiated public discussions. Local media and social media (Instagram Facebook were used to encourage participation in public discussions on the issue. Public hearings will be held later in accordance with the Environmental Code at the stage of the environmental assessment of the project after development of project documentation, the

Ministry said. According to the plan, construction of the NPP should be completed in 2034 for commissioning in 2035.Ulken village in the Almaty Region is located on the western shore of Lake Balkhash, some 370 kilometres from Almaty. The choice for the NPP site was between this village and the town of Kurchatov in the Abai Region. Ulken is a relatively new village founded in the early 1980s. It was originally built to house workers who were constructing the South Kazakhstan Hydroelectric Power Plant, which was never completed. Its population is around 1,500.

Kazakhstan Nuclear Power Plant (KNPP) company, a subsidiary of the Samruk Kazyna Sovereign Wealth Fund, which has been designated as the future plant operator, began preparing a feasibility study in 2018 to justify the need for nuclear power and the selection of a site. The plant is expected to have two reactors with a capacity ranging from 1,000 to 1,400 megawatts to compensate for the shortage of baseload capacity.

Construction of a nuclear plant has been under consideration long before President Tokayev voiced the idea in his state-of-the-nation address in 2021. Kazakhstan Nuclear Power Plant (KNPP) company, a subsidiary of the Samruk Kazyna Sovereign Wealth Fund, which has been designated as the future plant operator, began preparing a feasibility study in 2018 to justify the need for nuclear power and the selection of a site. The plant is expected to have two reactors with a capacity ranging from 1,000 to 1,400 megawatts to compensate for the shortage of baseload capacity. According to Tokayev, the looming energy shortage obliges countries to look for new sources and so constructing a NPP is now back on the agenda. In February 2022, Tokayev addressed an expanded government meeting, saying that without clean nuclear energy, Kazakhstan "will lose the entire economy, not to mention investments, and lose regional leadership".

Kazakhstan possesses the world's second-largest uranium reserves, accounting for 14% of the global total. It also operates research reactors and a range of other nuclear facilities associated with the initial stages of the nuclear fuel cycle, including uranium processing and fuel fabrication. At a June roundtable discussion in Almaty on the nuclear industry, KNPP CEO Timur Zhantikin said NPP construction will have a multiplier effect on Kazakhstan's development. "An increase in the scientific, technical and highly qualified personnel potential of the country is predicted. It will be necessary to create up to 8,000 new jobs during construction and find up to 2,000 high-quality personnel for the operation. As a rule, one job while constructing a nuclear power plant creates another ten in related sectors of the economy," he said. ...

Source: https://www.neimagazine. com/news/newskazakhstan-confirms-site-for-first-npp-11090297. August 22, 2023.

PPEJ is a joint special purpose vehicle set up by Polish public company ZE PAK (Zespól Elektrowni Patnów-Adam-Konin) and Polska Grupa Energetyczna (PGE) – both Treasury owned – to implement the project to construct the NPP in Patnów in central Poland. The plant will comprise two Areactors supplied by Korea Hydro & Nuclear Power (KHNP).

POLAND

Official Approval Sought for Poland's Second NPP

PGE PAK Energia Jadrowa (PPEJ) has submitted an application to Poland's Ministry of Climate & Environment for a decision-in-principle on construction of a NPP consisting of at least two Korean-supplied APR1400 reactors in the Patnów-Konin region of Wielkopolska province in central Poland. PPEJ is a joint special purpose vehicle set up by Polish public company ZE PAK (Zespól Elektrowni Patnów-Adam-Konin) and Polska Grupa Energetyczna (PGE) – both Treasury owned – to implement the project to construct the NPP in Patnów in central Poland. The plant will comprise two Areactors supplied by Korea Hydro & Nuclear Power (KHNP). The

company was established just five months after the letter of intent was signed in Seoul between PGE, ZE PAK and KHNP. PGE and ZE PAK will each own 50% of the shares in PPEJ, which will secure the interest of the Polish Treasury in the project.

This project is developing in parallel with Poland's official nuclear power programme. Poland has ambitious nuclear power development plans. In September 2021, it was announced that six large pressurised water reactors with a combined installed capacity of 6-9 GWe could be built by 2040 to reduce its reliance on coal. Construction of the first 1.0-1.6 GWe plant was expected to start in 2026 for commissioning in 2033. Subsequent units will be implemented every 2-3 years. In November 2022, the government announced the first plant, with a capacity of 3,750 MWe, would be built in Pomerania using US Westinghouse AP1000 technology. An agreement outlining a plan for delivery of the plant was signed in May by Westinghouse, Bechtel and state-owned Polish utility Polskie Elektrownie Jadrowe (PEJ).

In April, PEJ had applied to the Ministry of Climate & Environment for a similar decision for the Westinghouse project and in July the Ministry issued a fundamental decision approving the plan. It formally confirmed that investment in Poland's first NPP is in the public interest and in line with state energy policy. PPEJ's application included a description of project characteristics, indicating the maximum total installed capacity, the planned operating period and details of the APR1400 technology to be used in the construction of the plant. A positive decision will entitle ZE PAK and PGE to apply for a number of further administrative arrangements, such as a siting decision or construction licence. PGE noted that the application "was submitted after only 10 months from the moment of signing the letter of intent by PGE, ZE PAK and KHNP".

...In the meantime, however, the lawsuit could be an obstacle to export of the APR1400. "The Westinghouse lawsuit has been dragging for a long time and there's no guarantee of winning the battle," said Moon Joo-hyun, an energy engineering professor at Dankook University. Korea, nevertheless, has ambitions to become a major exporter of nuclear technology. KHNP is also competing with Westinghouse and EDF to supply reactors to the Czech Republic. The Yoon Suk Yeol administration pledged to export 10 nuclear plants by 2030 and export nuclear facilities worth $3.73bn by 2027. The Ministry of Trade, Industry and Energy will dispatch 11 commercial attachés this month to promote nuclear plant exports in potential markets such as Egypt, the Netherlands, India, Indonesia and Qatar.

KHNP is also competing with Westinghouse and EDF to supply reactors to the Czech Republic. The Yoon Suk Yeol administration pledged to export 10 nuclear plants by 2030 and export nuclear facilities worth $3.73bn by 2027. The Ministry of Trade, Industry and Energy will dispatch 11 commercial attachés this month to promote nuclear plant exports in potential markets such as Egypt, the Netherlands, India, Indonesia and Qatar.

Source: https://www.neimagazine.com/news/newsofficial-approval-sought-for-polands-second-npp-11094319. August 23, 2023

UGANDA

Uganda to Build Two Nuclear Power Stations with Russia and South Korea

Russia and South Korea have embarked on a joint venture to construct two nuclear power facilities in Uganda with the capacity to produce a total of 15,600 MW of electricity. One of the nuclear stations will generate 7,000 MW while the other will produce 8,400 MW of electricity. The development comes at a time Uganda has banned the exportation of unprocessed iron ore and timber resources. The country has also set a 2031 target to produce electricity using nuclear energy.

Source: https://energycapitalpower.com/uganda-nuclear-power-russia-south-korea/. August 16, 2023.

USA

An Advanced Reactor Strategic Plan

The US DOE should develop an Advanced Nuclear Energy Strategic Plan for commercialising advanced nuclear energy. This is the conclusion of a report from the Nuclear Innovation Alliance (NIA) that explores how the DOE could be transformed in order to meet the nation's energy security and clean energy goals. According to the report, Transforming the US Department of Energy: Paving the Way to Commercialize Advanced Nuclear Energy, developing an overarching Advanced Nuclear Energy Strategic Plan for commercialising advanced nuclear energy is critical as it would also create an integrated organising strategy for the various nuclear energy programmes, projects and technologies. This includes the Advanced Reactor Demonstration Program (ARDP) demonstration projects, risk reduction awards, and advanced reactor concepts 2020; fuels initiatives; and others.

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Using all the elements of DOE will support commercial developers by better integrating all DOE's existing efforts to provide advanced reactor developers with greater access to materials, tools, components and analytical capabilities that are not commercially available, or are sourced from an atrophied supply chain. An Advanced Nuclear Energy Earthshot would help identify and assess key supply chain projects for loan guarantees, for example.

A successful Strategic Plan would be spearheaded by the Office of Nuclear Energy (NE) and would account for the interrelationship with all the nuclear-related programmes at DOE – the Loan Programs Office (LPO), the Office of Clean Energy Demonstrations (OCED), the Advanced Research Projects Agency–Energy (ARPA-E), the Office of Science, the Office of Technology Transitions (OTT), and the National Laboratories, along with initiatives that cut across multiple DOE offices. The report notes that such a plan is certain to require adjustments over time, because of technology breakthroughs, technology stumbling blocks, and world events, but the need to adapt or a lack of unanimity should not be a bar to having such a plan, the report also notes that while an Advanced Nuclear Energy Strategic Plan would be useful in any event, it would be most useful in combination with a long-term budget plan although budget plans historically have not always made their to Congress. Another challenge is that the nuclear energy programmes currently work independently of each other and are budgeted as such. It would be difficult for them to agree on a common long-term budget.

Nonetheless, by creating a budget plan, DOE could address the resources needed to achieve its goals and identify what the relevant DOE offices and National Laboratories could contribute to the effort. It could lay out a plan to hire additional staff, support more technologies and awards for advanced reactors (largely under the ARDP), fuels, and the nuclear supply chain through the journey to commercialization. The budget plan would have to be embedded in a broader budget plan for how DOE allocates resources to ensure that a suite of solutions is available to meet climate and energy objectives.

Developing a Strategic Plan: Alongside calling for the development of a budgeted Advanced Nuclear Energy Strategic Plan, the report also makes recommendations on how the DOE should actually develop the plan. Its primary recommendation is to create an Advanced Nuclear Energy Earthshot similar to the US lunar programme of the 1960s. However, NIA emphasises that the goal would not simply be the development of nuclear technology, but its successful commercial deployment.

Using all the elements of DOE will support commercial developers by better integrating all DOE's existing efforts to provide advanced reactor

developers with greater access to materials, tools, components and analytical capabilities that are not commercially available, or are sourced from an atrophied supply chain. An Advanced Nuclear Energy Earthshot would help identify and assess key supply chain projects for loan guarantees, for example.

Advanced reactors also need specialised fuels that must be produced by private enterprise, and DOE has programmes that can support those efforts too, the report says, adding that an Earthshot approach would focus and better coordinate DOE innovation and development efforts for the complete Advanced Reactor Demonstration Programme (ARDP), which was authorized by the Energy Act of 2020 and is the main vehicle for funding commercial advanced reactor demonstrations. The Infrastructure Investment and Jobs Act added a six-year, $2.5 billion appropriation while the Inflation Reduction Act of 2022 established a production tax credit and an investment tax credit for any zero-emissions electricity producer that enters service after 2024. The Inflation Reduction Act also established a DOE programme to catalyze domestic HALEU production. This combination, coming at a time of a national push for decarbonization, creates an opportunity for nuclear innovation that the technology has not seen in decades, the report states. DOE plans to announce "six to eight" Earthshots and to date it has unveiled the Hydrogen Shot which includes nuclear as a carbon-free source.

The Infrastructure Investment and Jobs Act added a six-year, $2.5 billion appropriation while the Inflation Reduction Act of 2022 established a production tax credit and an investment tax credit for any zero-emissions electricity producer that enters service after 2024. The Inflation Reduction Act also established a DOE programme to catalyze domestic HALEU production.

Regarding the Earthshot, the report argues that of all the DOE efforts that it needs to fully integrate, none may be as important as the National Labs which each have remarkable technical capabilities and tend to have strong support in Congress. The NIA analysis notes that to fully integrate DOE's nuclear energy programmes across the National Labs, DOE could benefit from consolidating the oversight of the National Lab nuclear energy work under a single manager to ensure they are coordinated.

Through GAIN, DOE already provides a single point of entry that helps companies navigate the bureaucracy of DOE and National Labs but internal coordination of the labs is also important for executing programmes that support cross-cutting efforts, like hydrogen, which need to integrate advanced reactor technology with other forms of clean energy. DOE headquarters and the National Labs already place a strong focus on the ARDP's demonstration projects, which are public-private partnerships. These partnerships are key for timely and successful commercialization of new designs but some DOE grant recipients report that they find it hard to navigate and access all of the technical expertise within the various DOE labs.

Focus on Cost: Cost is integral to the ability of advanced reactors to succeed in the world market, not to mention in the domestic commercial market, the authors observe, but add that nuclear energy can be priced higher than energy dependent on weather conditions because dispatchable energy is a higher-value energy product. Nonetheless, the report says, the size of the market share that nuclear energy occupies will depend in part on a reactor's cost to build and operate. An Advanced Nuclear Energy Earthshot should focus on reducing the cost, to make successful commercial deployment more easily achievable. For example, the solar and hydrogen Earthshots are both framed in terms of cost (per watt and per kilogram, respectively). The authors say that DOE should consider extending this idea to an Advanced Nuclear Energy and should consider making cost the organising principle as opposed to, for example, focusing only on deploying a certain number of advanced reactors or generating a specific amount of MWh of advanced nuclear energy by a predetermined date.

The report concludes that nuclear energy will not fulfil its role in climate mitigation and energy security unless the actual costs of new nuclear reactor construction and operation come down. In particular, the report says, developers must be able to reliably deliver projects on budget and on schedule. This issue has traditionally been a challenge for the nuclear sector and it is one that must be addressed if nuclear is to reach its potential. The report argues that, in partnership with industry, the DOE can be instrumental in achieving that.

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Firstly, by promoting best practices in project management, contracting, and oversight and, secondly, encouraging design innovations such as modularity, smaller size, higher-volume manufacturing would simplify reactor projects. For example, the report argues that the standardization of certain components used in advanced reactor designs could facilitate their rapid deployment by creating a larger, predictable market for suppliers. Such innovation in standardised parts would allow multiple reactor vendors to leverage cost and supply chain benefits and would have a compounding effect on how quickly reactors can be built. Nuclear energy does not need to be the least expensive source of energy because the power it produces are a premium product that is available around the clock and in all atmospheric conditions. But nuclear energy needs to be more reasonably and predictably priced and new projects reliably delivered.

The report does point out that recent industry experience offers promising results. The current fleet of nuclear energy plants set for itself a goal in 2016 of cutting operating costs by 30%. It was meant to be aspirational, but the campaign brought forth new ideas, and the fleet met the goal by 2020. The motivation was also cost-based: to match the price of electricity from natural gas power plants. According to the NIA, in the construction context, the goal should be set in terms of cost per megawatt-thermal – for advanced reactors, electricity will not be the only product – and should match the cost of other clean firm technologies like geothermal energy, or natural gas with carbon capture. A stretch goal would be to match the cost of steam generated with natural gas without carbon capture, which is the utility industry's preferred alternative at the moment, because there is no requirement to cut climate-forcing emissions

EDF operates three pressurised water reactor designs, known as the 900 MWe, the 1300 MWe and the 1450 MWe N4. Its 32 operating 900 MWe reactors came into commercial operation between 1977 and 1988, and include the oldest of the country's current nuclear fleet. Such reactors are in operation at EDF's Blayais, Bugey, Chinon, Cruas-Meysse, Dampierre, Gravelines, Saint-Laurent and Tricastin nuclear power plants.

Source: https://www. neimagazine.com/features/featurean-advanced-reactor-strategic-plan-11095057/. August 23, 2023.

NUCLEAR SAFETY

FRANCE

Tricastin 1 Cleared for Ten More Years

In February 2021, ASN set the conditions for the continued operation of EDF's 900 MWe reactors beyond 40 years. The regulator said it considered the measures planned by EDF combined with those prescribed by ASN will ensure the safety of the units for a further 10 years of operation. EDF operates three pressurised water reactor designs, known as the 900 MWe, the 1300 MWe and the 1450 MWe N4. Its 32 operating 900 MWe reactors came into commercial operation between 1977 and 1988, and include the oldest of the country's current nuclear fleet. Such reactors are in operation at EDF's Blayais, Bugey, Chinon, Cruas-

Meysse, Dampierre, Gravelines, Saint-Laurent and Tricastin nuclear power plants.

ASN said the improvements and measures will be applied to each reactor individually during their fourth periodic safety reviews, scheduled to run until 2031. These reviews will take the particularities of each facility into account, it said. The measures planned by EDF for each reactor will be subject to a public inquiry. On 29 June this year, ASN adopted a decision setting the requirements governing the continued operation of Tricastin 1. For the periodic safety review of Tricastin 1, EDF took into account the specificities of this reactor and its site as well as the results of the inspections carried out, in particular during the ten-yearly outage of the reactor in 2019.

ASN said the safety improvements planned by EDF as part of this review were the subject of a public inquiry from 13 January to 14 February 2022, which concluded with a favourable opinion from the inquiry committee. "ASN considers that the conclusions of the reactor's fourth periodic safety review, the actions planned by EDF and those taken in response to ASN's decision on the generic phase of the safety review make it possible to achieve the objectives set for this periodic safety review," the regulator said in a 10 August statement. ... Tricastin 1 was connected to the grid on 31 May 1980 and entered commercial operation on 1 December that year.

Source: https://www.world-nuclear-news.org/Articles/Tricastin-1-cleared-for-ten-more-years. August 14, 2023

JAPAN

Japan's Kishida Visits Fukushima Plant to Highlight Safety before Start of Treated Water Release

Japanese Prime Minister Kishida visited the tsunami-wrecked Fukushima nuclear plant Sunday and said an impending release of treated radioactive wastewater into the Pacific Ocean cannot be postponed. He said the move is safe but his government will do its utmost to support fishing communities from the potential impact of damaging rumors during the decades-long project.

Kishida made his trip hours after returning from a summit with U.S. and South Korean leaders at the American presidential retreat of Camp David. Before leaving Washington on Friday, Kishida said it is time to make a decision on the treated water's release date, which has not been set due to the controversy surrounding the plan.

Kishida saw wastewater filtering and dilution facilities and met with the plant and company executives. He told reporters that he confirmed their commitment to safely carrying out the upcoming water discharge. To make room for new facilities needed for the progress of the decommissioning, the treated water needs to be disposed of and tanks removed to make room. The treated water discharge "by no means can be postponed for the decomissioning and Fukushima's recovery," Kishida said.

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He said he hoped to meet with representatives of fisheries organizations on Monday before his ministers decide the start date at a meeting next week. It is widely expected to be the end of August. Kishida said the water release is a long-term project and that he is aware of the importance of recognizing the concerns and needs of local fishing groups. "I hope to convey the government position directly to the fisheries representatives," he said.

Since the government announced the release plan two years ago, it has faced strong opposition from Japanese fishing organizations, which worry about further damage to the reputation of their seafood as they struggle to recover from the accident. Groups in South Korea and China have also raised concerns, turning it into a political and diplomatic

issue. The government and the plant operator, Tokyo Electric Power Co., or TEPCO, say the water must be removed to make room for the plant's decommissioning and to prevent accidental leaks from the tanks because much of the water is still contaminated and needs further treatment.

The water is collected, filtered and stored in around 1,000 tanks, which will reach their capacity in early 2024. The water is being treated with what's called an Advanced Liquid Processing System, which can reduce the amounts of more than 60 selected radionuclides to government-set releasable levels, except for tritium, which the government and TEPCO say is safe for humans if consumed in small amounts.

Japan has obtained support from the IAEA to improve transparency and credibility and to ensure the plan by TEPCO meets international safety standards. The government has also stepped up a campaign promoting the plan's safety at home and through diplomatic channels. The IAEA, in a final report in July, concluded that the TEPCO plan, if conducted strictly as designed, will cause negligible impact on the environment and human health, encouraging Japan to proceed.

While seeking understanding from the fishing community, the government has also worked to explain the plan to neighboring countries, especially South Korea, to keep the issue from interfering with their relationship-building. Japan, South Korea and the U.S. are working to bolster trilateral ties in the face of growing Chinese and North Korean threats. South Korean President Yoon's government recently showed support for the Japanese plan, but he faces criticism at home. During a joint news conference at Camp David, Yoon said he backs the IAEA's safety evaluation of the plan but stressed the need for transparent inspection by the international community.

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Source:https://www.thestar.com.my/aseanplus/aseanplus-news/2023/08/21/japan039s-kishida-visits-fukushima-plant-to-highlight-safety-before-start-of-treated-water-release#:~: text=TOKYO %20(AP)%3A%20Japanese%20Prime, Pacific %20Ocean%20cannot% 20be%20postponed. August 21, 2023.

The purpose of placing reactor unit 4 in cold shutdown is to investigate the exact cause of the leak and carry out necessary maintenance to repair the affected steam generator, according to a statement by Grossi, IAEA Director General. There was no radiological release to the environment, the statement noted, adding that over the next three days, the nuclear power plant will move unit 6 to hot shutdown to continue steam production.

UKRAINE

Ukraine: Zaporizhzhya Nuclear Plant Initiates Reactor Shutdown Following Water Leak

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4 and 6," said Mr. Grossi.

Power Challenges: The IAEA has been monitoring the situation at Europe's largest nuclear power plant since the early days of the conflict. The ZNPP is controlled by Russian forces but operated by its Ukrainian staff. Mr. Grossi reported that there were power disruptions on Thursday after the 750kV power line disconnected twice during the day. The ZNPP had to rely on 330 kV backup line, to supply the electricity required, for example, to perform safety functions such as pumping cooling water for the plant; and there was no total loss of off-site power to the site and emergency diesel generators were not needed. According to IAEA, the nuclear power plant has been experiencing major off-site power problems since the conflict began in February 2022, exacerbating the nuclear safety and security risks facing the site currently located on the frontline. ...Availability of cooling water remains relatively stable, with measures to mitigate water loss from the cooling pond by pumping in water from the ZNPP inlet channel.

The ZNPP had to rely on 330 kV backup line, to supply the electricity required, for example, to perform safety functions such as pumping cooling water for the plant; and there was no total loss of off-site power to the site and emergency diesel generators were not needed. According to IAEA, the nuclear power plant has been experiencing major off-site power problems since the conflict began in February 2022.

IAEA Experts' Site Inspections: IAEA experts at the nuclear power plant have also conducted multiple walkdowns in different parts of the site, including visits to spent fuel storage and reactor control rooms, the agency said. In one of the visits, on Tuesday, to the main control room, emergency control room and other safety-related rooms, the team did not observe any mines or usual objects in the main control; but in the turbine hall of unit 2, they noted the presence of a number of military trucks parked in an area reserved for vehicle maintenance. While the team did not observe mines or explosives in any new locations during the past week, they did confirm the presence of the mines previously observed on 23 July, IAEA added. The experts were informed by ZNPP that a drone was spotted and intercepted near the city of Enerhodar, but confirmed it had no impact on the plant's safety. Meanwhile, IAEA teams at other Ukrainian nuclear power plants – Khmelnitsky, Rivne, and South Ukraine, as well as the Chornobyl site – reported air-raid alarms on Wednesday. They added that the safety and security at the facilities were not affected. ....

Source: https://news.un.org/en/story/2023/08/1139662. August 10, 2023.

USA

US Regulator OKs SMR Emergency Preparedness Rule

The rule's emergency preparedness framework adopts a technology-inclusive and consequence-oriented approach, the NRC said: "The requirements include a scalable method to determine the size of the offsite emergency planning zone around a facility. Applicants and licensees for SMRs and other new technologies can use the rule in developing a performance-based emergency preparedness programme as an alternative to the current offsite radiological emergency planning requirements.

The rule will come into effect 30 days after it is published in the *Federal Register*, which is expected to happen later this year. The new rule builds on the NRC's existing emergency preparedness programme for large, light-water cooled nuclear power reactors, and acknowledges the technological advancements and other differences from large light-water reactors that are inherent in SMRs and other new technologies.

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requirements include a scalable method to determine the size of the offsite emergency planning zone around a facility. Applicants and licensees for SMRs and other new technologies can use the rule in developing a performance-based emergency preparedness programme as an alternative to the current offsite radiological emergency planning requirements." The rule will apply to SMRs and technologies such as non-light-water reactors, new research and test reactors and medical radioisotope facilities. It excludes large light-water reactors with thermal capacities over 1000 MW, fuel cycle facilities and currently operating research and test reactors, which remain under the current regulatory requirements.

NRC Chairman Christopher Hanson said the "thoughtfully articulated final rule" was the culmination of many years of effort by NRC staff working with stakeholders to advance the emergency preparedness regulatory framework. "Simply stated, the NRC has always established its regulatory requirements to address the particular hazards presented by the facilities it licenses and regulates. The requirements vary for different types of facilities, but the standard is always the same – ensuring reasonable assurance of the adequate protection of the public health and safety," he said.

Ottawa has approved up to $74 million in federal funding for SMR development in the province, Jonathan Wilkinson said in Saskatoon. SMRs generate nuclear power. The idea is to help fuel the transition to net-zero emissions and meet the federal government's climate goals by transitioning toward non-emitting energy.

...The final rule package was submitted to NRC commissioners for approval in January 2022. The four commissioners voted unanimously to approve it on 14 August. Two weeks earlier, a group of pronuclear organsiations – the Breakthrough Institute, the Nuclear Innovation Alliance, ClearPath, the Clean Air Task Force, and Third Way – had written to the to the commission asking it to finalise the rulemaking, saying the ongoing regulatory uncertainty from the lack of a final rule meant would-be developers were faced with the prospect of preparing two separate emergency preparedness plans to allow for different regulatory scenarios. Breakthrough Institute Director for Nuclear Energy Innovation Adam Stein said the commissioners "did the right thing" in approving the rule. ...

Source: https://www.world-nuclear-news.org/Articles/US-regulator-OKs-SMR-emergency-preparedness-rule. August 16, 2023

SMALL MODULAR REACTORS

CANADA

Ottawa Announces Up to $74M for SMR Development in Sask

Canada is getting behind the development of small modular nuclear reactors in Saskatchewan, the federal minister of energy and natural resources announced. Ottawa has approved up to $74 million in federal funding for SMR development in the province, Jonathan Wilkinson said in Saskatoon. SMRs generate nuclear power. The idea is to help fuel the transition to net-zero emissions and meet the federal government's climate goals by transitioning toward non-emitting energy, Wilkinson said, speaking at the Sylvia Fedoruk Canadian Centre for Nuclear Innovation at the University of Saskatchewan. "Delivering clean, reliable and affordable electricity will look different in every region of Canada," he said in a press release accompanying the announcement. "We are investing in the future of nuclear technology, building on Canada's decades-long legacy as a responsible global leader in nuclear power, and leveraging Saskatchewan's world-leading production of uranium to position the province to thrive."

Saskatchewan and three other provinces — Ontario, New Brunswick and Alberta — have led the charge on developing SMR technology that would help supply power in their respective provinces. Like their name implies, SMRs are much smaller than traditional nuclear reactors. While a conventional nuclear reactor generates about 1,000 megawatts of energy, SMRs generate

between 200 and 300 megawatts — enough to power about 300,000 homes.

A final decision on whether to build a SMR in Saskatchewan won't happen until 2029 but the planning process has been moving ahead with SaskPower put in charge of development and implementation in the province. The GE-Hitachi BWRX-300 is the reactor identified for development in the province. That's the same model chosen by Ontario Power Generation, which has been closely working with SaskPower on the project. SaskPower has identified Estevan, located in the province's southeast, and Elbow, located about midway between Saskatoon and Regina, as two sites that could potentially host SMRs. Both are close to water sources, existing power transmission infrastructure and have the ability to support a workforce, according to an announcement released last year by SaskPower. A final decision on the location to build one SMR is not expected until late 2024. If approved, construction could begin as early as 2030 with the first SMR coming on line sometime in 2034. Additional facilities could follow.

Up to $50 million will come from Natural Resources Canada's electricity predevelopment program, a $250 million program to support predevelopment of clean electricity projects. In addition, more than $24 million allocated for Saskatchewan is from Environment and Climate Change Canada's future electricity fund.

Funding Comes from Two Streams: The $74 million in funding announced Saturday, will support pre-engineering work and technical studies, environmental assessments, regulatory studies and community and Indigenous engagement to help advance the SMR project, Natural Resources Canada said. The money is drawn from two streams. Up to $50 million will come from Natural Resources Canada's electricity predevelopment program, a $250 million program to support predevelopment of clean electricity projects. In addition, more than $24 million allocated for Saskatchewan is from Environment and Climate Change Canada's future electricity fund.

The $250 million electricity predevelopment program is meant to support projects of "national significance" like SMRs, according to Natural Resources Canada. The $50 million from that stream earmarked for Saskatchewan is conditional on the finalization of a contribution agreement between Natural Resources Canada and SaskPower. Negotiations are currently underway. The Future Electricity Fund returns the proceeds drawn from Canada's carbon pricing plan in order to support clean energy project and energy-efficient technologies that will help Canada meet its climate goals and reach net-zero emissions by 2050.

The Saskatchewan project is an example of two levels of government co-operating on clean energy projects, Environment and Climate Change Minister Steven Guilbeault said in the press release. "Saskatchewan has a significant competitive advantage with an abundance of natural resources to be a leader in the development of clean, affordable and reliable electricity grid," Guilbeault said in the statement. "Building a clean electricity grid in Saskatchewan is good for the economy, good for communities and good for the planet."

Dispute over Clean Energy Regulations: The announcement comes amid pushback from the provincial government on the federal government's proposed clean energy regulations. Premier Scott Moe has claimed the regulations, which are intended to pave the way to a net-zero power grid — not a fossil fuel-free grid — by 2035, are "unachievable" for the province and would "at least double the power rates." Moe has said Saskatchewan is targeting a non-emitting grid by 2050. Experts have disagreed with Moe's assessment, especially because the new regulations don't mean the end of natural gas power generation.

Source: https://www.cbc.ca/news/canada/saskatchewan/canada-sask-smr-development-nuclear-1.6941609. August 19, 2023.

CHINA

China's Small Nuclear Reactor Completes Core Module Assembly

Assembly of the core module of the world's first commercial SMR, Linglong One, was completed, according to its developer, the China National Nuclear Corporation (CNNC). This marks the peak of the installation process of Linglong One, representing a historic step in the miniaturization of global nuclear energy and confirming that China is at the forefront globally in terms of modular SMR construction. Located in south China's island province of Hainan, Linglong One is a multi-purpose small modular pressurized water reactor self-developed by the CNNC.

The core module is the key component of Linglong One, and was independently designed and purchased by the Nuclear Power Institute of China under the CNNC. It includes the likes of pressure vessels and steam generators. Before assembly, the steam generators were welded to the pressure vessels in the factory. This design innovation has not only improved the safety and reliability of the nuclear power plant, but also greatly shortened the construction period, said Deng Xiaoliang, deputy general manager of Hainan Nuclear Power Co., Ltd. of the CNNC. ...

Based at the Changjiang nuclear power plant in Hainan, construction on Linglong One started in July 2021. After completion, it is expected to achieve an annual power generation capacity of 1 billion kWh, which would meet the needs of about 526,000 households. It is expected to reduce carbon dioxide emissions by about 880,000 tonnes per year, equivalent to planting 7.5 million trees a year.

Its developer CNNC also participated in the staffing work of the first SMR user requirements document of the IAEA, contributing Chinese wisdom to the development of SMRs. Based at the Changjiang nuclear power plant in Hainan, construction on Linglong One started in July 2021. After completion, it is expected to achieve an annual power generation capacity of 1 billion kWh, which would meet the needs of about 526,000 households. It is expected to reduce carbon dioxide emissions by about 880,000 tonnes per year, equivalent to planting 7.5 million trees a year. Linglong One is also designed for urban heating, industrial steam production and seawater desalination. It is set to be displayed at a conference on the development and application of SMRs to be held in Hainan this September.

Source: https://www.macaubusiness.com/chinas-small-nuclear-reactor-completes-core-module-assembly/. August 11, 2023.

GENERAL

Decarbonisation Drives Interest in SMRs Finds NEA

The Nuclear Energy Agency (NEA) has released a second status update on a further 21 small modular reactor initiatives under development. The Agency's SMR Dashboard: Volume 2 adds to the first list of 21 SMRs with projects spanning the globe in 11, mostly northern hemisphere, countries and encompassing a range of design concepts, configurations, sizes and development status. The reactor design concepts are roughly evenly split between water-cooled, gas-cooled, fast spectrum, micro and molten salt and reflect the significant innovation beyond the water-cooled approach.

Similarly, while land-based configurations dominate, multi-module, marine-based and mobile options also are identified as emerging. In terms of the scale of the featured SMRs, the power output ranges up to about 1,000MWth and they include multiple reactor designs aiming to provide outlet temperatures above 800oC, with one reactor – Canadian Dual Fluid Energy's proposed fast spectrum DF300 – tipping 1,000oC. These high temperatures enable carbon-free industrial applications such as aluminium production and can provide high-temperature steam for a wide range of processes. As before the projects are assessed on the basis of publicly available information on six criteria. These are

licensing readiness, siting, financing, the supply chain, community engagement and the commercial supply of qualified fuel.

Based on these Japan's High-Temperature Engineering Test Reactor (HTTR) and Russia's Brest-OD-300 demonstrator fulfil the most. The HTTR is a one-of-a-kind, fully funded operating 30MWth high temperature gas-cooled reactor built to advance technology readiness and demonstrate high temperature nuclear heat application systems. The Brest-OD-300 is a lead-cooled fast reactor demonstration unit with a design output of 700MWth that is believed to still be in construction. At the other end of the scale, several appear in the early stages with the least development based on the available information being Toshiba's 4S small 30MWth sodium-cooled fast reactor that is intended for remote areas as a potential replacement for diesel generators. Taken together with the 21 SMRs featured in the first volume, the HTTR fulfils the most criteria while the Brest-OD-300 falls below the first 'top two', Rosatom's KLT-40S in Russia and INET's HTR-PM in China, both of which are in operation. The NEA believes there may be more than eighty SMR designs at various stage of development so the two volumes of the 'Dashboard' represent about half of them.

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SMR Status Overview: The Agency states in the second volume that its analysis continues to reveal substantial progress by small modular reactor developers internationally towards deployment and commercialisation. As SMR designs continue to make progress towards implementation, governments, regulators and vendors have begun consideration of how the spent fuels and other nuclear wastes produced by these technologies will be addressed. While continuing activity related to technology definition and development makes it premature to prepare fully for the back end of the fuel cycle for some technologies, light-water based SMR technologies, as a general matter, enjoy the benefits of familiarity and major technical challenges are not expected for the disposal of used fuel from these technologies.

Other technologies, however, do raise some questions which will need to be addressed in the coming years. SMR developers aiming to deploy novel fuel cycles, are conducting important work to characterise their waste streams and work with waste management organisations to prepare appropriate plans for the long-term storage of the wastes. At the time of publication, however, there was insufficient information available from verifiable public sources to assess the progress of SMRs in terms of waste management planning and readiness for end of life cycle management.

The NEA adds in the volume that notable public announcements, even in the months since volume 1 was published, now reflect technology choices and plans by chemical manufacturers, oil companies and copper mine owners. Market signals suggest that this trend will only continue to accelerate as awareness grows about the potential for SMRs to provide alternatives to fossil fuels for both power and non-power industrial applications.

Source: https://www.powerengineeringint.com/nuclear/decarbonisation-drives-interest-in-small-modular-reactors-finds-nea/. August 23, 2023.

SOUTH KOREA

Daewoo E&C, KAERI to Team Up for Nuclear Tech Research

South Korea's Daewoo E&C announced that it signed a research collaboration MOU with the KAERI. They agreed to collaborate for advanced nuclear research and development as well as the exploration of new projects. The main areas of

cooperation include small modular reactors (with a generation capacity of 300,000 kW) and overseas research reactors, as well as technology for the storage and disposal of spent nuclear fuel. They decided to promote joint research, exchange of personnel, and shared utilization of research facilities and equipment.

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Additionally, they will jointly undertake advanced national technology projects in the field of research collaboration, with Daewoo E&C planning to invest in design and research personnel. Earlier in June this year, Daewoo E&C signed an MOU with KEPCO Plant Service & Engineering for joint overseas nuclear project development and last month signed an MOU with SK Ecoplant. "Through the MOU with the Korea Atomic Energy Research Institute, we plan to participate in advanced nuclear technology research and development, secure fundamental technology and drive the exploration of new business opportunities," a Daewoo E&C source said.

Source: https://www.kedglobal.com/energy/newsView/ked202308180011. August 18, 2023.

USA

Duke Energy Seeks New Nuclear Reactor to Replace Coal at North Carolina Plant

Duke Energy proposes building new nuclear reactors at its Belews Creek power plant in North Carolina, which would end the facility's decades-long use of coal, and a second site still to be determined. The proposal is part of a newly-filed update to Duke Energy's (DUK) 2022 integrated resource plan as the company aims to comply with North Carolina's emission mandates that require utilities to cut carbon dioxide emissions by 70% by 2030 from 2005 levels en route to net-zero emissions by 2050. Each nuclear plant would be capable of powering nearly 250K homes, the company said.

In the update, Duke (DUK) offered three scenarios that would get the company to 70% by 2030, 2033 or 2035; the company said it prefers the 2035 timeline – by that year, it would seek to add 600 MW of capacity from two small modular reactor sites, with both sites being the same reactor technology. The utility said it plans to choose an SMR technology for the Belews Creek site by 2025, aiming for a Q1 2034 in-service date for the Belews Creek SMR and Q1 2035 for the second site. Duke Energy (DUK) operates 11 nuclear reactors at six plants in North and South Carolina, but the last nuclear facility to come online in North Carolina was Duke's Harris Plant in 1987.

The utility said it plans to choose an SMR technology for the Belews Creek site by 2025, aiming for a Q1 2034 in-service date for the Belews Creek SMR and Q1 2035 for the second site. Duke Energy (DUK) operates 11 nuclear reactors at six plants in North and South Carolina, but the last nuclear facility to come online in North Carolina was Duke's Harris Plant in 1987.

Source: https://seekingalpha.com/news/4004066-duke-energy-seeks-new-nuclear-reactor-to-replace-coal-at-north-carolina-plant. August 16, 2023.

NUCLEAR COOPERATION

CANADA–UKRAINE

Ukraine and Canada will Collaborate to Strengthen Nuclear Security and Implement New Nuclear Energy Technology

Nuclear energy, including the advancement of small modular reactor technologies, is set to expedite the energy transition and contribute to

Ukraine's economic resurgence founded on principles of sustainable development. During a meeting with the President of the Canadian Nuclear Safety Commission (CNSC) and the Head of the International Nuclear Regulators Association (INRA), Rumina Velshi, Yaroslav Demchenkov, Deputy Minister of Energy of Ukraine, underscored this point.

The discussion between Deputy Minister Demchenkov and the Canadian counterparts encompassed various aspects of nuclear and radiation safety. Demchenkov noted that Russia continues to exert its presence in the nuclear technology market, leveraging the specter of a radiation catastrophe at Europe's largest nuclear power plant. Curiously, Russia remains mostly unscathed by sanctions within the nuclear sector. Minister of Energy Herman Halushchenko has repeatedly emphasized Russia's violation of all seven principles of nuclear and radiation safety, effectively undermining established norms contrary to international agreements on nuclear security. This issue of nuclear safety is a foundational element of President Zelenskyy's Peace Formula.

Curiously, Russia remains mostly unscathed by sanctions within the nuclear sector. Minister of Energy Herman Halushchenko has repeatedly emphasized Russia's violation of all seven principles of nuclear and radiation safety, effectively undermining established norms contrary to international agreements on nuclear security. This issue of nuclear safety is a foundational element of President Zelenskyy's Peace Formula.

In the course of the meeting, Yaroslav Demchenkov emphasized that reinforcing global standards of nuclear safety is a paramount objective in safeguarding people, the environment, and future generations from the adverse repercussions of nuclear incidents or conflicts. Achieving this goal will be facilitated through the implementation of modern technologies for the storage and safeguarding of nuclear materials, elevated levels of training and awareness, as well as the formulation of joint crisis response strategies.

Ms. Velshi expressed her concern regarding the situation at the Zaporizhzhia NPP. Both parties deliberated on potential avenues to enhance collaboration between the regulatory bodies of both nations and international alliances of nuclear regulators worldwide to ensure robust nuclear safety protocols at the plant. The meeting also delved into the prospects of nuclear energy and nuclear technologies. Deputy Minister Demchenkov highlighted that nuclear energy will form a significant component of Ukraine's future climate-neutral energy matrix.

Source: https://odessa-journal.com/ukraine-and-canada-will-collaborate-to-strengthen-nuclear-security-and-implement-new-nuclear-energy-technology. August 17, 2023.

The value of China's imports of Russian nuclear materials for use at power plants hit a record $490 million in 2022, the highest figure since comparable customs data became available in 2015, with the need to fuel a new fast-breeder reactor in southeastern China possibly behind the increase. The nuclear materials imported from Russia include uranium and plutonium.

CHINA–RUSSIA

China's Imports of Russian Nuclear Materials Hit Record-High in 2022

The value of China's imports of Russian nuclear materials for use at power plants hit a record $490 million in 2022, the highest figure since comparable customs data became available in 2015, with the need to fuel a new fast-breeder reactor in southeastern China possibly behind the increase. The nuclear materials imported from Russia include uranium and plutonium. In the September-December period of 2022, Russia shipped 25 tons of nuclear fuel for the CFR-600 fast reactor, according to data from a British think tank and U.S. media reports. The CFR-600's two units are expected to begin operation later this year and in 2026, respectively.

Since fast-breeder reactors can produce high-purity plutonium that can be diverted to nuclear weapons through fuel reprocessing, Russia-China cooperation in this area amid Beijing's move to bolster its nuclear arsenal has raised international concerns. An expert in nuclear power generation said once the CFR-600, located in the Fujian Province county of Xiapu, becomes fully operational, it could produce 200 to 300 kilograms of high-purity plutonium per year — an amount that could be used to create some 100 to 200 nuclear warheads. China is projected to increase the number of nuclear warheads in its military stockpile from the current level of about 400 to 1,500 in 2035. ...

Although the notice from the NRC provided little explanation, the notice issued by BIS explained that the change in the Export Administration Regulations (15 CFR Parts 730-774 or EAR) is based on an increased concern with China's military-civil fusion policy and efforts to expand its military nuclear capability. The changes implemented by the NRC are effective as of August 8, 2023, and the changes implemented by BIS are effective as of August 11, 2023.

Source: https://english.kyodonews.net/news/2023/08/4a009cd72676-chinas-imports-of-russian-nuclear-materials-hit-record-high-in-2022.html. August 12, 2023.

USA–CHINA

U.S. Government Revises Export Controls Regarding Commercial Nuclear Commerce with China

On August 11, 2023, the U.S. NRC and the U.S. Department of Commerce, Bureau of Industry & Security ("BIS") announced amendments to their existing regulations concerning exports of nuclear materials and related equipment destined for China and Macau. Although the notice from the NRC provided little explanation, the notice issued by BIS explained that the change in the Export Administration Regulations (15 CFR Parts 730-774 or EAR) is based on an increased concern with China's military-civil fusion policy and efforts to expand its military nuclear capability. The changes implemented by the NRC are effective as of August 8, 2023, and the changes implemented by BIS are effective as of August 11, 2023.

The NRC is responsible for regulating the export and import of certain nuclear materials and nuclear-related equipment as promulgated under 10 CFR Part 110 (Part 110). The NRC's export control regime includes general licenses that can be used under certain conditions for specified countries, as well as a procedure for exporters to request specific licenses when needed. Part 110 sets forth the licensing criteria used by the NRC for regulated nuclear materials and equipment; the U.S. Department of Energy, National Nuclear Security Administration (NNSA), separately regulates the export of related nuclear technology and technical assistance under 10 CFR Part 810 (Part 810). For both general and specific licenses, an overriding consideration is whether an export will be "inimical to the common defense and security or constitute an unreasonable risk to the public health and safety."

The NRC's amendment to Part 110 removes the general license for exports of special nuclear material, source material, or deuterium for nuclear end use in China, even though China was and is not an eligible destination for use of a general license to export certain other civilian nuclear reactor components. Persons wishing to export such materials (as described in Part 110) must now apply for a specific license in accordance with the NRC's regulations, pay the requisite licensing fee, and await a decision on the application before undertaking a regulated transaction.

At the same time, BIS issued an amendment to the EAR to impose additional export licensing requirements for exports of dual-use, nuclear-related items (i.e., commodities, software, and technology) to China and Macau. ...The Federal Register notice briefly sets forth the preexisting nuclear-related export controls for dual-use items destined for China (i.e., items not regulated by the

NRC or NNSA), including items: on the Commerce Control List ("CCL") that were controlled for enhanced non-proliferation reasons ("NP1"); destined for military end-uses/end users; when there is knowledge the item will be used in nuclear explosive activities, unsafeguarded nuclear activities, or safeguarded or unsafeguarded nuclear fuel cycle activities; when there is "knowledge" the item is for use in a maritime nuclear propulsion project; and items destined for Chinese entities placed on the Entity List due to their involvement in China's military nuclear program.

BIS explains that the tightened export controls were "necessary to protect U.S. national security and foreign policy interests by imposing a license requirement to China and Macau on items that could contribute to nuclear activities of concern.

BIS explains that the tightened export controls were "necessary to protect U.S. national security and foreign policy interests by imposing a license requirement to China and Macau on items that could contribute to nuclear activities of concern. These controls are being put in place to further allow the U.S. Government to monitor the export of these items to assure that they are only being used in peaceful activities such as commercial nuclear power generation, medical developments, production of or use in medicine, and nonmilitary related industries."

Thus, effective August 11, all items on the CCL that show a reason for control of "NP2" now require a specific license from BIS for export or reexport to, or transfer within, China (including Hong Kong) and Macau. This amendment expands the scope of dual use items subject to the EAR, beyond those previously controlled for NP1 reasons, that must be licensed for (a) export to China, Hong Kong, and Macau, (b) reexport from abroad to those destinations, and (c) transfer to a new end use or end user in country. The licensing policies that are now applied include (a) "extended review or denial" if the item would make a significant contribution to nuclear weapons or their delivery systems, and (b) "a presumption of denial if the item would make a material contribution to the development, production, maintenance, repair, or operation of weapons systems, subsystems, and assemblies."

In sum, these new amendments reflect the trend toward increasing export controls focused on China where there is a U.S. national security, foreign policy, or economic concern associated with the supply of dual use commercial items, with a focus on military, intelligence, surveillance, and cyber capabilities. NNSA has not announced any changes to its Part 810 export controls directed at China - such technology exports already require a specific license and do not qualify under a general authorization set forth under Part 810 - but industry should monitor that regime for any change in the licensing review process related to China.

Source: https://energycentral.com/news/us-government-revises-export-controls-regarding-commercial-nuclear-commerce-china. August 15, 2023.

USA–PHILIPPINES

Philippines, US Cite Importance of Nuclear Energy

The Philippines and the United States have reaffirmed the importance of nuclear energy as a key contributor to energy security. The two countries last week launched the inaugural US-Philippines Energy Policy Dialogue (EPD) that aims to advance commitments by Washington and Manila to deepen cooperation on energy security, energy access and clean energy transition, as agreed during US Vice President Harris' visit to the Philippines in November last year. Department of State Principal Deputy Assistant Secretary for the Bureau of Energy Resources Laura Lochman and Department of Energy Deputy Assistant Secretary for Asia and the Americas Beth Urbanas co-led the US delegation.

Philippine Department of Energy Supervising Undersecretary for policy and planning Felix William Fuentebella led the Philippine delegation.

The US and Philippine delegations emphasized the centrality of energy security, decarbonization and collaboration among nations with shared values in sustained economic development amid the region's rapid economic growth and rising energy demands.

The US State Department said the discussion reinforced the role of energy cooperation in strengthening the US-Philippine partnership and focused on accelerating the deployment of renewable energy, modernizing and expanding transmission, and reducing dependence on imported fossil fuels. Both delegations reviewed the progress of current energy projects in the Philippines and established priorities for future cooperation and technical support. The US and the Philippines highlighted ongoing cooperation on small modular reactor capacity building and discussed next steps to deepening cooperation and moving forward to deployment under the highest standards of nuclear safety, security and nonproliferation.

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During her visit, Harris announced that the US and the Philippines were initiating negotiations on a civil nuclear cooperation agreement ("123 Agreement") to support expanded cooperation on zero-emission energy and nonproliferation priorities. Once in force, this agreement will provide the legal basis for US exports of nuclear equipment and material to the Philippines.

In a statement, the White House said the US is committed to working with the Philippines to increase energy security and deploying advanced nuclear reactor technology as quickly as safety and security conditions permit to meet the Philippines' dire baseload power needs. The deployment will support both energy security and climate goals and support workers and businesses in both countries. Following the inaugural EPD, US Department of Energy leadership including Urbanas and Deputy Secretary David Turk will visit the Philippines to continue engagement and partnership on shared energy transition priorities.

Source: https://www.philstar.com/headlines/2023/08/21/2290126/philippines-us-cite-importance-nuclear-energy. August 21, 2023.

NUCLEAR NONPROLIFERATION

GENERAL

Documents at Trilateral Summit to Push Nuclear Nonproliferation

Strengthening nuclear nonproliferation efforts will be included in two documents released during the trilateral summit involving Japan, the United States and South Korea on the outskirts of Washington, sources said. The meeting to start on Aug. 18 at Camp David between Prime Minister Kishida, U.S. President Biden and South Korean President Yoon is the first one scheduled between the three leaders, who will be joined by their foreign ministers.

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According to a Japanese government source, one document, called the Camp David principles, will lay out basic conventions behind trilateral cooperation, such as the importance of upholding international order based on the rule of law and strengthening nuclear nonproliferation. A separate joint statement will list specific cooperative measures to be implemented, including regular

meetings between officials of the three nations to discuss national security cooperation.

To emphasize a rejection of any unilateral effort to change the status quo through force, the Camp David principles will touch upon the Russian invasion of Ukraine and the various economic and military moves being made by China. The document will call for respecting sovereignty and territorial integrity. It will also include wording to strengthen efforts at nuclear disarmament and nonproliferation so that nuclear weapons are never again used.

The separate joint statement will call for regular meetings on national security at the levels of national leader, foreign minister, defense minister and senior government official in charge of national security. Takeo Akiba, secretary-general of the National Security Secretariat, is expected to represent Japan at the fourth level of such meetings. The measure is designed to set up a structure for discussions and cooperation that can be maintained even if there is a change in government in any of the three nations. ...

Source: https://www.asahi.com/ajw/articles/14983208. August 17, 2023.

URANIUM PRODUCTION

IRAN

Iran Breaks Ground for New Uranium Mine

Mohammad Elsami, head of the Atomic Energy Organization of Iran (AEOI), said detailed exploration for uranium and rare earth elements began in Jang-e Sar in Iran's West Azerbaijan province last year and is still ongoing. The mining complex will be a hub for the supply of raw materials for nuclear fuel and will play a "significant role" in supporting Iran's plans for 20,000 MWe of nuclear capacity, he said.

Mohammad Elsami, head of the Atomic Energy Organization of Iran (AEOI), said detailed exploration for uranium and rare earth elements began in Jang-e Sar in Iran's West Azerbaijan province last year and is still ongoing. The mining complex will be a hub for the supply of raw materials for nuclear fuel and will play a "significant role" in supporting Iran's plans for 20,000 MWe of nuclear capacity, he said.

The AEOI said it has carried out geological mapping, prepared a detailed phase report and used airborne geophysical technology to identify and investigate uranium mineralisation and other elements in the area. The organisation said it has estimated and evaluated "the tonnage and grade of minerals" but did not provide resource figures. The construction schedule is expected to take 30 months to complete, and will proceed alongside "operation, construction and development of studies, especially for the processing of other elements with radioactive materials", he said.

According to information from the IAEA, the Bandar Abbas Uranium Production Plant, which had a production capacity of 21 tU per year, closed in 2016. A 50 tU per year production facility at Ardakan, processing ore from the Saghand mine in the Yazd province of central Iran, began operations in 2017.

The first phase of the project at Jang-e Sar will require an investment of around IRR10 trillion (around USD240 million) to be completed. ... Iran has previously mined uranium at Gachin near the port of Bandar Abbas on the Persian Gulf. According to information from the IAEA, the Bandar Abbas Uranium Production Plant, which had a production capacity of 21 tU per year, closed in 2016. A 50 tU per year production facility at Ardakan, processing ore from the Saghand mine in the Yazd province of central Iran, began operations in 2017. In February, the AEOI announced the start of construction of a uranium-molybdenum mine at the Narigan Mining and Industrial Complex in Yazd, which at that time Eslami said had been estimated to contain 650 tU in addition to 4600 tonnes of molybdenum.

Source: https://world-nuclear-news.org/Articles/Iran-breaks-ground-for-new-uranium-mine. August 15, 2023.

SWEDEN

Sweden to Lift Parliamentary Ban on Uranium Mining

Sweden's Climate Minister Pourmokhtari has announced plans to lift the country's ban on uranium mining and make way for greater nuclear energy capacity. The Swedish Parliament has shown majority support for a lift on the ban, according to Pourmokhtari. The government plans to build at least ten large reactors in the next 20 years to meet the demand for low-carbon energy. Swedish Prime Minister Kristersson told reporters in January that the government is "changing the legislation", which will increase nuclear investment in the country.

Swedish ministers decided to phase out nuclear generation in 1980 and have historically taken an anti-nuclear stance. However, this policy was repealed in June 2010. Pourmokhtari is a public advocate of nuclear generation and says it should form a part of Sweden's future energy mix. "The government is aiming at doubling electricity production in 20 years," Pourmokhtari told *The Times* this weekend. ...

Source: https://www.mining-technology.com/news/sweden-lift-uranium-mining-ban/?cf-view&cf-closed. August 21, 2023.

NUCLEAR WASTE MANAGEMENT

GENERAL

IAEA Conducts First Mission on Disused Sources

Most radioactive waste arising from nuclear applications consists of disused sealed radioactive sources (DSRS). Radioactive sources are used in different devices in medical, industrial and agricultural facilities. They have to be accounted for and when they are no longer usable, they have to be recovered, dismantled, stored and, in some cases, prepared for transportation. The IAEA launched the DSRS TeC service in September 2022 in an effort to increase and enlarge the accessible pool of resources and support for sustainable management of DSRS. Morocco's National Centre for Energy and Nuclear Science and Technology hosted a pilot DSRS TeC mission in May 2022. Like other IAEA-led peer review services, DSRS TeC will comprise a team made up of IAEA and external experts. The DSRS TeC will review the technical proficiencies, operational processes, quality management and capabilities of a facility to operate at regional level and beyond. By building on national capabilities, it is hoped that support for sustainable management of DSRS will be scaled up and at the same time strengthen the existing capacity of the countries.

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The IAEA announced that the first DSRS TeC mission has now been conducted following the launch of the service. The inaugural DSRS TeC mission, supported by funds from the USA, took place in Bangkok at the Thailand Institute of Nuclear Technology (TINT), from 18 to 21 July. The mission team comprised four experts from the Philippines and Serbia, and two IAEA staff members. Preparation of DSRS packages for domestic transport of sources, characterisation of devices, and dismantling and conditioning of sources were addressed during the review.

TINT built a dedicated DSRS storage facility in 2013, which operates under a strict quality management system. In 2020, TINT redesigned its inventory system. Following the peer review, the team concluded that TINT's system is comprehensive, providing source details and allowing full tracking of a source's origin, condition and location in the facility. ...

Source: https://www.world-nuclear-news.org/Articles/IAEA-conducts-first-mission-on-disused-sources. August 10, 2023.

JAPAN

Tsushima Panel Adopts Petition for Nuclear Waste Site Survey

A special committee of the assembly of the southwestern city of Tsushima, Nagasaki Prefecture, voted to adopt a petition calling on the city to accept a survey to examine whether it is suited to host a final disposal site for high-level radioactive waste from nuclear plants. The full assembly is highly likely to adopt the petition on Sept. 12, the first day of a regular session. The focus will then be on a decision by Mayor Naoki Hitakatsu, who is seen as cautious about accepting the survey.

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Such surveys are currently being conducted in the town of Suttsu and the village of Kamoenai, both in Hokkaido. State subsidies of up to ¥2 billion will be provided to those accepting a survey. On Wednesday, the Tsushima assembly panel voted on eight petitions on whether to accept a survey. The panel approved by a majority vote a petition from the local construction industry calling for accepting the survey, as well as one from the Tsushima chamber of commerce and industry calling for discussions on a final disposal site.

The other six petitions from local fishery cooperatives and others opposing the survey were voted down. After the petitions were submitted, the Tsushima assembly set up the special committee in June. The committee received explanations about the survey from officials of the industry ministry's Agency for Natural Resources and Energy and the Nuclear Waste Management Organization of Japan, which is in charge of conducting the survey. The survey is regarded as the first stage of the process to select a final disposal site. In order to proceed to the second stage, a drilling survey, the consent of the head of the municipality and the prefectural governor is necessary.

Source: https://www. japantimes.co.jp/news/2023/08/17/japan/tsushima-nuclear-waste-site-survey/. August 17, 2023.

POLAND

Poland Launches Search for New Repository Site

The new facility, it said, will be intended solely for the storage of low and intermediate-level waste and radioactive sources from nuclear power, industry, medicine and research and development in Poland. It will not accept high-level waste or used nuclear fuel, which require the construction of an underground facility with completely different characteristics and in a different location.

Preference will be given to municipalities with an area of approximately 100 hectares for the construction of a landfill and auxiliary facilities. However, the area must meet certain conditions. These include: being located at least 50 km from the country's land border with neighbouring countries; in an area where there are lands of low production quality; not being located within areas such as national parks or nature reserves; not within populated areas; and not in areas prone to earthquakes, subsidence or flooding.

The ministry said that during the construction of the new repository, it will use the experience gained during the operation of the existing National Radioactive Waste Repository (NRWR) in Ró¿an and "follow the example of proven facilities of this type operated in Spain (El Cabril) or France (Aube)". State-owned public utility Zak³ad Unieszkodliwiania Odpadów Radiotworniczych (ZUOP), which is responsible for the proper handling of radioactive waste from the moment it is taken over from the producer, will be the investor and operator of the repository.

Preference will be given to municipalities with an area of approximately 100 hectares for the construction of a landfill and auxiliary facilities.

However, the area must meet certain conditions. These include: being located at least 50 km from the country's land border with neighbouring countries; in an area where there are lands of low production quality; not being located within areas such as national parks or nature reserves; not within populated areas; and not in areas prone to earthquakes, subsidence or flooding.

The ministry noted that the municipality where the new repository will be located will be entitled to an annual fee from the state budget (from the date of acceptance of the first waste to the repository until the decision to close the repository). This will be in the amount of 400% of the income from the real estate tax located in the area, obtained in the previous year, but not more than PLN10.5 million (USD2.6 million)....

Source: https://www.world-nuclear-news.org/Articles/Poland-launches-search-for-new-repository-site. August 18, 2023.

UK

Nuclear Waste Retrieval Begins at UK's Oldest Waste Store

Sellafield engineers, using new equipment designed and installed by a Bechtel-Cavendish Nuclear team, have begun retrieving waste from the UK's oldest waste storage building. The Pile Fuel Cladding Silo (PFCS) at Sellafield nuclear facility in northwest England is a sealed building with six compartments of radioactive material. It was built in the 1950s to store debris from the UK's oldest nuclear reactors. This week, a crucial stage was reached when a remotely operated crane reached through one of six shielded access doors and started safely and securely scooping out waste. The milestone is significant in the permanent, safe, and secure disposal of materials, and has Sellafield retrieving waste from all four legacy ponds and silos for the very first time. ...

Source: https://www. prnewswire.com/news-releases/nuclear-waste-retrieval-begins-at-uks-oldest-waste-store-301902670.html, 16 August 2023.

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 Anil Chopra, PVSM AVSM VM VSM (Retd).

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