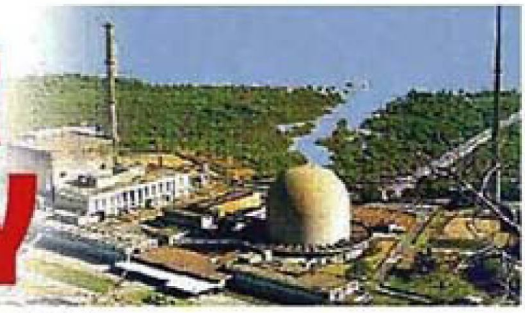
NUCLEAR SECURITY



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

Vol 18, No. 04, 15 DEC. 2023

OPINION – Jeffrey Donovan (IAEA)

Nuclear Energy Makes History as Final COP28 Agreement Calls for Faster Deployment

Nuclear energy made history today as the United Nations Climate Change Conference (COP28) wrapped up in the UAE city of Dubai. For the first time since the annual climate summits commenced in 1995, the 198 signatory countries to the UN Framework Convention on Climate Change (UNFCCC) officially called for accelerating the deployment of low-emission technologies including nuclear energy to help achieve deep and rapid decarbonization, particularly in hard-to-abate sectors such as industry and through the low carbon production of hydrogen.

The appeal came in the 28th paragraph of the so-called Global Stocktake, a final agreement that assesses where the world stands on achieving the objectives of the 2015 Paris Agreement and how shortcomings might be rectified. Global headlines about the document, the subject of heated debate in the closing hours of COP28, focused on its call to transition away from fossil fuels and triple renewable energy capacity. But the inclusion of nuclear, together with a separate declaration made last week at COP28 by more than 22 countries to advance the aspirational goal of tripling nuclear power capacity by 2050, as well as statements by the IAEA and the nuclear industry, underscored the momentum building behind the world's second largest source of clean electricity.

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"Nuclear energy's inclusion in the Global Stocktake is nothing short of a historic milestone and a reflection of how much perspectives have changed," said IAEA Director General Rafael Mariano Grossi. "It demonstrates there is now a global consensus on the need to scale up this clean and reliable technology to achieve our vital goals on climate change and sustainable development."

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The IAEA Statement on Nuclear Power, released on 1 December at COP28 and supported by dozens of countries, called for active recognition and support for the energy technology. "Resilient and robust nuclear power has the potential to play a wider role in the quest towards net zero carbon emissions, while ensuring the highest level of nuclear safety and security," statement said. The IAEA's annual nuclear power outlook high case projection sees installed nuclear capacity more than doubling to 890 gigawatts by 2050, compared to 369 gigawatts today. This represents an almost 25% increase from the Agency's estimate in 2020, with its projections revised up for a third consecutive year.

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However, several challenges need to be addressed if nuclear power is to fulfil its potential in helping the world get to net zero greenhouse gas emissions by mid-century. These include rising interest rates and commodity prices, the need for a level financial and policy playing field as well as greater regulatory harmonization and industrial standardization, a topic on which the IAEA's Nuclear Harmonization and Standardization Initiative (NHSI) is advancing global efforts.

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In recent years, nuclear power has been included in several national or regional taxonomies on what qualifies as a sustainable investment. However, such moves so far have not influenced the lending principles and policies of banks, including multilateral banks, although some private investment funds appear to be changing their approach. "Achieving a fair and enabling investment environment for new nuclear projects remains an uphill battle," Mr Grossi said. "We are not at a level playing field, yet, when it comes to financing nuclear projects."

At COP28, Belgian Prime Minister Alexander De Croo, French President Emmanuel Macron and Mr Grossi announced that the world's first Nuclear Energy Summit will be held in Brussels in March 2024 to build on the global momentum behind nuclear power. Around 30 countries are expected to participate in the Summit along with industry leaders, experts and representatives from civil society.

In addition, the Summit will showcase the IAEA's Atom4NetZero initiative, which provides decision makers with comprehensive, data-driven energy scenario modelling that also includes the full potential of nuclear power in contributing to net zero emissions. Such studies will be vital to make a credible technical case for governments and investors to support new nuclear projects, Mr Grossi said.

"Today we celebrate the real progress that nuclear power has made in the global climate and energy debate," the IAEA Director General said. "But we must tackle several challenges if we are to succeed. The Nuclear Energy Summit is the next major event where the world will come together to discuss how we can forge real solutions, so that the lofty pledges made at COP28 can become reality."

Source: https://www.iaea.org/newscenter/news/nuclear-energy-makes-history-as-final-cop28-agreement-calls-for-faster-deployment, 13 December 2023.

OPINION – Simon Bradley

Is Nuclear Energy Poised for a Comeback?

Amid concerns over the climate and energy crises, nuclear power appears to have become a credible alternative again. But the issue remains controversial.

Shifting Global Mindsets: Attitudes towards nuclear energy have shifted in recent years, driven by concerns about climate change and the recent energy crisis resulting from Russia's invasion of Ukraine. Japan, which saw the 2011 Fukushima meltdown, has restarted its reactors, while other nations are building (mainly China, India and Russia), considering (including Poland, Romania, South Korea) or extending nuclear facilities (France, Belgium and Finland). At the COP28 climate talks in Dubai, the US, Britain, France, Ghana and Sweden were among more than 20 countries that signed a declaration aiming to triple nuclear power capacity by 2050 as part of efforts to achieve net-zero emissions. Global nuclear capacity now stands at 370 gigawatts, with 31 countries operating reactors. Fans of nuclear energy say it is a clean, safe and dependable complement to wind and solar energy. According to an International Energy Agency (IEA) report last year nuclear is vital for achieving carbon emission targets set out in the 2015 Paris Agreement. But tripling nuclear energy capacity by 2050 would require huge investment. In Western countries, which have almost three-quarters of global nuclear capacity, investment has stagnated due to soaring construction costs and projects have run over budget and faced delays. Critics say the COP28 pledge is unrealistic, as producing nuclear energy has become too expensive, risky and slow to build. Renewables like wind and solar are cheaper, safer and faster solutions, they argue. Environmental groups also worry about safety and the disposal of nuclear waste.

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Issue Back on the Swiss Authorities' Table: Following the nuclear disaster at Fukushima, the Swiss government in 2011 decided to phase out nuclear power. In 2017, 58% of Swiss citizens validated this decision when they voted to gradually decommission the country's five existing nuclear power plants, ban the construction of new ones and adopt a new law – Energy Strategy 2050 – that promotes renewables. But six years on, mindsets appear to be shifting. Some politicians, especially on the centre-right, believe the energy transition cannot be achieved with solar and wind power alone. The Sonntags Zeitung/Le Matin Dimanche reported that the seven-member Federal Council, which includes Environment Minister Albert Rösti of the rightwing Swiss People's Party, appears to be "doubting the path it has taken to a nuclear-free future". The Federal Council recommends that parliament adopt a postulate by Radical-Liberal Party President Burkart which urges the authorities to maintain existing nuclear plants and consider a future scenario where new ones

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would be possible. The text suggests new reactors could be installed in old nuclear power facilities. The government says its recent acceptance of the proposal is not a greenlight to lift the ban on new nuclear power plants, but it promises a report that should allow "decisions to be made with full knowledge of the facts."

Split Parliament: The nuclear issue is likely to be discussed at the winter session of parliament, which began on December 4. But Burkart's proposal should spark controversy, as some left-wing and centrist politicians have long opposed the construction of new plants over fears of radioactivity, waste and high costs. "A new nuclear power plant would not be built for 20 years at the earliest, and that is clearly too late for the energy transition," said Green parliamentarian Bastien Girod. According to the political platform Smart vote, if there were a vote, the opponents of nuclear power plants in the House of Representatives would secure a narrow majority of 105 to 95 votes.

A handful of politicians changing their minds or abstaining could change things. The Senate would be a different story, where pro-nuclear supporters dominate, said Sonntag Zeitung/Le Matin Dimanche. A May 2023 report by the federal technology institute ETH Zurich's Energy Science Center says nuclear energy could be an option to achieve energy security in a net-zero future. But the construction time and costs for building new nuclear power plants in Switzerland are uncertain and the political framework is currently not in place. "It might be challenging to commission new nuclear power plants before 2050. However, keeping the current nuclear power stations in operation in Switzerland as long as they are deemed safe and can be run economically can support Switzerland achieving decarbonisation until 2050 and provide a large fraction of electricity supply even in winter," it says.

Four Power Plants that Can Run as Long as Safe: Switzerland has four operational nuclear power stations that generate roughly a third of the nation's energy needs External link, while around 60% comes from hydropower. While the Swiss government decided to phase out nuclear power, no deadline was set to shut down Swiss power stations. The 47-year-old Mühleberg plant was shut down in December 2019 and is currently being dismantled. In Switzerland there is no legally specified duration of the service life of nuclear power plants. They may continue to be operated as long as they are safe. Operators Axpo Holding AG and Alpiq Holding AG have already boosted the planned lifespan for their plants to 60 years from a previous target of 50. That would see them operating until around 2040. Alpiq is studying the impact of a further extension of up to 80 years. By 2050, experts estimate Switzerland will need around 50% more electricity than it does today, especially due to the huge increase in electric cars.

According to a survey published in March 2023, just over half of all Swiss believe nuclear power plants are important to prevent a shortage of electricity. The poll showed that 64% of respondents are opposed to the closure of Swiss nuclear plants by 2037, as demanded by the Green Party. Also, 56% are "for or rather in favour" of the rapid construction of new nuclear plants to secure the country's electricity supply.

Nuclear vs. Renewables: Swiss Citizens Conflicted: The Swiss have voted many times on the issue of nuclear power. In 2016, citizens rejected a proposal by the Green Party to close down nuclear plants after 45 years in operation. In 2017, they agreed to gradually decommission existing plants and ban the construction of new ones. A new vote could be on the horizon. The Club Energie Suisse has collected 120,000 signatures for its "Stop the blackout" initiative aimed at lifting the ban on the construction of new nuclear power plants in Switzerland. According to a survey published in March 2023, just over half of all Swiss believe nuclear power plants are important to prevent a shortage of electricity. The poll showed that 64% of respondents are opposed to the closure of Swiss nuclear plants by 2037, as demanded by the Green Party. Also, 56% are "for or rather in favour" of the rapid construction of new nuclear plants to secure the country's electricity supply.

Despite public support for nuclear power, it remains the third-preferred choice in an energy crisis behind solar and wind power. Of those surveyed, 77% were in favour of solar installations on buildings and 74% wanted large wind turbines to help prevent an energy crunch. Two-thirds of those surveyed also support the development of hydroelectric power in the Alps via large-scale projects. A different survey published in June by the Association of Swiss Electric Companies showed strong support for renewables. It found no clear backing for nuclear power in the future energy mix. In all, 65% said they would not prefer a new nuclear power plant in place of wind farms, Alpine solar installations or new dams.

Source: https://www.swissinfo.ch/eng/sci-tech/explainer—is-nuclear-energy-poised-for-a-comeback-/49029466, 04 December 2023.

OPINION – Alan Ahn

Why Nuclear Fuel is Vital to U.S. National Security Interests in Ukraine and the Middle East

Amid conflicts in Eastern Europe and the Middle East, the buildout of a robust nuclear fuel supply chain has heightened ramifications for U.S. national security, perhaps most obviously by alleviating our reliance on Russian uranium. In addition to mitigating dependence on Russia, a strong nuclear fuel sector supports national security in myriad ways: advancing global nonproliferation by enhancing international confidence in reliable fuel supply; strengthening American leadership and competitiveness in the global nuclear energy market, particularly against China and Russia; and serving as a potential source of material for defense applications critical to maintaining the readiness of U.S. strategic deterrence capabilities. Individually, these benefits are certainly relevant and important to U.S. national security. But collectively, they all reinforce U.S. leverage in upholding the highest international standards in nuclear security and nonproliferation, including establishing norms and practices to constrain the spread of sensitive technologies and the means to produce weapons-usable material.

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A Perception Issue: For decades, the US was the dominant supplier of nuclear fuel services to the world, and the global nuclear fuel market appeared to function reliably. It is for perhaps this reason that American leaders lost sight of the national security stakes at hand and allowed the nuclear fuel industry to languish. In the 1990s, the US gradually lost its share in the global enrichment market to overseas competitors, including Russia. When Putin launched his unprovoked attack on Ukraine in 2022, our deep dependence on Russian nuclear fuel suddenly and dramatically became untenable. While some lawmakers clearly understand the geostrategic significance of this issue—including those who introduced the Nuclear Fuel Security Act (NFSA) back in February—many operate under the misconception that nuclear fuel is simply a commercial matter, leading some to question

When Putin launched his unprovoked attack on Ukraine in 2022, our deep dependence on Russian nuclear fuel suddenly and dramatically became untenable. While some lawmakers clearly understand the geostrategic significance of this issue—including those who introduced the Nuclear Fuel Security Act (NFSA) back in February—many operate under the misconception that nuclear fuel is simply a commercial matter, leading some to question whether nuclear fuel provisions or funding belong in national security legislation.

whether nuclear fuel provisions or funding belong in national security legislation. For example, there are conversations in Congress about including funding for federal nuclear fuel programs in a national security supplemental bill, a vehicle that would likely include aid packages for Ukraine and Israel. Given longstanding misperceptions about nuclear fuel, some may view funding for federal fuel programs as outside the purview of a national security supplemental or even a distraction from its overall aims.

The world's pervasive dependence on Russian energy, including nuclear fuel, is no longer acceptable, considering that it undermines our collective resolve to support Ukraine against Russian aggression (and directly bolsters Putin's military and arms complex).

Nuclear Fuel and National Security: Implications for Ukraine and the Middle East: However, our current commitments in Ukraine and the Middle East clearly highlight and illustrate the complex interconnections between nuclear fuel and national security. The national security imperatives of nuclear fuel are closely aligned with the US' objectives in these crises, and rebuilding our nuclear fuel infrastructure is complementary—even essential—to our strategies for stabilizing these conflicts. Following the dissolution of the Soviet Union, Ukraine voluntarily relinquished the nuclear arsenal that had been deployed within its territory during the Soviet era. Ukraine then immediately acceded to the Nuclear Nonproliferation Treaty (NPT) in 1994. Therefore, a failure to come to Ukraine's aid at this moment would send negative, reverberating signals to our friends and allies across the world and foment doubts about the prudence of adhering to global nonproliferation norms. The world's pervasive dependence on Russian energy, including nuclear fuel, is no longer acceptable, considering that it undermines our collective resolve to support Ukraine against Russian aggression (and directly bolsters Putin's military and arms complex).

More effectively providing countries with nuclear fuel supply is the fundamental step to disincentivizing the development of sensitive fuel cycle technologies and advancing U.S. nonproliferation goals. Moreover, considering that Russia makes formal commitments to supply fuel for the life of the reactors it exports to client states—as part of comprehensive packages including training, financing, and other concessions—nuclear fuel supply is also an issue of commercial competitiveness.

Geopolitical instability in the Middle East is long-established and well-documented, and thus, worries about the threat of nuclear proliferation in the region have persisted for decades. Recent terrorist acts and humanitarian crises have further underscored the imperative of effectively managing regional proliferation risks. And as more countries in the region express interest in starting civil nuclear programs—including Saudi Arabia and Jordan—U.S. leadership in maintaining robust international nonproliferation standards only grows in importance. Constraining the spread of technologies that can produce weapons-usable material has long been a major U.S. policy priority. In 2009, the U.S. concluded a "123" Agreement with the UAE, in which Abu Dhabi formally renounced its rights to sensitive enrichment and reprocessing (ENR) technologies. While some lauded this ENR provision in the agreement as a major nonproliferation win for the US and advocated for enshrining it as the "gold standard" for all subsequent 123 Agreements, Washington does not have a successful track record in negotiating such concessions from its civil nuclear partners since the UAE.

In general, we stand a far greater chance of achieving such nonproliferation conditions with more robust capabilities and measures to ensure a reliable and international fuel supply. More effectively providing countries with nuclear fuel supply is the fundamental step to disincentivizing the development of sensitive fuel cycle

technologies and advancing U.S. nonproliferation goals. Moreover, considering that Russia makes formal commitments to supply fuel for the life of the reactors it exports to client states—as part of comprehensive packages including training, financing, and other concessions—nuclear fuel supply is also an issue of commercial competitiveness. China is rapidly building out its own nuclear fuel supply chain and will be in a position to make comparable offers to international customers in the future. And as our international competitiveness lags behind, our nonproliferation leverage will erode even further. Regional turmoil and Saudi Arabia's ongoing push to start its civil nuclear program (including ambitions to develop uranium enrichment) have increased the urgency of addressing these policy challenges. With Saudi Arabia allegedly using possible civil nuclear cooperation with China to push Washington to relent on its enrichment demands, U.S. negotiating leverage and commercial presence in the region are increasingly crucial—and nuclear fuel critically supports both.

A robust and globally competitive U.S. civil nuclear sector is not just a commercial issue but has immense consequences for U.S. national security. Nuclear fuel lies squarely at the nexus of American climate, energy, commercial, geopolitical, and national security interests. At this momentous historical juncture, the US must rise to the occasion and rebuild its nuclear fuel capabilities for the sake of both our longer-term security and the pressing national security challenges of today.

Nuclear Power Needs U.S. Leadership: Uranium is produced, traded, and sold like many other commodities. Still, it is no exaggeration that the geopolitical ramifications of nuclear fuel are perhaps greater than any other commercial good in world history. A robust and globally competitive U.S. civil nuclear sector is not just a commercial issue but has immense consequences for U.S. national security. Nuclear fuel lies squarely at the nexus of American climate, energy, commercial, geopolitical, and national security interests. At this momentous historical juncture, the US must rise to the occasion and rebuild its nuclear fuel capabilities for the sake of both our longer-term security and the pressing national security challenges of today.

Source: https://nationalinterest. org/feature/ why-nuclear-fuel-vital-us-national-security-interests-ukraine-and-middle-east-207782, 07 December 2023.

OPINION – Saba Kiran

Significance and Challenges of the Second Meeting of States Parties to the TPNW

The upcoming Second Meeting of States Parties to the Treaty on the Prohibition of Nuclear Weapons (TPNW), set to take place from November 27 to December 1, 2023, has significant implications for the worldwide situation regarding nuclear disarmament. This research study thoroughly examines the significance of the event while carefully examining the major challenges that might hinder the successful implementation of the TPNW. The Second Meeting serves as significant setting for participating nations to reaffirm their joint commitment to the fundamental principles established in the Treaty on the Prohibition of Nuclear Weapons (TPNW). By actively participating in this diplomatic forum, states parties demonstrate their collective will to eliminate the worldwide danger presented by nuclear weapons. This helps build a clear and binding framework that strictly forbids the acquisition, use, and development of such weapons.

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The meeting provides a platform for a thorough evaluation of the progress made since the beginning of the TPNW, giving participating governments a great chance for open talks about the difficulties faced in implementing the treaty. The meeting's relevance is mostly based on its ability to encourage open conversation and collaboration among governments with differing geopolitical objectives. This collaborative approach plays a crucial role in helping to reach agreement on challenging topics and finding common ground in the global effort to create a society without the imminent danger of nuclear weapons. Nevertheless, notwithstanding the promising possibilities of the Second Meeting, significant challenges need careful deliberation. The primary issue is to successfully reconcile the varied national interests of the member governments. The level of dependence on nuclear deterrent and geopolitical factors might create obstacles to establishing a united stance in favour of the goals of the TPNW.

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In addition, the Second Meeting has to address the wider geopolitical landscape, which involves tense ties between nuclear-armed nations and those campaigning for disarmament. The complex interaction of power dynamics at the international level generates uncertainties that might impede the progress of the TPNW's objectives. Moreover, the effectiveness of the Second Meeting hinges on the willingness of states parties to translate rhetoric into tangible action. Bridging the gap between articulated commitments and concrete measures for disarmament poses a formidable challenge, necessitating a robust and sustained diplomatic effort.

The meeting resonates with transparency and accountability, which are essential elements of the TPNW. States parties utilize this forum to exchange information about their individual disarmament efforts, promoting transparency and reinforcing mutual accountability in fulfilling their obligations under the treaty. The meeting also assumes significance as a strategic platform for encouraging non-signatory states to accede to the TPNW. Through diplomatic engagement and discourse, states parties can articulate the myriad benefits of the treaty, potentially persuading other nations to join and thereby expanding the treaty's reach and impact.

Nonetheless, a significant array of challenges comes to the forefront, especially considering the unwavering resistance from nations possessing nuclear arms. Evidently, major nuclear powers, namely the US, Russia, China, France, and the United Kingdom, have not yet pledged to the tenets of the treaty. Effectively involving these states in meaningful discussions and negotiations emerges as an urgent challenge, necessitating skillful diplomatic approaches to navigate these complex circumstances.

Addressing the humanitarian concerns of nuclear weapons constitutes an imperative challenge for the meeting. This involves grappling with issues such as environmental impact, long-term health effects, and the moral imperative to prevent the use of these devastating weapons, requiring a comprehensive and compassionate approach.

The delicate balance between disarmament commitments and the legitimate security concerns of certain states emerges as another significant challenge. The meeting must navigate this tension by fostering clear dialogue that acknowledges and reconciles the imperative of national security with the broader disarmament objectives of the TPNW. Verification mechanisms and compliance with the TPNW present a complex challenge. The establishment of protocols to verify the dismantling of nuclear weapons and monitor compliance necessitates international cooperation and the cultivation of mutual trust among states parties.

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the meeting. This involves grappling with issues such as environmental impact, long-term health effects, and the moral imperative to prevent the use of these devastating weapons, requiring a comprehensive and compassionate approach. Furthermore, promoting widespread public awareness and support for the TPNW remains an ongoing challenge. The meeting should explore strategies to enhance education and advocacy efforts, involving civil society, academia, and the media to amplify the treaty's message and garner broader public support.

In conclusion, the Second Meeting of States Parties to the TPNW stands as a pivotal moment in the global pursuit of nuclear disarmament. Its significance lies not only in the consolidation of international commitment but also in the potential to address and overcome the multifaceted challenges that impede progress. As the international community convenes, navigating the resistance from nuclear-armed states, balancing national security concerns, and addressing verification issues are formidable tasks that necessitate careful consideration and diplomatic acumen. The aspiration is that this meeting will catalyze renewed commitment, collaboration, and tangible progress towards a safer and more secure world, free from the looming threat of nuclear weapons.

Source: https://moderndiplomacy.eu/2023/11/27/significance-and-challenges-of-the-second-meeting-of-states-parties-to-the-tpnw/, 27 November 2023.

OPINION – Lin Congyi

UK Nuclear Submarine Failures Suggest Overburdened Nuclear Deterrent System

According to media reports, a Royal Navy nuclear submarine carrying 140 crew members and several UGM-133 Trident II (Trident D5) missiles broke down on mission in the Atlantic Ocean recently, causing an unplanned descent to dangerous depths zone narrowly avoiding shipwreck and casualties. The incident has again reignited the debate on the diminishing nuclear power of the country. For many years, the Vanguard-class nuclear submarines have been a weapon that keeps the Royal Navy on edge. For example, in 2009, the HMS Vanguard submarine of the Royal Navy and Le Triomphant of the French Navy collided in the Atlantic Ocean, and the former was towed back to a port after the incident.

In 2015, Able Seaman William McNeilly, who was serving in the Royal Navy Submarine Service, published a self-composed report online saying that one only needs a fake identification document to board the nuclear submarine and access to the nuclear weapons system critical to national survival, and his service had at least witnessed more than 30 security vulnerabilities of the Vanguard-class submarine, including incomplete protection on classified information, incorrect computerized fire danger assessment, missiles early warning failure and void security check.

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Later in June 2016, a Trident D5 missile launched from a Vanguard-class nuclear submarine sailing along the coast of Florida deviated from course, heading for the US continent instead of the west coast of Africa as planned, with no nuclear warhead installed fortunately. In November 2022, the Vanguard-class nuclear submarine HMS Victorious experienced an electrical fire accident during an underwater cruise in the Atlantic Ocean, when more than 130 sailors onboard had to immediately assist in extinguishing the fire and ascending the nuclear submarine to expel toxic gases. Some analysts pointed out that the unrelenting troubles of the Vanguard-class submarines were mainly arisen from their extended service.

As the global strategic situation significantly changed after the end of the Cold War, the UK adjusted its nuclear strategy accordingly, seeking to launch unbearable strikes on enemies with the smallest scale of nuclear force by upholding the

minimal nuclear deterrence principle. As the demand for strategic equipment decreased, the country dismantled land-based nuclear weapons in 1992 and ceased the nuclear deterrence duties of the Air Force in 1998, remaining only four Vanguard-class submarines and their installed Trident submarine-launched ballistic missiles for nuclear deterrence.

The Vanguard-class strategic nuclear submarines are the second generation of ballistic missile nuclear submarines of the Royal Navy, which initiated design and development in 1983 and commenced service with its first ship to the Navy in 1993. As the only strategic strike force of the UK at present, the four submarines implement the Continuous At Sea Deterrent (CASD) policy, that is, securing the availability of one submarine for 24-hour combat readiness patrol in the high seas, ready to launch the equipped nuclear weapons at the shortest time.

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The Vanguard-class submarines were originally designed to sustain 25 years and decommission around 2020. As the successor to these submarines, the HMS Dreadnought strategic nuclear submarine is scheduled to be deployed in 2028. However, due to delays in construction, the new submarine is unlikely to enter service even in the early 2030s, so the Vanguard-class submarines have to be commissioned for 37-38 years, well beyond their intended service life, which will inevitably impact their combat readiness with the aging of the facilities.

Meanwhile, the poor health of the submarines has also adversely affected the individuals aboard. Under normal circumstances, the nuclear submarines are deployed on maritime operations for about two months, or no more than three months generally. This is mainly because long underwater activities and confined space put all crew under intense pressure and leave no valve to relief from psychological stress. Therefore, the crew was prone to develop mental problems if exposed to extended periods of underwater living.

However, the patrol periods of the Vanguard-class submarines are generally extended. Relevant parties said that a partial reason is that one of the four submarines suffered a reactor leak and underwent a seven-year refit before restoring service in July 2022, which resulted in only three submarines available for a period, who were compelled to contribute more naturally. Relevant data suggest that in 2022, each of two Vanguard-class submarines had been on patrol for 157 days. In September 2023, British photographer Sheila Weir captured a picture of a Vanguard-class submarine returning to HM Naval Base Clyde on the west coast of Scotland. After fulfilling missions at sea for six months purportedly, the submarine was heavily caked in algae, with significant portions of anechoic tiles on the hull falling off. We can imagine the crew's circumstances based on the deplorable state of the submarine. All these circumstances have raised doubts about the UK nuclear weapon safety and deterrent stability, a plight that may become more pronounced with further delays in building the HMS Dreadnought submarine.

Source: http://eng.chinamil.com.cn/OPINIONS_209196/Opinions_209197/16269409.html, 27 September 2023.

OPINION – Melissa Evans

Protecting Cultural Heritage in ARASIA Countries, through Nuclear Techniques

A new regional project, approved last week as part of the 2024–2025 IAEA technical cooperation programme, will help State Parties of the

Cooperative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology (ARASIA) to take a comprehensive approach to the trafficking of cultural objects by bringing together experts across a variety of disciplines. The trafficking of cultural artefacts is often transnational, with artefacts smuggled across country borders. This complex crime requires a coordinated approach to ensure that national treasures are recognized when they are in transit from their origin or being illicitly offered for sale.

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The IAEA has already worked extensively with countries in the region to build capacities in non-destructive testing and its applications in the field of cultural heritage. "Close collaboration between the Ministry of Culture and the Lebanese Atomic Energy Commission (LAEC) has already yielded fruitful results in the fight against illicit trafficking, specifically in the application of non-destructive testing," explained Bilal Nsouli, Director of the Lebanese Atomic Energy Commission and ARASIA Chair. ...

The new project brings together international organizations, antiquities experts and law enforcement agencies to improve methods of identification. Using non-destructive testing nuclear techniques, scientists can identify the age and properties of objects suspected of having been trafficked or forged. A number of specialized international organizations with expertise in addressing crimes related to cultural heritage will participate in the project.

Scientists in ARASIA countries have, with IAEA support, also built their expertise in radiocarbon dating of archaeological materials. Valuable information about artefacts has been uncovered as a result, which has been used in the conservation and authentication of archaeological findings. Participants learned how to date archaeological artefacts, such as pottery, ceramics and bone. The new project brings together international organizations, antiquities experts and law enforcement agencies to improve methods of identification. Using non-destructive testing nuclear techniques, scientists can identify the age and properties of objects suspected of having been trafficked or forged. A number of specialized international organizations with expertise in addressing crimes related to cultural heritage will participate in the project.

The United Nations Interregional Crime and Justice Research Institute (UNICRI), which works to advance justice, crime prevention, security and the rule of law in support of peace, human rights and sustainable development, is one of those organizations. "Illicit trafficking in cultural property is a serious crime, undermining cultural heritage and contributing to transnational organized crime and terrorism. In preserving our global cultural heritage, the role of non-destructive testing is a linchpin in the battle against the illicit trafficking of cultural artefacts. Such techniques can provide critical evidence to advance criminal investigations and prosecutions of trafficking, as well as illicit trade and forgeries.

UNICRI is proud to partner with the IAEA to address the urgent threat of illicit trafficking in cultural property," said Antonia De Meo, Director of UNICRI. Through its knowledge centre 'Security Improvements through Research, Technology and Innovation' (SIRIO) and other programmes, UNICRI works to identify security risks and innovative solutions using cutting-edge technologies, including non-destructive testing. "The special angle of this project aims to make a novel meaningful connection between science and law

enforcement agencies, thus facilitating better response to possible illicit trafficking of valuable cultural heritage artefacts, through effective application of nuclear techniques," said Jane Gerardo Abaya, Director of the IAEA Technical Cooperation Department's Division for Asia and the Pacific at the project's first working group meeting.

The Science: Non-destructive testing is used to examine the properties of objects or structures without causing harm to their physical integrity. This can be done through several different radiation methods, including X-rays, gamma ray radiation, neutron activation analysis or ion beam methods. Through these techniques, radiation can make hidden layers of an object more apparent to the human eye, and also identify its chemical composition based upon the radiation that it releases when exposed to an X-ray. Radiocarbon dating is another method used in classifying cultural heritage objects. By examining the amount of carbon-14 present using accelerator mass spectrometry, scientists can determine the object's age.

Source: https://www. iaea.org/newscenter/news/protecting-cultural-heritage-in-arasia-countries-through-nuclear-techniques, 01 December 2023.

NUCLEAR STRATEGY

INDIA

India Successfully Conducts Training Launch of Short-Range Ballistic Missile Agni-1

India on Thursday successfully conducted the training launch of the Short-Range Ballistic Missile 'Agni-1', the defence official said. The launch took place from APJ Abdul Kalam Island, off the Odisha coast. The user training launch, carried out under the aegis of the Strategic Forces Command, successfully validated all operational and technical parameters. "Agni-1 is a proven very high precision missile system. The user training launch, carried out under the aegis of the Strategic Forces Command, successfully validated all operational and technical parameters," said the official.

The performance was substantiated through data gathered from various tracking systems, such as radar, telemetry, and electro-optical systems. These systems were strategically placed at different points along the flight path, including two down-range ships positioned at the terminal point, providing comprehensive coverage for the entire trajectory. The missile was successfully test-fired last time on June 1 from the same base. In October last year, India successfully test-fired 'Agni Prime' - a new generation of ballistic missiles - from off the coast of Odisha. The Agni series of missiles are the mainstay of India's nuclear delivery options.

The Dutch air base at Volkel appears to have started integration training with the new U.S. B61-12 guided nuclear gravity bomb in 2021, even before the bomb went into full-scale production and entered the U.S. stockpile in 2022.

Source: https://www.indiatvnews.com/news/india/agni-1-india-successfully-conducts-training-launch-of-short-range-ballistic-missile-apj-abdul-kalam-island-defence-ministry-latest-updates-2023-12-07-906301, 07 December 2023.

USA

New Nuclear Bomb Training at Dutch Air Base

The Dutch air base at Volkel appears to have started integration training with the new U.S. B61-12 guided nuclear gravity bomb in 2021, even before the bomb went into full-scale production and entered the U.S. stockpile in 2022. An image included in a Sandia National Laboratories video from early-2022 that snapshots accomplishments from 2021 shows what appears to be a B61-12 training shape hanging under the right wing of an F-16.

The video does not identify the location but the image appears to be from Volkel Air Base in the Netherlands; The design of the protective aircraft shelter visible in the photo is unique to Dutch shelters. Eleven of the shelters at the Volkel are equipped with an underground vault that can hold up to four B61 bombs. But normally they only hold

1-2 bombs each for an estimated 10-15 bombs at the base. A picture posted on a public forum shows the outline of a vault inside a Protective Aircraft Shelter at Volkel Air Base.

Although the training B61-12 is mounted on an F-16, the weapon is not yet assigned to the NATO fighter jets. The B61-12 has entered the U.S. nuclear weapons stockpile, but it is so far only assigned to the B-2 strategic bomber, according to the U.S. Department of Energy. The fighter jets (F-15E, F-16, Tornado) have completed integration flights but had, as of recently, not yet been assigned the B61-12 (see table below). The new F-35A that will take over the nuclear strike role at Volkel and other European bases had also not been assigned the B61-12 yet, but U.S. European Command training was scheduled to start in 2023.

The 312th Squadron of the 1st Wing at Volkel Air Base is part of the so-called NATO nuclear sharing arrangement where the United States equips Dutch F-16s (and aircraft of five other NATO countries: Belgium, Germany, Greece, Italy, Turkey) and trains their pilots to employ U.S. B61 nuclear bombs in war. During peacetime, the weapons are under the custody of U.S. Air Force units (the 703rd Munitions Support Squadron (MUNSS) at Volkel).

The 312th Squadron of the 1st Wing at Volkel Air Base is part of the so-called NATO nuclear sharing arrangement where the United States equips Dutch F-16s (and aircraft of five other NATO countries: Belgium, Germany, Greece, Italy, Turkey) and trains their pilots to employ U.S. B61 nuclear bombs in war. During peacetime, the weapons are under the custody of U.S. Air Force units (the 703rd Munitions Support Squadron (MUNSS) at Volkel).

On December 8, 2023, the 312th Squadron performed what is known as an elephant walk where 14 F-16s were displayed on the runway at the same time. A similar display was performed in 2021. At least one of the pilots in the 2023 event can be seen wearing a helmet visor with a nuclear weapons explosion mushroom cloud (see image below). It is possible, but unknown, that this is the helmet of the commander of the 312th Squadron.

The nuclear weapons upgrade at Volkel Air Base is part of a broad nuclear modernization program of U.S. non-strategic nuclear forces in Europe that includes replacement of aircraft, bombs, base infrastructure, nuclear command and control, readiness level, operational planning, and public visibility.

There is no public information that the B61-12 bombs have been shipped to Europe yet but the C-17A nuclear transport aircraft has been cleared and the first shipments could potentially begin next year. If so, they would replace the estimated 100 B61-3/4 nuclear bombs currently deployed in Europe.

Source: Hans Kristensen, https://fas.org/publication/new-nuclear-bomb-training-at-dutch-air-base/, 13 December 2023.

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US Research Advances on Alternative to Bomb-Grade Uranium in Navy Vessels – Documents

U.S. research is advancing on the potential to change fuel for nuclear reactors on Navy submarines and aircraft carriers from bomb-grade uranium to a safer option, documents showed Wednesday, even as the program's funding is at risk in Congress. In order to lower proliferation risks of keeping stockpiles of highly-enriched uranium, the U.S. government has been exploring since 2018 how to use low-enriched fuel that cannot be used as fissile material in weapons. The U.S. research program progressed from a planning phase into an "iterative experimental campaign phase" in fiscal year 2021 and early findings represent progress in what could be a 20-

to 25- year design effort, said a report to Congress last year from the NNSA.

The report, seen by Reuters, had not been revealed previously. The issue of highly-enriched fuel in naval vessels is heightened by the $245 billion AUKUS defense technology partnership with Australia and Britain that provides for the sale of U.S. nuclear-powered submarines and sharing of nuclear-propulsion technology with Australia in response to China's growing power in the Indo-Pacific. Non-proliferation experts say sending submarines to Australia that use highly-enriched uranium could set a precedent for other countries to use the fuel. The low-enriched uranium fuel program seeks to meet "the stringent requirements for the power output, compact size, and long-life the U.S. Navy requires," said the NNSA report.

Non-proliferation experts say sending submarines to Australia that use highly-enriched uranium could set a precedent for other countries to use the fuel. The low-enriched uranium fuel program seeks to meet "the stringent requirements for the power output, compact size, and long-life the U.S. Navy requires," said the NNSA report.

The document concluded that "initial activities are the first steps on a long, costly path to fuel development and success is not assured." It also mentioned a 2016 report's findings that it could take over $1 billion to develop alternative fuel. The earlier report also said low-enriched fuel would negatively impact reactor endurance and ship costs and operational effectiveness. The 2022 report warned the costs could detract from higher-priority non-proliferation and naval propulsion research and development activities. Still, head of the NNSA Jill Hruby said in the document she was pleased with progress the program has made "in this technically challenging effort." NNSA did not immediately respond to questions about the documents.

Israel's long-range Arrow air defense system on Wednesday shot down a ballistic missile, fired by the Iran-backed Houthis in Yemen, over the Red Sea, the military said. The incident set off sirens in the southernmost city of Eilat, though the Israel Defense Forces said the surface-to-surface missile did not enter Israeli airspace.

Congress has given the program $100 million since 2016 but funding is in question after the subcommittee in the Republican-controlled House of Representatives this year voted to stop it. The Senate has approved funding and the two chambers are expected to work together to figure out any funding. ...

Source:https://wtvbam.com/2023/12/06/us-research-advances-on-alternative-to-bomb-grade-uranium-in-navy-vessels-documents/, 06 December 2023.

BALLISTIC MISSILE DEFENCE

ISRAEL

Eilat-Bound Missile Fired from Yemen, Intercepted by Arrow Over Red Sea

Israel's long-range Arrow air defense system on Wednesday shot down a ballistic missile, fired by the Iran-backed Houthis in Yemen, over the Red Sea, the military said. The incident set off sirens in the southernmost city of Eilat, though the Israel Defense Forces said the surface-to-surface missile did not enter Israeli airspace. "The target did not cross into Israeli territory, and did not pose a threat to civilians. The alert was activated according to protocol," the IDF said in a statement.

The Iran-backed rebel group later claimed responsibility for the attack, saying it fired a number of missiles at "military targets" in the Eilat area. The Houthis have fired several ballistic missiles and drones at Eilat since the beginning of the Israel-Hamas war in October, all of which were intercepted or missed their targets. Wednesday's Arrow interception was its fourth interception of a ballistic missile, all of which occurred amid the war in Gaza. Cruise missiles and drones launched by the Houthis in recent weeks have been taken out by Israeli fighter jets.

The Iran-backed Houthis, who seized Yemen's

capital Sanaa in 2014 and control large swaths of the country, are "part of the axis of resistance" against Israel along with Hamas — which is also sponsored by Tehran. Houthi rebels have expressed support for the Palestinians and threatened Israel amid the Israel-Hamas war. The Iranian-backed group's slogan is "Death to America, Death to Israel, Curse the Jews, Victory to Islam." Iran has warned repeatedly that Israel could face wider threats if it does not halt its war against Gazan terrorists, launched after Hamas's October 7 terrorist rampage through southern Israel. On Sunday, ballistic missiles fired by the Houthis struck three commercial ships in the Red Sea, while a US warship shot down three drones in self-defense during an hourlong assault, the US military said.

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In November, the Houthis seized a vehicle transport ship linked to Israel in the Red Sea off Yemen. The rebels still hold the vessel near the port city of Hodeida. Missiles also landed near another US warship last week after it assisted a vessel linked to Israel that had briefly been seized by gunmen. Meanwhile, Lebanon's Hezbollah, another Iran-backed group, has carried out daily attacks on northern Israel amid the Gaza war. The IDF said it had been shelling Hezbollah sites in southern Lebanon with artillery and tank fire. An IDF drone also hit a Hezbollah command room and another site belonging to the terror group, it said. Several rockets were fired at IDF posts along the border, the IDF said, with Hezbollah claiming responsibility for the attacks. Israel's northern border with Lebanon has heated up significantly since the Israel-Hamas war began on October 7, with Hezbollah seeking to tie down troops with a steady stream of low-level clashes and attacks.

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Since the cross-border exchanges began, six soldiers and three civilians have been killed on the Israeli side. According to an AFP tally, 107 people have been killed on the Lebanese side. The toll includes at least 14 civilians, three of them journalists. Hezbollah has said that 79 of its members have been killed since the war's outbreak in southern Lebanon. Israel launched its war on Hamas in Gaza after thousands of terrorists infiltrated into southern Israel on October 7, massacring some 1,200 people in Israel, mostly civilians, and taking some 240 hostages. Daily exchanges of fire and attacks, with Hezbollah, Hamas and other terror groups have raised fears of a broader conflagration.

Source: https://www.timesofisrael.com/apparent-eilat-bound-missile-fired-from-yemen-intercepted-by-arrow-over-red-sea/, 06 December 2023.

NUCLEAR ENERGY

BELGIUM

Belgium to Extend Life of Two Nuclear Power Plants

The Belgian Government has signed an agreement with French utility company Engie to extend the life of two of its nuclear power plants. The Tihange 3 and Doel 4 nuclear reactors were scheduled to be shut down in 2025, but in March 2022 the government initiated talks with Electrabel, the Belgian subsidiary of Engie, to extend the operation of the two reactors, enabling the retention of 2GW of power capacity until 2035.

Negotiations with Electrabel began in July 2022

and terms for the operation of the reactors for a further ten years were considered. After the signing of a non-binding agreement in January, the final and legally binding agreement has now been signed. The agreement confirms the commitment by both parties to implement Flexible Long-Term Operation, with an estimated investment of €1.6bn–2bn ($1.7bn–2.2bn) and a predicted restart date of November 2025.

After the signing of a non-binding agreement in January, the final and legally binding agreement has now been signed. The agreement confirms the commitment by both parties to implement Flexible Long-Term Operation, with an estimated investment of €1.6bn–2bn ($1.7bn–2.2bn) and a predicted restart date of November 2025.

A contract for difference mechanism will be used to cover renumeration for electricity generation, reducing the risk associated with investment. The strike price for the electricity output will be based on the cost of extending the operation of the nuclear units, which will be estimated by the Federal Agency for Nuclear Control. An initial cost will be set in 2025, and then updated in 2028 based on the actual cost of the extension to cover the period up to 2035. ...

Source: https://www.power-technology.com/news/belgium-agree-to-extend-life-of-two-nuclear-power-plants/?cf-view, 14 December 2023.

CHINA

Impressive Milestones Achieved on Chinese Advanced Nuclear Power Projects

China National Nuclear Corp. (CNNC) announced on Dec. 6 that China's independently developed high-temperature gas-cooled modular pebble bed (HTR-PM) reactor demonstrator had commenced commercial operation. The HTR-PM project was constructed at a site in Rongcheng, Shandong Province roughly midway between Beijing and Shanghai in eastern China. Touted as "the world's first commercially operational modular nuclear power plant with fourth-generation nuclear technology," the achievement marks an important milestone, transitioning the technology from experiments to the commercial market.

Construction of the pioneering project began in December 2012, led by China Huaneng (which holds a 47.5% stake in the demonstration), along with CNNC subsidiary China Nuclear Engineering Corp. (CNEC, 32.5%), and Tsinghua University's Institute of Nuclear and New Energy Technology (INET, 20%). Chinergy, a joint venture between Tsinghua and CNEC, served as the engineering, procurement, and construction contractor for the nuclear island. The HTR-PM features two small reactors, each with a capacity of 250 MWth. The reactors use helium as the coolant and graphite as the moderator. Each reactor is loaded with more than 400,000 spherical fuel elements, or pebbles, each 60 millimeters in diameter, which is roughly the size of a tennis ball. Each pebble contains about seven grams of uranium fuel enriched to 8.5%. Heat from the reactor produces steam in a steam generator. Tsinghua has reported helium temperatures at the reactor core inlet run about 250C, while outlet temperatures reach about 750C. Steam at 13.25 Megapascal (MPa) and 567C is produced at the steam generator outlet. The steam is used to drive a single steam turbine connected to a 210-MWe generator.

The reactors use helium as the coolant and graphite as the moderator. Each reactor is loaded with more than 400,000 spherical fuel elements, or pebbles, each 60 millimeters in diameter, which is roughly the size of a tennis ball. Each pebble contains about seven grams of uranium fuel enriched to 8.5%. Heat from the reactor produces steam in a steam generator. Tsinghua has reported helium temperatures at the reactor core inlet run about 250C, while outlet temperatures reach about 750C. Steam at 13.25 Megapascal (MPa) and 567C is produced at the steam generator outlet. The steam is used to drive a single steam turbine connected to a 210-MWe generator.

The demonstration project was first connected to

the grid on Dec. 20, 2021. Significant testing has been done since that time to validate operation and demonstrate acceptability. CNNC said the HTR-PM design has broad applications in various fields including power generation and combined heat and power. It noted advantages include high safety, power generation efficiency, and environmental adaptability. Tsinghua has said more than 30 years of continuous research, conducted by hundreds of Tsinghua scientists, has gone into the project. Developers stepped from the basic research of key technologies, to a 10-MW experimental reactor (HTR-10) built at an INET site, and finally to the demonstration project that is now in commercial operation at Shidaowan. Notably, Tsinghua said 93.4% of the equipment used in the final HTR-PM project was manufactured domestically.

Linglong One SMR Milestone: Meanwhile, China also is leading the nuclear industry forward with construction of the world's first multipurpose small modular reactor (SMR) demonstration project, known as Linglong One. The unit is sited in southern China on the island of Hainan. In November, CNNC announced the top head of the steel containment vessel for the unit was hoisted into place, signaling commencement of the peak phase of internal installation. The Linglong One project began construction at the Changjiang Nuclear Power Plant on July 13, 2021. Linglong One, also known as the ACP100 design, is a multipurpose pressurized water reactor design developed by CNNC following more than 10 years of independent research and development. CNNC has called it "another significant achievement of independent innovation after Hualong One, CNNC's third-generation nuclear power technology."

In 2016, the Linglong One design became the first SMR to pass a safety review by the IAEA. Each Linglong One unit has a generating capacity of 125 MW. The demonstration project is wholly owned by CNNC's China National Nuclear Power. CNNC has said the design and construction of Linglong One are revolutionary and groundbreaking. Modular construction is its most prominent feature. On Aug. 10 this year, the core module of the Linglong One reactor was lifted and placed in the nuclear island. The pressure vessel, evaporator, and other key equipment were installed in one step. Through standardized design, single module production, and mass production, the construction period is shortened and costs reduced, while improving safety, the company said. The small size and simplified system make the SMR convenient for transportation and operation. In addition to generating electricity, CNNC said the Linglong One can also be used for seawater desalination, and heating or cooling, among other useful purposes. The company envisions it serving as self-contained energy sources for parks, islands, mining areas, and high-energy-consuming enterprises.

COP28 might be remembered as the "nuclear COP." More than 20 countries including the U.S., France, Japan and the United Kingdom have pledged to triple global nuclear energy generation by 2050 at the launch of COP28 in Dubai in the United Arab Emirates, the world's annual climate summit. John Kerry, former U.S. secretary of state and President Biden's climate envoy, made the case for nuclear energy during the event's launch ceremonies, saying that the science has proven "you can't get to net-zero 2050 without some nuclear.

Source: https://www.powermag.com/impressive-milestones-achieved-on-chinese-advanced-nuclear-power-projects/, 07 December 2023.

GENERAL

20-Plus Countries Pledge to Triple the World's Nuclear Energy by 2050

COP28 might be remembered as the "nuclear COP." More than 20 countries including the U.S., France, Japan and the United Kingdom have pledged to triple global nuclear energy generation by 2050 at the launch of COP28 in Dubai in the United Arab Emirates, the world's annual climate summit. John Kerry, former U.S. secretary of state

and President Biden's climate envoy, made the case for nuclear energy during the event's launch ceremonies, saying that the science has proven "you can't get to net-zero 2050 without some nuclear." While there are important methane, climate-finance and environmental-justice initiatives being hammered out at the conference, the nuclear goal stands out as a bit of a policy departure compared to previous COP meetings.

Nuclear has received little attention at past COPs due to its cost challenges and lingering controversies surrounding its safety and other issues. There's another reason for this being considered the nuclear COP: The United Arab Emirates, COP28's host, is on the verge of completing the second nuclear facility in the Middle East, which will provide one-quarter of the country's electricity. Construction on the power plant began in 2012, and the last of its four 1.4-gigawatt reactors at the Barakah Nuclear Energy Plant has just received its operating license from regulators. The leaders spearheading COP28's ramped-up nuclear targets are heeding the prescriptions set forth in many major climate-change models, including the International Energy Agency's, which call for massive growth in global nuclear energy capacity in order to have a chance of meeting net-zero goals and keeping global warming in check. (However, there are certainly opposing models showing a path to zero emissions without a significant scale-up of nuclear power.) Today's global fleet of approximately 440 nuclear reactors has a combined capacity of around 400 gigawatts — enough that nuclear energy provides about 10 percent of the world's power. But less than a paltry 4 gigawatts of nuclear energy has been connected to the grid in 2023. The global solar industry is forecast to install more than 400 gigawatts of capacity in 2023 alone.

The goal of tripling the world's nuclear output would require deploying an average of 40 gigawatts of nuclear power every year through 2050, according to the World Nuclear Association. ...The COP28 declaration includes language about nuclear's contribution in keeping a 1.5°C limit on temperature rise within reach and its energy-security benefits, as well as the claim that paring down the world's nuclear power would make reaching net zero more difficult and costly. Nuclear's potential role in hard-to-abate sectors such as hydrogen production and petrochemical processing is also highlighted. The pledge also asks the signees to consider smaller and more innovative reactor designs in their grid planning and makes an appeal that they continue to maintain the existing reactor fleet, extending its lifetime if feasible and safe.

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Over the past few decades, the hefty price tag of building nuclear plants has been the industry's Achilles' heel. This poses particular challenges in market-based economies, where periods of high interest rates and inflation threaten the viability of mega projects, be they offshore wind, high-speed rail — or nuclear reactors. Importantly, the COP28 declaration looks to address some of these financial flaws and invites the World Bank and other regional and international banks to include nuclear energy in their lending policies. Ironically absent from the pool of signees is China, the only country with any real chance of meeting the COP goal. China aims to double its nuclear energy capacity by 2035 and is well on its way; as of this year, 22 nuclear plants are under construction in China with more than 70 planned.

But while the U.S. saw its first newly built nuclear reactor in decades reach commercial operation this year in Vogtle 3 and could see Vogtle 4 go online next year, you'd be hard-pressed to find an American nuclear expert willing to predict

when the next reactor will be up and running. Confronting climate change requires bold, large-scale action — and tripling nuclear generation certainly qualifies in that regard. But before overestimating the influence or significance of the COP28 nuclear pledge, I would challenge you to name COP27's or COP26's theme. Still, government agencies such as the U.S. Office of Nuclear Energy and a growing team of young influencers are understandably enthusiastic about nuclear's spotlight and the aspirational growth targets unveiled at COP28. Perhaps the emphasis on nuclear at this year's meeting reinforces the idea that we're in the midst of a generational shift in sentiment about atomic power.

Source: https://www.canarymedia.com/articles/nuclear/20-plus-countries-pledge-to-triple-the-worlds-nuclear-energy-by-2050, 05 December 2023.

MOROCCO

Morocco Charts its Path to Peaceful Nuclear Energy

The Director General of the IAEA, Grossi, announced that "Morocco is one of the next 13 future countries to produce nuclear energy as a source of electricity generation". In his remarks on the sidelines of the World Nuclear Fair in Paris, Grossi pointed out that it is necessary to double the number of nuclear reactors, currently around 400 in the world, in order to facilitate the implementation of the recommendations of the Paris Climate Agreement. "Currently 10 countries are in the decision-making stage for the construction of nuclear power plants and 17 others are in the evaluation phase, but 12 to 13 new nuclear powers will emerge in a few years' time," he added.

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With economic ambition matched by political will, **Morocco is moving steadily towards joining the group of peaceful nuclear powers.** Having launched major investments in solar and wind energy, as well as in the production of green hydrogen, the North African country aims to meet clean energy needs away from polluting fossil sources, as part of its commitment to reduce environmental pollution. In this regard, **international reports confirm Morocco's serious and responsible intention to engage in intensive cooperation with a view to strengthening its nuclear potential,** both in terms of safety and technology. Indeed, the Kingdom of Morocco is expected to make practical progress towards the construction of a possible Moroccan nuclear reactor after 2030.

This is because Morocco has considerable phosphate resources (70% of the world's phosphate) from which uranium is extracted, as well as being at the forefront in terms of global reserves of natural resources. This represents a major boost for Morocco in its move towards nuclear energy.

This is because Morocco has considerable phosphate resources (70% of the world's phosphate) from which uranium is extracted, as well as being at the forefront in terms of global reserves of natural resources. This represents a major boost for Morocco in its move towards nuclear energy. Morocco's choice for nuclear energy is not a newly made decision, but **since 2014, Rabat has started preparing the legal basis for the use of nuclear energy, gathering expertise and assessing its capacity to achieve this ambition.**

Addressing the House of Representatives last June, **Morocco's Minister of Energy Transition and Sustainable Development, Leila Benali, reported that "the Ministry had conducted an assessment of the use of nuclear energy in**

electricity production, which had begun in 2015", preparing a report this year on the subject to give effect to the assessment's recommendations. Benali deduced that, **"following Morocco's significant investment in renewable energy, it is time to move towards nuclear energy, in which it accumulated a considerable knowledge and experience base, as part of preparations for a national decision on electricity production using nuclear energy".**

In October 2022, **Morocco concluded an agreement with Russia on cooperation in the use of nuclear energy signed by the Russian state nuclear energy company Rosatom.** Under this agreement, Russia assists Morocco in establishing and improving nuclear energy infrastructure; as well as designing and building nuclear reactors. The Russian company accompanies Morocco in the exploration and development of uranium deposits, the study of the country's mineral resources and the training of personnel working in nuclear power plants. **The agreement with Rosatom does not aim to build a nuclear power plant, but rather an experimental nuclear reactor similar to the pre-existing one on Moroccan territory in the Maamora forest.**

Morocco 'will never give up the option of switching to nuclear energy'. Morocco's interest in the nuclear option is not limited to renewable energies, but also touches on seawater desalination. Indeed, after signing an agreement last July with a Moroccan company, Rosatom is helping to implement seawater desalination projects, adopting nuclear energy for peaceful purposes, in order to contribute to the realisation of Morocco's plan to provide 1.3 billion cubic metres of water per year.

According to Moroccan experts, Morocco 'will never give up the option of switching to nuclear energy'. **Morocco's interest in the nuclear option is not limited to renewable energies, but also touches on seawater desalination.** Indeed, after signing an agreement last July with a Moroccan company, Rosatom is helping to implement seawater desalination projects, adopting nuclear energy for peaceful purposes, in order to contribute to the realisation of Morocco's plan to provide 1.3 billion cubic metres of water per year. **Morocco is committed to the peaceful use of nuclear energy.** In this regard, Morocco's permanent ambassador to the United Nations, Omar Hilale, warned of the dangers posed by gaps in the codification of nuclear law, given the complex challenges prevailing in a world characterised by wars, regional crises, climate change and delays in the implementation of the 2030 development agenda.

Morocco can diversify energy sources by adopting an energy mix that incorporates nuclear energy, being an essential source of energy"; stressing that "the stake will be substantial in the next 30 to 40 years, as 80% of global electricity must have a reduced carbon footprint, compared to 32% marked at present, to ensure greater effectiveness in the fight against climate change.

For his part, **Khammar Murabet, former director general of the Moroccan Agency for Nuclear and Radiological Safety, explained that "Morocco can diversify energy sources by adopting an energy mix that incorporates nuclear energy, being an essential source of energy";** stressing that "the stake will be substantial in the next 30 to 40 years, as 80% of global electricity must have a reduced carbon footprint, compared to 32% marked at present, to ensure greater effectiveness in the fight against climate change. Responding to an invitation from the IAEA, **in his capacity as Chairman of the Committee on Disarmament and International Security (First Committee) of the current 76th session of the United Nations General Assembly, Hilale took part in the panel discussion on 'Non-proliferation and peaceful uses of nuclear energy'.** The Moroccan diplomat stressed that "non-compliance with the decisions of existing

nuclear law would lead to the failure of the current legal arsenal and would probably fuel illicit aspirations through an increased risk of illicit use of nuclear energy, the creation of new sources of nuclear weapons and the proliferation of possible regional or even international crises".

In the same vein, Hilale highlighted the implementation of several international nuclear security initiatives, such as the Proliferation Security Initiative, the Nuclear Security Summits or the Global Initiative to Combat Nuclear Terrorism, launched in Morocco in 2006. Morocco, as a founding partner of the Global Initiative to Combat Nuclear Terrorism, has actively contributed to this initiative, including the adoption of the Declaration of Principles and its work as coordinator of the Implementation and Evaluation Group of the Action Group on Response and Mitigation, 2019-2021.

Saudi Arabia's nuclear research reactor is almost complete and the IAEA is discussing the necessary inspections with Riyadh, the head of the U.N. watchdog said. Rafael Mariano Grossi said Argentine company Invap, which built the reactor, has finished the fuel and is going to ship it to Saudi Arabia.

Saudi Energy Minister Prince Abdulaziz bin Salman said in September the kingdom has decided to end light-touch oversight of its nuclear activities by the U.N. atomic watchdog and switch to full-blown safeguards, a change the agency has been demanding for years.

Source: https://www.atalayar.com/en/articulo/economy-and-business/morocco-charts-its-path-to-peaceful-nuclear-energy/20231130133550194313. html, 30 November 2023.

SAUDI ARABIA

IAEA Chief Says Saudi Research Reactor Almost Complete

Saudi Arabia's nuclear research reactor is almost complete and the IAEA is discussing the necessary inspections with Riyadh, the head of the U.N. watchdog said. Rafael Mariano Grossi said Argentine company Invap, which built the reactor, has finished the fuel and is going to ship it to Saudi Arabia. "Of course there are a few regulatory aspects that need to be taken care of because from the moment Saudi has a research reactor, we will have to have a comprehensive safeguards agreement in place," Grossi said, adding that Riyadh is getting close to signing an updated IAEA agreement from 2015.

Saudi Energy Minister Prince Abdulaziz bin Salman said in September the kingdom has decided to end light-touch oversight of its nuclear activities by the U.N. atomic watchdog and switch to full-blown safeguards, a change the agency has been demanding for years. "I hope to be discussing with him (the Saudi energy minister) now so when we have the nuclear material here there will be the necessary inspections by the IAEA," Grossi told reporters during a visit to Riyadh. Asked when the fuel will arrive in Saudi Arabia, Grossi said: "It's a decision by the Saudis... From a technical point of view, what I understand from the Argentine company is that they are ready."

Saudi Arabia has a nascent nuclear programme that it wants to expand to eventually include activities like proliferation-sensitive uranium enrichment. It is unclear where its ambitions end, since Crown Prince Mohammed bin Salman has said for years it will develop nuclear weapons if regional rival Iran does. The IAEA is giving the kingdom "the advice that is necessary and indicating what is required from the inspection point of view from safeguards because these are sensitive technologies," he said.

Source: Pesha Magid, https://www.reuters.com/business/energy/iaea-chief-says-saudi-research-reactor-almost-complete-2023-12-13/, 13 December 2023.

UK

UK Regulators Begin Assessment of Holtec SMR

Generic Design Assessment (GDA) is a process carried out by the ONR, the Environment Agency and Natural Resources Wales to assess the safety,

security, and environmental protection aspects of a nuclear power plant design that is intended to be deployed in Great Britain. Successful completion of the GDA culminates in the issue of a Design Acceptance Confirmation from the ONR and a Statement of Design Acceptability from the Environment Agency. In May 2021, the UK's Department for Business, Energy and Industrial Strategy opened the GDA process to advanced nuclear technologies, including SMRs.

Holtec has been developing its SMR unit since 2011. The SMR-300 is a pressurised water reactor producing around 300 MW of electrical power or 1050 MW of thermal power for process applications, and the company says it has undergone several design evolutions, the most recent of which is the incorporation of forced flow capability overlayed on gravity-driven flow in the plant's primary system.

Following its readiness review of Holtec's application, the department concluded that the design was ready to enter the GDA process. "The GDA assessment will look to actively explore opportunities to maximise the value of international regulatory collaboration and identify efficiencies in processes," ONR said. Holtec has been developing its SMR unit since 2011. The SMR-300 is a pressurised water reactor producing around 300 MW of electrical power or 1050 MW of thermal power for process applications, and the company says it has undergone several design evolutions, the most recent of which is the incorporation of forced flow capability overlayed on gravity-driven flow in the plant's primary system. Holtec noted the UK government has awarded its UK subsidiary, Holtec Britain, GBP30 million (USD37.7 million) of grant funding from the Future Nuclear Enabling Fund for Holtec to complete Steps 1 and 2 of the GDA. "The application exceeded the quality thresholds across all four assessment criteria and successfully completed the department's due diligence and governance approvals processes," the Department for Energy Security and Net Zero said.

Holtec is participating in the Great British Nuclear SMR competition, where the UK government's ambition is to announce in 2024, which companies the government will support for technology deployment. Holtec said it is planning a large expansion in the region should Holtec be successful in the Great British Nuclear competition, "locating a factory to build the major mechanical SMR components and other aligned areas of business (clean energy and defence) to support deployment of 5 GW+ of on-grid UK electricity by 2050".

"Holtec looks forward to putting our advanced pressurised water reactor, designed with inherent safety, through the scrutiny of the UK regulators ... while continuing our ongoing pre-application dialogue with the US Nuclear Regulatory Commission and other regulators in parallel," the company said. UK Minister for Nuclear Andrew Bowie said: "As the government that revitalised the UK nuclear industry, committing public funds to nuclear for the first time in a generation, we're rapidly expanding our nuclear power capacity to move towards a cleaner energy mix and help deliver net-zero. Today's news represents a multi-million investment to develop cutting-edge technology which could transform how power stations are built by making construction faster and cheaper." Holtec is participating in the Great British Nuclear SMR competition, where the UK government's ambition is to announce in 2024, which companies the government will support for technology deployment. Holtec said it is planning a large expansion in the region should Holtec be successful in the Great British Nuclear competition, "locating a factory to build the major mechanical SMR components and other aligned areas of business (clean energy and defence) to support deployment of 5 GW+ of on-grid UK electricity by 2050".

Source: https://www.world-nuclear-news.org/Articles/UK-regulators-begin-assessment-of-Holtec-SMR, 07 December 2023.

USA

US Approves a Non-Water-Cooled Nuclear Reactor

The U.S. Nuclear Regulatory Commission has issued a construction permit for a new nuclear test reactor to be built in Oak Ridge, Tennessee. Kairos Power, the California company developing the Hermes demonstration reactor, says it's the first non-water-cooled reactor to be approved for construction in the U.S. in over 50 years. Construction of the 35-megawatt thermal reactor, which uses molten salt to cool the reactor core, at the Heritage Center Industrial Park is expected to begin next year.

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The Oak Ridge National Laboratory and the Tennessee Valley Authority, are "collaborators" on the project, which has been paid for "nearly exclusively" through private investment, the company says, though the project has also been selected for $303 million in Department of Energy funding.

In a statement the TVA said it has been partnering with Kairos for several years to provide its "expertise in engineering, operations and licensing support" to Kairos. The Hermes reactor will be just a few miles from TVA's Clinch River Nuclear site. "With the Hermes construction permit now approved, Kairos Power is demonstrating our leadership in developing advanced nuclear reactors and we have made a big step forward on our path to deploying clean, safe, reliable, and affordable energy in East Tennessee and beyond," said Mike Laufer, Kairos Power co-founder and CEO, in a statement.

A separate application to the NRC for an operating license will have to be approved before Kairos Power can operate the demonstration reactor, the NRC said. Across the country, private developers, policymakers and utilities are exploring options for advanced reactors and small modular reactors to maintain reliability in a decarbonizing grid, power hydrogen production, replace jobs and tax revenue in struggling towns where coal power plants are closing and bring zero-emissions electricity to remote areas of the globe.

But new nuclear power has been infamously expensive and difficult to build in the United States over the past several decades, and one of the more celebrated advanced reactor projects, NuScale's Carbon Free Power Project, was recently canceled as costs climbed and subscribers pulled out.

Source: Robert Zullo, https://sourcenm.com/2023/12/15/us-approves-a-non-water-cooled-nuclear-reactor/, 15 December 2023.

The US Nuclear Fusion Strategy

According to a report by Reuters, the US is set to announce its strategy on nuclear fusion at the upcoming UN summit on climate change, COP28. After decades of federal investment, the US is looking to transform nuclear fusion from an experiment into a climate solution. By focusing on the development and innovation of supermagnets for producing magnetic fields capable of containing plasma, the US aims to commercial fusion technology as quickly as possible. Creating fusion energy requires strong magnetic fields to confine and control the extremely hot hydrogen fuel, which can become a plasma several times hotter than the sun (around 5,500 degrees C). Therefore, the

US is set to announce its strategy on nuclear fusion at the upcoming UN summit on climate change, COP28. After decades of federal investment, the US is looking to transform nuclear fusion from an experiment into a climate solution. By focusing on the development and innovation of supermagnets for producing magnetic fields capable of containing plasma, the US aims to commercial fusion technology as quickly as possible.

development of supermagnets capable of producing immense magnetic fields is necessary if commercialisation of nuclear fusion is going to be realised.

By targeting fast commercialisation of fusion technology, the US aims to develop a framework for deploying fusion technology globally, if support from international partners can be secured. However, despite progress being made, significant R&D will still be required before fusion technology is rolled out. For instance, a recent experiment conducted at the US National Ignition Facility generated only 0.5% of the energy that was put into powering the lasers used in the fusion reactor. Furthermore, reactors have hitherto achieved fusion for only a few seconds, while it is necessary that the fusion process is maintained steadily for longer periods of time for commercial-scale power generation.

Nuclear fusion has long been looked to as a potential source of clean energy. A major environmental concern related to nuclear power is the creation of radioactive waste, which can remain radioactive and dangerous to human health for thousands of years. However, unlike nuclear fission (the splitting of large atoms, such as uranium, into smaller atoms), nuclear fusion (the fusing of hydrogen atoms to form helium atoms) does not create any long-lived radioactive nuclear waste. For this reason, and for its potential to produce vast amounts of energy, nuclear fusion has the potential to greatly help mankind tackle climate change.

Source: https://www.mondaq.com/unitedstates/energy-law/1395122/the-united-states-nuclear-fusion-strategy, 28 November 2023.

US and Allies to Triple Nuclear Energy Capacity by 2050

Although tripling their nuclear energy output will go a long way in helping Europe become more energy independent, it's likely to come at a heavy price. Consider that in the majority of advanced economies, home to nearly 70 percent of global nuclear capacity, investment in nuclear energy has mostly stalled thanks to massive cost overruns, incessant project delays as well as never-ending public opposition. Indeed, all 31 nuclear power plants that have been constructed since 2017 belong to China and Russia.

But the leaders attending the climate summit are confident they can overcome these hurdles. John Kerry, President Biden's climate envoy, says there are "trillions of dollars" available that could be used for investment in nuclear energy. "We are not making the argument to anybody that this is absolutely going to be the sweeping alternative to every other energy source — no, that's not what brings us here. But you can't get to net-zero 2050 without some nuclear power," he told reporters. France's President Macron has said that nuclear energy, including small modular reactors, is an "indispensable solution" in the fight against climate change. France is Europe's largest nuclear power producer, deriving ~70 percent of its electricity from nuclear stations. But not everybody is buying that nuclear renaissance thesis. Masayoshi Iyoda, an activist from Japan with 350.org, says that nuclear power is a dangerous distraction from decarbonization goals, "It is simply too costly, too risky, too undemocratic, and too time-consuming. We already have cheaper, safer, democratic, and faster solutions to the climate crisis, and they are renewable energy and energy efficiency," he has said in a statement, citing the Fukushima nuclear accident.

NuScale Power Corporation, a developer of modular light water reactor nuclear reactors, has been forced to terminate the Carbon Free Power Project with Utah Associated Municipal Power Systems (UAMPS) thanks to high costs and low interest by end users. The plan was to build a novel nuclear power plant comprising six SMRs, each generating 77 MW. But the project fell apart after prospective customers for its electricity backed out and costs more than doubled to $9.3 billion.

First SMR Launch Tanks: Unfortunately, it appears that nuclear power, including the small modular reactors Macron has alluded to, is not about to become an easy sell. NuScale Power Corporation, a developer of modular light water reactor nuclear reactors, has been forced to terminate the Carbon Free Power Project with Utah Associated Municipal

Power Systems (UAMPS) thanks to high costs and low interest by end users. The plan was to build a novel nuclear power plant comprising six SMRs, each generating 77 MW. But the project fell apart after prospective customers for its electricity backed out and costs more than doubled to $9.3 billion.

The cancellation has come even after the Department of Energy, in 2020, approved $1.35 billion over 10 years for the plant. NuScale was the first U.S. company to secure regulatory approval for modular reactors. As you might expect, the critics have wasted no time coming out of the woodworks. "The termination of NuScale's contract signals the broader challenges of developing nuclear energy in the US. Placing excessive reliance on untested technologies without adequate consideration of economic viability, practicality, and safety concerns is irresponsible and clearly won't work, "Edwin Lyman, director of nuclear power safety at the Union of Concerned Scientists, has told Reuters.

Short-seller Iceberg Research has followed up last month's negative report with a new, even more damning report saying the company's Standard Power contract is "a pipe dream that was designed to divert attention from the loss of UAMPS." Iceberg claims NuScale has touted Standard Power as a credible partner because its investors comprise "ultra high net worth family offices and financial institutions [with] access to capital in excess of $10B." However, the short seller remains skeptical because of Standard Power's small size as well as the lack of identification among its investors. Further, Iceberg has faulted NuScale management's claims to having a solid balance sheet, with $197M of cash and no debt at the end of Q3, saying this overlooks the company's $153M cash burn during the last 12 months and does not take into account the hit to its books by the UAMPS contract termination, which adds ~$63M in liabilities. Iceberg estimates NuScale has a mere 11-19 month cash runway.

SMRs have been touted as the nuclear reactors of the future thanks mainly to their smaller footprint which allows them to be sited on locations not suitable for larger nuclear power plants. Prefabricated SMR units (similar to NuScale's) can be manufactured, shipped and installed on site, making them several times cheaper to build than large power reactors.

Full-Size Mock up Of NuScale's SMR: SMRs have been touted as the nuclear reactors of the future thanks mainly to their smaller footprint which allows them to be sited on locations not suitable for larger nuclear power plants. Prefabricated SMR units (similar to NuScale's) can be manufactured, shipped and installed on site, making them several times cheaper to build than large power reactors. Additionally, they can be deployed incrementally to match increasing power demand. Another key advantage: SMRs can be refueled every 3 to 7 years compared to between 1 and 2 years required for conventional nuclear plants.

Source: https://oilprice.com/Alternative-Energy/Nuclear-Power/United-States-And-Allies-To-Triple-Nuclear-Energy-Capacity-By-2050.html, 04 December 2023.

NUCLEAR COOPERATION

INDIA–USA

US Must Ease Tech Controls, Support Indian Nuke Deterrent: Ashley J Tellis

Ashley J Tellis, a former US official closely involved with the India-US civil nuclear agreement and a top American strategic affairs expert, has said that to meet the vision embedded in the agreement, India must clarify its civil nuclear liability legal framework either through an amendment or by specifying liability limits in commercial agreements or a broad inter-governmental agreement. For its part, the US must drop its "absurd" and "maniacal" tech controls regime that is born out of concerns over India's nuclear weapons programme and open doors for tech transfers to India in a range of domains, Tellis has said. In a paper for Carnegie Endowment for International Peace, Tellis, who is the Tata chair for strategic affairs at the think tank, has also outlined the strategic logic of deeper nuclear cooperation.

Discussions on civil nuclear issues have acquired renewed momentum under the Joe Biden

administration, with Biden, who as chair of the Senate Foreign Relations Committee played a key role in pushing the deal through the US Congress, keen on seeing the American nuclear industry win benefits that it hoped for.

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During Prime Minister Modi's state visit to Washington DC in June, and then during Biden's visit to Delhi in September, both countries, in joint statements, referred to "intensified consultations" between relevant entities on both sides to expand opportunities for "facilitating" bilateral collaboration in nuclear energy, "including in the development of next-generation small modular reactor technologies in a collaborative mode". The US administration is understood to have consulted Tellis on the subject and how to take the nuclear story forward.

India and US agreed on civil nuclear cooperation in 2005 and finalised it in 2008, largely due to then-President Bush's commitment to overcoming the structural barriers that had inhibited the strategic relationship between the two countries, with an eye on China's rising power. The agreement saw India agree to a separation of civil and military nuclear reactors and open up the former for international inspections, and in return, without being a signatory to the NPT, the US helped India's entry into the club of nuclear-haves by changing both international legal regime and its own domestic legislation and opening the doors for cooperation in the domain of nuclear commerce.

India's nuclear liability law — the Civil Liability for Nuclear Damage Act (CLNDA) — thus made the country an outlier in the realm of international nuclear commerce," Tellis has written, adding that it also complicated foreign efforts to supply advanced nuclear reactors. Tellis acknowledged that India sought to create "work-arounds" on the issue.

Prescription for India: Tellis noted in his paper that the Manmohan Singh government had "consciously" set to make international and domestic private sector participation in the nuclear industry possible by enacting a nuclear liability legislation consistent with international standards as codified in the Convention on Supplementary Compensation for Nuclear Damage (CSC). This convention imposes burdens imposed in the case of any nuclear accident on nuclear plant operators rather than suppliers. But an unrelated Supreme Court judgment around the same time on the Bhopal Gas tragedy reminded Indian body politic of the "ghastly tragedy", Tellis argued, making Singh's proposed legislation hard to enact. The BJP too, at that point, strongly opposed the original legislation.

As a result, Tellis claimed, a "convoluted" law was passed that accepted the nuclear plant operator's liability in principle, but also bestowed on it the right to seek "legal recourse against suppliers for defective products or technology". "India's nuclear liability law — the Civil Liability for Nuclear Damage Act (CLNDA) — thus made the country an outlier in the realm of international nuclear commerce," Tellis has written, adding that it also complicated foreign efforts to supply advanced nuclear reactors. Tellis acknowledged that India sought to create "work-arounds" on the issue. "These have included providing government clarifications to the textual ambiguities, defining the limits of a supplier's liability in specific financial terms, and committing to create an insurance pool to limit the supplier's risks in case of an accident." But these, he noted, had proved to be inadequate and claimed that most private companies were unlikely to "embrace the Indian nuclear market" until the issue was resolved. But the imperatives of "energy security, climate adaptation and geopolitical interests" have led to India keeping the nuclear option alive, with India importing reactors from Russia and pursuing negotiations with French and US companies.

Tellis then offers three possible solutions. The first, and "cleanest", option would be to amend the law by "channeling all liability in case of a nuclear accident solely to the operator", with the operator relying on an insurance pool. But this option, Tellis acknowledged, is unlikely before the next Indian general elections. The second option is documenting liability ceilings "into commercial contracts with nuclear suppliers" as a way to assuage their fears about open-ended liability. Tellis said that the final "perhaps least satisfying" fallback solution was an "intergovernmental agreement" that confirms the "limited liability" of foreign private companies.

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Prescription for US: Tellis also, however, said the US administration had a "bigger and more consequential" task of "addressing the issue of India's nuclear weapons programme in US grand strategy". He noted that US interests are best served by the "existence of strong power centers on China's periphery" and India's value stemmed from its ability to stand up to China independently, which was why the Bush administration and successive US administrations had been committed to enhancing Indian capabilities and power. "The ultimate bedrock of India's ability to constrain Chinese assertiveness derived from its nuclear weapons."

Given China's rise and expansion of its nuclear arsenal, there was even more reason, Tellis said, to consider Indian nuclear weapons as an asset to maintain the current balance of power. It was therefore in the US interest to increase the "effectiveness" of the Indian "nuclear deterrent.

Given China's rise and expansion of its nuclear arsenal, there was even more reason, Tellis said, to consider Indian nuclear weapons as an asset to maintain the current balance of power. It was therefore in the US interest to increase the "effectiveness" of the Indian "nuclear deterrent". The NPT makes this difficult, but this, Tellis has suggested, does not mean that the US can't help India improve its own strategic capabilities. This is where the "thicket of US export controls and end-user verifications" posed a challenge, for they are premised on the denial of any technology, expansively defined, with even tenuous connections to the Indian nuclear weapons programme and its delivery systems.

This has meant, Tellis noted, that India has been denied export licenses in other areas too. While there have been recent initiatives, including a bilateral Strategic Trade Dialogue to deal with the issue of export controls, Tellis acknowledged that there is "bitterness" in India at how the US "talks a big game" about supporting India but this doesn't translate it into licensing practices. The persistence of this denial regime will also hamper cooperation in newer emerging and critical technologies between the two countries, a stated policy aim.

In the paper, Tellis has termed this US denial, almost two decades after the nuclear deal, "absurd". "Washington's obligations to NPT do not require such a maniacal control regime as far as India is concerned.... The inherited non-proliferation rules and how they are implemented not only prevent India from incurring the full benefits of...the original civil nuclear agreement but, even more importantly, subvert the overarching objective that drove its negotiation: assisting India's ascendancy to create the Asian multipolarity that balances China's rise." It was time, Tellis argued, for the US executive to revise its rules that made India's nuclear weapons programme an obstacle in tech cooperation.

Source: https://www.hindustantimes.com/india-news/us-must-ease-tech-controls-support-indian-nuke-deterrent-ashley-j-tellis-101701141687985.html, 28 November 2023.

OPEC–IAEA

IAEA and OPEC Fund to Strengthen Cooperation in Climate Adaptation

The IAEA and the OPEC Fund for International Development (OPEC Fund) have formally agreed to strengthen joint efforts in the area of nuclear science and technology for climate adaption and mitigation. On the margins of this year's United Nations Climate Change Conference (COP28), IAEA Director General Grossi and OPEC Fund Director General Abdulhamid Alkhalifa signed Practical Arrangements on Cooperation in the Area of Climate Adaptation to enhance collaborative efforts by both entities to develop and implement joint projects on climate adaptation.

Under the framework of the agreement, the OPEC Fund will support the establishment of a global seed bank to collect, store, and preserve seeds that have characteristics that can withstand new climate conditions, including seeds developed through application of nuclear techniques for plant breeding and soil and water management. The IAEA provides expertise and assistance in the application of nuclear techniques in these areas supporting climate-smart agriculture. By using nuclear techniques, such as plant mutation breeding, scientists can accelerate the natural evolution of plants using irradiation of seeds to help create new varieties with desirable traits adapted to climate change. Seed banks ensure these new varieties can be used in areas where crops are battling the effects of climate change throughout the globe.

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The IAEA and the OPEC Fund have been collaborating since 1989, and the OPEC Fund has already provided more than 2.4 million dollars to IAEA activities in the fields of health and agriculture. Most recently, the IAEA worked with the OPEC Fund in 2018 to help improve rice harvests in Bangladesh, Cambodia, Lao PDR and Nepal, and to help prevent the spread of animal diseases through capacity building in Cambodia, Lao PDR, Myanmar and Vietnam.

Source: https://www. iaea.org/newscenter/pressreleases/iaea-and-opec-fund-to-strengthen-cooperation-in-climate-adaptation, 08 December 2023.

SOUTH KOREA–AFRICA

South Korea Lays Groundwork for African Nuclear Push

Nuclear energy companies from South Korea are lining up to win business from Africa as governments on the continent consider the suitability of nuclear power for meeting their long-term energy needs. South Korean utility Korean Hydro & Nuclear Power (KHNP) presented its i-SMR technology at COP28, which it says should receive standard design approval by 2028. The firm signed a memorandum of understanding with the Ugandan government earlier this year, while the company's CEO Jooho Whang gave a keynote address to a nuclear conference in Kampala.

Bum-Jin Chung, president of the Korea Nuclear Society, says that Hwang's visit to Uganda represents a "solid signal" that the company is serious about advancing its plans in the country. He notes that Uganda's power system is not yet ready to absorb the quantity of electricity delivered by a large-scale reactor, but says that by 2040, when power demand will have more than doubled, nuclear energy will be highly attractive.

"Nuclear power will be the cheapest option," he says, noting the advantages of nuclear in providing a stable source of baseload power. "Nuclear power is very expensive in terms of the initial investment," he admits, but adds that "once it is, once it is built, then the operating and

maintenance costs is very cheap". South Korea itself has relied heavily on nuclear power to enable its own industrial growth. The country is the world's fifth-largest producer of nuclear energy and has undertaken a major export drive in recent years. Several Korean companies, including KHNP and the KEPCO, were part of a consortium that constructed the UAE's first nuclear power station, which began operating in 2020.

As the world attempts to fight climate change while increasing energy access, the nuclear option is on the agenda. More than 20 governments worldwide, including Ghana, signed a pledge at COP28 earlier this week to triple nuclear energy generation capacity by 2050. Only one nuclear power plant, in South Africa, is currently operational on the continent.

Nuclear Links: As the world attempts to fight climate change while increasing energy access, the nuclear option is on the agenda. More than 20 governments worldwide, including Ghana, signed a pledge at COP28 earlier this week to triple nuclear energy generation capacity by 2050. Only one nuclear power plant, in South Africa, is currently operational on the continent. But a second facility is under construction in Egypt and several other African countries, including Ghana, Uganda and Nigeria, have shown serious interest in joining the nuclear club.

South Korean companies face intense competition for a slice of the African nuclear market. Russia's state-owned Rosatom has already building Egypt's El Dabaa nuclear power plant and has forged links with multiple African governments. Rosatom, along with its Chinese counterparts, is often able to provide a package deal that includes financing to make its offer more attractive to governments.

Multiple obstacles need to be overcome before nuclear power can be deployed more widely in Africa. Many critics are unconvinced that nuclear will ever be a viable option for most African countries, given the massive costs and lengthy construction periods needed for large-scale reactors. Environmental and security risks are also major concerns. Chung says that the grids of most African countries are not ready for a large-scale nuclear reactor. But he says that the emergence of technology for small modular reactors, which deliver much less power than a conventional alternative, can enable nuclear energy to be used more widely in Africa. A country such as Rwanda, he says, which is many years away from being able to absorb the electricity generated in a large-scale reactor, could potentially turn to SMRs in the relatively near future.

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Source: Ben Payton, https://african.business/2023/12/energy-resources/south-korea-lays-groundwork-for-african-nuclear-push, 08 December 2023.

TURKEY–GREECE

Erdogan Says Turkey, Greece could Cooperate on Nuclear Energy

Turkey wants to develop cooperation with Greece on nuclear energy, Turkish President Erdogan was cited as saying on Friday after meetings in Athens, adding he hoped his visit would help improve ties between the NATO allies, but historic rivals.

Turkey and Greece agreed during a landmark visit by Erdogan on Thursday to establish a roadmap designed to usher in a new era of closer relations. Speaking to reporters on his flight back from Greece, where he met Prime Minister Mitsotakis and several ministers, Erdogan said the meetings were held in a "very positive" atmosphere. "We are trying to expand, develop this cooperation not just to energy, but all areas including nuclear energy. For example, we may provide an opportunity to Greece from the nuclear power plant we will build in Sinop," Erdogan said, without elaborating, according to his office. He said Mitsotakis was "warm" to the idea.

Turkey wants to develop cooperation with Greece on nuclear energy, Turkish President Erdogan was cited as saying on Friday after meetings in Athens, adding he hoped his visit would help improve ties between the NATO allies, but historic rivals. Turkey and Greece agreed during a landmark visit by Erdogan on Thursday to establish a roadmap designed to usher in a new era of closer relations.

Ankara and Athens have long been at loggerheads over issues including where their continental shelves start and end, energy resources in the eastern Mediterranean, flights over the Aegean Sea, and the ethnically partitioned island of Cyprus. The two countries came to the brink of war in the 1990s, and in recent years have repeatedly argued about such issues. Asked about resolving outstanding maritime disputes with Greece, Erdogan said Turkey's stance on protecting its rights in the region had not changed, but that a fair sharing of energy resources was possible. "A comprehensive and fair sharing in the eastern Mediterranean is possible. So long as we build the basis to make this happen, form correct roadmaps, and don't give provocations an opportunity," he said, adding a regional conference of littoral states that Ankara is proposing would be a "correct step" in forming this basis.

As the world continues its transition to a future defined by sustainability and clean energy, Canada's uranium mines may prove instrumental. The country's Athabasca Basin is already a uranium heavyweight, home to the world's top uranium producing mine. In light of increasing demand for alternative energy sources to fossil fuels, the Basin is attracting considerable uranium exploration.

Source: https://www.reuters.com/world/europe/erdogan-says-turkey-greece-could-cooperate-nuclear-energy-2023-12-08/, 08 December 2023.

URANIUM PRODUCTION

CANADA

Uranium Exploration in Saskatchewan's Athabasca Basin

While mostly known for its gold, copper, nickel, oil and gas reserves, the country also hosts the third-largest uranium supply in the world, representing roughly 10 percent of global reserves. As the world continues its transition to a future defined by sustainability and clean energy, Canada's uranium mines may prove instrumental. The country's Athabasca Basin is already a uranium heavyweight, home to the world's top uranium producing mine. In light of increasing demand for alternative energy sources to fossil fuels, the Basin is attracting considerable uranium exploration. Investors would do well to keep the region on their radar and develop a deeper understanding of the current market for the resource.

An Impending "Supply Black Hole" in Uranium: The uranium market is heating up. For the past year, uranium prices have climbed steadily, driven by the demand for sustainable fuels and the ongoing instability in global oil and gas supply chains. These factors appear to have put the energy resource on a path with which battery metals investors are all too familiar. According to Justin Huhn, founder and publisher of Uranium Insider, there simply isn't enough uranium inventory to keep up with demand. Huhn says he expects to see a "supply black hole" in the mid-term, which could have major

consequences for both uranium prices and equities moving forward. "The only (uranium) inventory that exists in the world right now is strategic, held by nation-states and nuclear utilities with limited inventories," Huhn explained in an interview with Investing News Network. "We're at this moment in time where the supply side has gotten so squeezed that very, very low-volume demand in the spot market is moving the price significantly.

Best-case scenario — we're talking five years from now and even then it's like a moment-in-time snapshot — supply may be reaches that structural demand. "Uranium is a structurally undersupplied market," he added. "Nobody knows where that relief is going to come from." Uranium prices in Q4 2023 have reached a 15 year high, and the market is experiencing its most favorable supply and demand fundamentals in more than a decade. Consequently, many analysts believe uranium displays all the hallmarks of an early bull market. That's good news for investors — and for any company currently engaged in uranium exploration and development.

The Athabasca Basin can deliver the stable source of uranium necessary for this, currently accounting for 15.5 percent of total annual uranium production. Spanning roughly 100,000 square kilometers of the Canadian Shield in Northern Alberta and Saskatchewan, the sandstone basin is home to 10 of the 15 highest-grade uranium deposits in the world and hosts the majority of Canada's uranium reserves — an estimated 514,000 tonnes.

A Hotbed of Uranium Mining and Exploration: Demand for uranium is potentially even more pronounced in Canada compared to other regions. As a result of a favorable regulatory climate, innovative new technology and multiple utilities with plans to construct their own nuclear facilities, the country appears to be on the verge of what some have called a "nuclear renaissance." The Athabasca Basin can deliver the stable source of uranium necessary for this, currently accounting for 15.5 percent of total annual uranium production. Spanning roughly 100,000 square kilometers of the Canadian Shield in Northern Alberta and Saskatchewan, the sandstone basin is home to 10 of the 15 highest-grade uranium deposits in the world and hosts the majority of Canada's uranium reserves — an estimated 514,000 tonnes.

The Athabasca Basin region is distinct for its unique geology. The surface of the region consists mostly of sandstone sediment with depths ranging up to 1,000 meters. Uranium is primarily found at the base of this sandstone, deposited between rock layers in geologic formations known as unconformities. The nature of these formations, as well as precisely how they've become so uranium-rich, is a question that's puzzled geologists for decades. Researchers from the University of Regina recently attempted to answer that question. Their results, however, only raised further questions. Although fluid from ore-bearing areas in the Basin displays high levels of uranium, fluid from areas with no uranium ore shows the same trait.

The conditions under which the Basin's uranium deposits formed thus remain something of a puzzle — though geologist Guoxiang Chi, who is working on the project, suspects the presence of reducing agents, such as graphite or methane gas, to be the culprit. "Without a reducing agent, you can't have ore," Chi explained. It's worth noting that several of the most prominent new uranium discoveries have been made just outside the margin of the current sandstone basin in areas thought to have once been covered by the sandstone.

Major Players in the Athabasca Basin: Several mining and exploration companies have already staked their claim in the basin. As a result, in addition to major uranium mines, the region is home to plenty of uranium exploration projects, many of which are already in the advanced stage. We've summarized some of the more notable players and their assets below.

North Shore Uranium: A relative newcomer to Saskatchewan's uranium exploration sector, North

Shore currently holds over 60,000 hectares of highly prospective claims along the Athabasca Basin's eastern margin. These claims span two properties, Falcon and West Bear, both of which benefit from pre-existing infrastructure in a region with significant exploration activity. North Shore is currently in the process of prioritizing uranium targets for drilling set to begin in early 2024.

Cosa Resources currently holds more than 140,000 hectares of uranium assets. Proximal to the Athabasca Basin, the projects are either near or within district-scale structural corridors or highly prospective uranium corridors. Most notably, Cosa's 100 percent owned Ursa property encompasses a large portion of the underexplored Cable Bay shear zone.

ATHA Energy: ATHA Energy is notable for holding the largest uranium exploration portfolio in the Athabasca Basin, comprising a total of 3.4 million acres. In August, ATHA conducted the largest multiplatform electromagnetic survey in the Basin's history as part of its exploration-at-scale strategy. Initial results have been promising, identifying multiple high-priority areas within the company's East Apex Project.

Cosa Resources: Cosa Resources currently holds more than 140,000 hectares of uranium assets. Proximal to the Athabasca Basin, the projects are either near or within district-scale structural corridors or highly prospective uranium corridors. Most notably, Cosa's 100 percent owned Ursa property encompasses a large portion of the underexplored Cable Bay shear zone. The company's team includes multiple people who were part of the discovery of the Hurricane uranium deposit.

Cameco: Cameco, one of the world's top uranium mining companies, operates two major uranium mines in the Athabasca Basin, Cigar Lake and McArthur River/Key Lake. The company owns 54.5 percent of Cigar Lake, the highest-grade uranium mine in the world and the world's top producing mine, as well as 70 percent and 83 percent, respectively, of McArthur River and Key Lake, the world's largest high-grade uranium mine and mill. Other companies with advanced exploration projects in the region include Baselode Energy, Fortune Bay and Okapi Resources.

Investor Takeaway: Canada has long held a significant position in the global uranium market. Between considerable exploration and development within the Athabasca Basin and the country's plans to embrace nuclear energy, this is unlikely to change. Instead, as more projects come online and more companies claim land within the Basin, Canada will continue to be a major player in the global uranium market — maintaining its standing as a significant source of investment opportunities.

Source: https://investingnews.com/uranium-exploration-in-saskatchewans-athabasca-basin/, 05 December 2023.

NUCLEAR PROLIFERATION

AUSTRALIA–USA

Australia Praises US Congress Green Light for AUKUS Nuclear Submarine Sale

Australia's Prime Minister Anthony Albanese hailed U.S. Congress for authorising the sale of nuclear submarines to another country for the first time, allowing the AUKUS defence partnership of Australia, the U.S. and Britain to go ahead. More than two-thirds of the U.S. House of Representatives voted in favor of a defence policy bill that included a record $886 billion in annual military spending and authorised policies such as aid for Ukraine and push back against China in the Indo-Pacific.

"This is an extraordinary achievement," Albanese said in an interview with radio network 2GB, adding he had spoken to more than 100 U.S. lawmakers in support of the AUKUS provisions. "To get this legislation passed means that AUKUS can go ahead, means that Australia will have access to those Virginia-class submarines which are nuclear propelled and that will be so important for Australia's national security."

The AUKUS pact to develop nuclear-powered submarines and other high technology weapons is Australia's most expensive defence project with a $244 billion price tag over three decades, but relied on U.S. approval to share sensitive technology. Australia said it wants to see an Australian-flagged nuclear powered submarine in the water in the early 2030s to avoid a capability gap as its existing Collins class diesel-electric fleet retires. A new class of Australian-built AUKUS submarine is not expected until early 2040.

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Albanese travelled to Washington in October to push for the legislation - required for the sale of three U.S. Virginia class nuclear-powered submarines to Australia, and a raft of other measures to jointly develop defence technology - to be passed this year. "This is the first time in American history that America and its Congress have authorised the sale of nuclear-powered submarines," Defence Minister Richard Marles said in a Sky News television interview on Friday. ...

Source: Kirsty Needham, https://www. reuters.com /world/asia-pacific/australia-praises-us-congress-green-light-aukus-nuclear-submarine-sale-2023-12-15/, 15 December 2023.

IRAN

Do Not Overlook Iran's Nuclear Ambitions, IAEA Director Warns

Rafael Grossi, the head of the UN nuclear watchdog IAEA, urged global powers to resume nuclear negotiations with the Iranian regime and "not lose sight of the risks posed by its stockpiling of enriched uranium while attention has turned to the war between Israel and Hamas."In an interview with the Financial Times published on November 30, Rafael Grossi said that "There needs to be some recreation of a system of dialogue with Iran." "Attention...may of course be on something else. But this doesn't solve the issue. It may even make them more acute, in the sense that there's a sense of a certain indifference, people may not be looking at [Iran's nuclear ambitions], but the problem exists." Grossi said Tensions between the Iranian regime and the West have escalated following Hamas' devastating attack on Israel on October 7. The regime supports Hamas and several paramilitary groups that are essentially proxies of the Iranian regime throughout the region. Grossi said that negotiations with Tehran may require a new framework, rather than an attempt to revive the Joint Comprehensive Plan of Action (JCPOA), as the 2015 nuclear deal with Iran is formally known.

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Grossi continued, "Trying to put [a nuclear deal] back into the JCPOA box wouldn't work... You can still call it a JCPOA but it should be a JCPOA 2.0 or something because you have to adapt." He also said that the situation surrounding the Iranian regime's nuclear program is "very uncertain" and called on countries to "sit down and re-engage." Five days before Grossi's recent remarks, the AFP agency reported that Western powers have no inclination to escalate tensions against the Iranian regime. The AFP wrote that Western powers, fearing further escalation in the Middle East, have no inclination to take a tough stance against the regime at a time when it is advancing its nuclear program and simultaneously reducing cooperation with the IAEA. According to the report, in a situation where the IAEA Board of Governors of

the Agency says that recent actions by the Iranian regime have moved unprecedented boundaries, it has refrained from presenting a mandatory resolution.

Source: https://iranfocus. com/nuclear/50296-do-not-overlook-irans-nuclear-ambitions-iaea-director-warns/, 30 November 2023.

NUCLEAR NON-PROLIFERATION

KAZAKHSTAN

'Let Us Be a Lesson', Say Kazakhs Wary of Return to Nuclear Testing

Hundreds of tests were carried out between 1949 and 1989 on the barren steppe near the city of Semey, formerly known as Semipalatinsk, close to the Kazakh-Russian border. The effect of radiation had a devastating impact on the environment and local people's health, and continues to affect lives there today. Many nuclear proliferation experts believe resuming testing by either nuclear superpower more than 30 years after the last test is unlikely soon. But tensions over Russia's invasion of Ukraine have led to increasingly hostile rhetoric, and the arms control architecture built since the Soviet Union's collapse more than three decades ago has begun to unravel. In early November, President Putin revoked Russia's ratification of the 1996 global treaty banning nuclear weapons tests. Moscow says it will not lead to a resumption of testing unless the US does first. "Let our suffering be a lesson to others," said Serikbay Ybyrai, local leader in the village of Saryzhal, who saw tests being carried out some 20 km away when he was a boy. "If this (testing) resumes, humanity will disappear."

Hundreds of tests were carried out between 1949 and 1989 on the barren steppe near the city of Semey, formerly known as Semipalatinsk, close to the Kazakh-Russian border. The effect of radiation had a devastating impact on the environment and local people's health, and continues to affect lives there today. Many nuclear proliferation experts believe resuming testing by either nuclear superpower more than 30 years after the last test is unlikely soon.

When devices were detonated above ground – until 1963 when tests went underground – authorities would order local people out of homes and schools because of fears that ground tremors might cause buildings to collapse. "I remember I was about five years old," said Baglan Gabullin, a resident of Kaynar, another village that lived under the shadow of nuclear testing. He recalled how adults would instruct him and his friends not to look in the direction of the blast. "We were small, so on the contrary, out of curiosity we looked. The flash was yellow at first, and then the black mushroom grew," he said. Kazakh authorities estimate up to 1.5 million people were exposed to residual radioactive fallout from testing. Over 1 million received certificates confirming their status as victims of tests, making them eligible for an 18,000-tenge ($40) monthly payout.

Maira Abenova, an activist from the Semey region who set up a non-governmental organisation protecting the rights of nuclear test victims after losing most family members to diseases she said were related, urged politicians not to allow nuclear escalation. "As someone living with the consequences of what you could call 40 years of nuclear warfare, I think we can tell the world what we have gone through," she said. There is little reliable data on the specific health impact of testing in Kazakhstan. But scientists say exposure to radioactive material on the ground, inhalation of radioactive particles in the air and ingestion of contaminated food including local livestock contributed to increased cancer risk and cases of congenital malformation. In Saryzhal, a village of around 2,000 people living in small white-painted homes surrounded by blue wooden fences, Gulsum Mukanova recalls how she and other children would watch above-ground explosions, known as atmospheric tests. ...

Source: https://www.euractiv.com/section/central-asia/news/let-us-be-a-lesson-say-kazakhs-wary-of-return-to-nuclear-testing/, 30 November 2023.

NUCLEAR DISARMAMENT

VIETNAM

Vietnam Emphasises Necessity to Completely Eliminate Nuclear Weapons

The total elimination of nuclear weapons is the common interest of humankind and requires efforts and political determination of all countries, Ambassador Dang Hoang Giang, Permanent Representative of Vietnam to the United Nations, stressed at the second meeting of state parties to the TPNW. Addressing the meeting, which is taking place in New York from November 27 to December 1, Giang said international security is facing many serious challenges and expressed his concern over the level of destruction and humanitarian consequences of nuclear weapons.

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The ambassador emphasised the need to enhance strategic trust, in which the key is to promote the compliance with basic principles of international law and the UN Charter, and strengthen international mechanisms on disarmament and counter-proliferation. To effectively implement the TPNW, he called on member countries to fulfill their obligations under the document, and non-member countries to soon sign, ratify and join it, contributing to its universalisation. It is also necessary to uphold the importance of the treaty, raise public awareness of the consequences of nuclear weapons, and promote international cooperation in capacity building for developing countries, Giang said. The diplomat reiterated Vietnam's consistent policy of supporting efforts in anti-proliferation and nuclear disarmament towards a world free of nuclear weapons, citing the issuance of Decree No. 81 in 2019 by the Vietnamese government on the prevention and control of WMD proliferation.

Source: https://en.vietnamplus.vn/vietnam-emphasises-necessity-to-completely-eliminate-nuclear-weapons/272072.vnp, 30 November 2023.

NUCLEAR TERRORISM

AFGHANISTAN

Former Afghan Security Chief Warns of Taliban's Alleged Pursuit of Tactical Nuclear Weapons

Rahmatullah Nabil, the former head of Afghanistan's national security service, has expressed concerns about the Taliban exploring avenues to acquire tactical nuclear weapons. The announcement was reported by Aamaj News, detailing Nabil's remarks at the ongoing Herat security meeting in Dushanbe. Coinciding with Nabil's revelation, the Herat Security Conference was inaugurated on November 27 in the capital of Tajikistan. The conference has drawn the participation of individuals, experts, and politicians united against the Taliban government. Scheduled to span two days, the event serves as a platform for participants to deliberate on the prevailing situation in Afghanistan. Earlier, Daryo reported that Taliban has declared its intention to completely block the flow of water from the Kunar River, a vital watercourse running from Afghanistan into Pakistan.

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Source: https://daryo.uz/en/2023/11/28/former-afghan-security-chief-warns-of-talibans-alleged-pursuit-of-tactical-nuclear-weapons, 28 November 2023.

NUCLEAR SAFETY

KOREA

Korea to Begin Dismantlement Process for Kori-1 Power Plant Next Year

Korea is expected to begin the process to dismantle the now-defunct Kori-1 nuclear reactor next year, the industry ministry said Friday. As the country's first commercial nuclear power plant,

the Kori-1 reactor in the southeastern city of Busan was permanently closed in June 2017 after some 40 years of service from 1978. The Korea Hydro & Nuclear Power is now awaiting an approval by the Nuclear Safety and Security Commission for its dismantlement. "The successful dismantlement of a power plant carries significance in the nuclear industry ecosystem. We are expected to get down to the dismantlement process for the Kori 1 reactor next week, which will be a chance to boost the competitiveness of the industry," a ministry official said.

An IAEA team of experts said Morocco is committed to maintaining and strengthening its regulatory framework for nuclear and radiation safety. The team said the country has taken effective steps to establish a new legal and regulatory framework. It recommended additional measures to complete the transition from a 1971 law and align the new regulations with IAEA safety standards. The team also called for improving the regulatory oversight of the country's research reactor. The Integrated Regulatory Review Service (IRRS) team concluded the 10-day mission to Morocco on 6 December 2023.

Source: https://www.koreatimes.co.kr/www/nation/2023/12/113_364715.html, 08 December 2023.

MOROCCO

IAEA Mission Says Morocco Progresses with New Nuclear and Radiation Safety Framework, Recommends Further Steps to Complete Transition

An IAEA team of experts said Morocco is committed to maintaining and strengthening its regulatory framework for nuclear and radiation safety. The team said the country has taken effective steps to establish a new legal and regulatory framework. It recommended additional measures to complete the transition from a 1971 law and align the new regulations with IAEA safety standards. The team also called for improving the regulatory oversight of the country's research reactor. The Integrated Regulatory Review Service (IRRS) team concluded the 10-day mission to Morocco on 6 December 2023. The mission was conducted at the request of the Government of Morocco and hosted by the "Agence Marocaine de Sûreté et de Sécurité Nucléaires et Radiologiques" (AMSSNuR), the national regulatory body for nuclear and radiation safety and nuclear security.

The sixteen-member team, comprised of eleven senior regulatory experts from eight countries, as well as five IAEA staff members, reviewed the governmental, legal and regulatory framework for nuclear and radiation safety in Morocco. The IRRS team conducted interviews and discussions with AMSSNuR staff. Team members also observed regulatory oversight activities at a research reactor, a cyclotron to produce isotopes for use in medicine and their transport, a radioactive waste management facility, a radiotherapy department in a clinic and a company for industrial radiography. These visits included discussions with management and staff of the facilities. Using IAEA safety standards and international good practices, IRRS missions are designed to strengthen the effectiveness of the national regulatory infrastructure while recognizing the responsibility of each country to ensure nuclear and radiation safety.

While Morocco has invited other types of IAEA peer review and advisory missions before, this was the first IRRS mission to the country. Morocco uses nuclear and radiation technologies for medical, industrial, agricultural, research and educational applications. The National Centre for Nuclear Energy, Sciences and Technology (CNESTEN) operates an MA-R1 TRIGA MARK II research reactor at the Maâmora Nuclear Research Centre.

This full scope mission covered all types of nuclear and radiation facilities and activities and exposures regulated in Morocco and the IRRS team developed a broad understanding of Morocco's regulatory infrastructure. While Morocco has invited other types of IAEA peer review and advisory missions before, this was the first IRRS

mission to the country. Morocco uses nuclear and radiation technologies for medical, industrial, agricultural, research and educational applications. The National Centre for Nuclear Energy, Sciences and Technology (CNESTEN) operates an MA-R1 TRIGA MARK II research reactor at the Maâmora Nuclear Research Centre. Morocco does not operate any nuclear power reactors but considers nuclear power production as a long-term option among other low carbon energy sources to meet the country's future needs.

The Mission Identified Several Good Performances by AMSSNuR: Promotional and supporting actions aiming to enhance nuclear and radiation safety among countries in the region. Proactive communication with interested parties. The timely establishment of a comprehensive integrated management system. The development of a Geographic Information System (GIS) application displaying the location of all facilities and important features of radioactive sources being directly available to the Ministry of Interior for emergency preparedness and response purposes. The IRRS team recognized Morocco's invitation for a full-scope IRRS mission as a sign of openness, transparency, and commitment to continuous improvement for safety. However, the team said that the main challenges for Morocco are to complete the transition phase to a new national nuclear legal and regulatory framework. The Government adopted a new law in 2014 which led to a reconfiguration of the nuclear oversight authorities with AMSSNuR as the independent regulatory body. The other key challenge is to bring the regulations in line with the IAEA safety standards.

The IRRS Team Identified Several Recommendations and Suggestions: The Government and AMSSNuR should improve the regulatory oversight of the research reactor with regards to the periodic safety review and the inspection programme. The Government should establish and implement a national policy and strategy for nuclear safety, for the long-term safe management of radioactive waste and nuclear spent fuel, and for decommissioning activities. The Government should ensure that authorization decisions for category I facilities do not affect regulatory independence. AMSSNuR should continue liaising with the Government to ensure that the regulations to be promulgated are consistent with the IAEA safety standards. ...

IAEA Safety Standards: The IAEA safety standards provide a robust framework of fundamental principles, requirements, and guidance to ensure safety. They reflect an international consensus and serve as a global reference for protecting people and the environment from the harmful effects of ionizing radiation.

Source: https://www.iaea.org/newscenter/pressreleases/iaea-mission-says-morocco-progresses-with-new-nuclear-and-radiation-safety-framework-recommends-further-steps-to-complete-transition, 07 December 2023.

Ukraine's Zaporizhzhya Nuclear Power Plant (ZNPP) has for several days depended on a single power line for the off-site electricity it needs to cool its six reactors and for other essential nuclear safety and security functions, leaving it highly vulnerable to any further grid disruptions during the military conflict, Director General Rafael Mariano Grossi of the IAEA said today.

UKRAINE

IAEA Director General Statement on Situation in Ukraine

Ukraine's Zaporizhzhya Nuclear Power Plant (ZNPP) has for several days depended on a single power line for the off-site electricity it needs to cool its six reactors and for other essential nuclear safety and security functions, leaving it highly vulnerable to any further grid disruptions during the military conflict, Director General Rafael Mariano Grossi of the IAEA said today. The site's fragile power supplies continue to be at the centre of concern regarding nuclear safety and security at Europe's largest nuclear power plant (NPP), underlined by the site's eighth complete loss of external electricity last Saturday after the separate connections to both of its remaining power lines

were cut, apparently caused by external grid events outside the ZNPP. As a result, the plant temporarily relied on emergency diesel generators for power.

It regained the connection to its main 750 kV line after nearly five hours, but its last 330 kV back-up power line is still disconnected. The IAEA experts at the ZNPP have been informed that the repairs are expected to be completed by early next week. Before the conflict, the ZNPP had four 750 kV lines as well as several back-up options available. The IAEA team also reported that reactor unit 4 – whose main cooling pumps briefly stopped running during last week's external power loss – is once again in hot shutdown mode producing heating and steam for the site and the nearby town of Enerhodar, where most plant staff live. The other five reactors remain in cold shutdown. "The IAEA remains fully focused on doing everything it can to help prevent a nuclear accident during this devastating war. The repeated loss of off-site power at the Zaporizhzhya Nuclear Power Plant, sometimes from causes at a considerable distance from the plant, remains one of our main challenges in this context, especially during the winter months. No one would gain from a nuclear accident and it must be avoided," Director General Grossi said.

The ZNPP has also previously relied on one sole external power line, but it is clearly not a sustainable situation, Director General Grossi added. Two days ago, a new team of IAEA experts crossed the frontline to replace their colleagues who had been monitoring nuclear safety and security at the ZNPP for the past several weeks. It is the fourteenth IAEA team at the site since the IAEA Support and Assistance Mission to the ZNPP was established by the Director General in September 2022.

The new team of IAEA experts will continue to pay close attention to the staffing situation at the ZNPP, the status of the external power supply as well as maintenance activities at the site, including any actions the plant may take following last month's detection of boron in the secondary circuit of a steam generator of unit 5. Borated water is used in the primary coolant to help maintain nuclear safety functions. In a continuous reminder of the physical proximity of the conflict to the ZNPP, the IAEA experts continue to hear explosions in the distance, likely from heavy artillery and rockets. Today, the new team reported that they heard nine explosions closer to the site. Also today, the IAEA team conducted a walkdown of the turbine halls of all six reactor units. The experts did not observe any mines, explosives, military equipment or vehicles in the areas they visited. Not all parts of the turbine halls were accessed so additional access would be required to fully assess whether there were any items present that could potentially impact nuclear safety.

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Elsewhere in Ukraine, the IAEA experts present at the Khmelnitsky, Rivne and South Ukraine NPPs as well as at the Chornobyl site have reported that nuclear safety and security is being maintained despite the challenging war-time circumstances, including the frequent sound of air raid alarms at some of the facilities. The IAEA is continuing to support nuclear safety and security in Ukraine with the delivery of much-needed equipment and other technical assistance. Last week, the South Ukraine NPP received the third and final delivery of spare parts and rubber products for the site's emergency diesel generators, ensuring their operational readiness if the site were to lose external power. The provision of this assistance was organized under a tripartite agreement between the IAEA, France and Ukraine's nuclear operator Energoatom signed in May this year.

Source: https://www.iaea.org/newscenter/pressreleases/update-201-iaea-director-general-statement-on-situation-in-ukraine, 07 December 2023.

NUCLEAR SECURITY

CHINA

Japan Adds Chinese Nuclear Weapons Lab and Others to WMD Concern List

Japan revised its End User List, which provides exporters with information on foreign entities possibly involved in activities such as the development of WMDs. With the latest revision, the list now totals 706 organizations in 15 countries and regions, up by 36 organizations and institutions — including the China Academy of Engineering Physics (CAEP), the main research and manufacturing center for Chinese nuclear weapons. Iran has the most listed with 223 organizations and institutions, followed by North Korea with 153 then China and Pakistan with 101 each. Five organizations in Iran and Hong Kong were removed. The revision will take effect.

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Japan aims to prevent the outflow of civilian technology that could be diverted to military use. Exporters are required to get approval from the Minister of Economy, Trade and Industry to export products to the listed organizations unless it is clear that the materials will not be used to develop WMDs such as nuclear weapons or missiles. China saw seven organizations added. Of all the Chinese entities, about 90% are possibly involved in missile development. Many universities, academies and research institutes are also listed, which reveals the extent of Xi Jinping's Military-Civilian Fusion policy. Machine tools produced by Japanese companies and others are suspected of being used by the CAEP, according to a Nikkei investigation. The economy ministry makes the list to enhance the effectiveness of its "catch-all" control system, which obliges exporters to apply for an export license for goods that may be used for the development of WMDs even if the goods are not subject to export restrictions under international agreements.

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The list has been issued since catch-all controls were introduced in April 2002 and is revised about once a year. It is not an embargo list. In addition to catch-all controls, Japan enforces "list controls" by listing sensitive items — including goods, technology or software — that are subject to regulation. List controls require exporters to apply for a license when exporting or transferring listed items to a foreign country. Even some items not listed cannot be exported without permission if there are security concerns at the export destination. In applying for a permit, the company exporting the item is obliged to check the intended use at the destination to see if there is any possibility that it could be converted into a WMD. The U.S. has a similar control system, the Entity List, which contains the names of certain foreign persons — including businesses, research institutions, government and private organizations, as well as individuals — that are subject to license requirements for the export of specified items. The Entity List was first published in 1997 and now contains over 2,000 persons.

Although we cannot simply compare them, some pointed out that Japan's End User List is less effective than the Entity List. The U.S. embargoes exports in principle to persons listed, while Japan

only urges caution and does not immediately ban exports. Japan's list is also limited in coverage. The U.S. list includes organizations of security concern in addition to those developing WMDs, and while there are differences in the way the two lists are counted, Japan's only has about 700 entries. By country, the number of China-related entries for Japan is only 101, compared to about 600 for the U.S. For example, the CAEP has been on the U.S. list since 1997. If organizations of concern are omitted from a list, they may slip through the checks. The organizations that Japan lists are limited to involvement in WMDs and some military entities are not included. There are examples of Chinese and North Korean organizations on the Japanese list that are only in English, and Japanese companies have complained that the system is not user-friendly. For companies with limited resources for research and analysis, the End User List is an important source of information for scrutinizing export destinations. ...

About 400 shipments of nuclear waste from around the country were disposed of at a repository near Carlsbad this year, and federal officials said this exceeded their goal for 2023. The Waste Isolation Pilot Plant, about 30 miles east of Carlsbad, takes in shipments of transuranic (TRU) nuclear waste from laboratories and facilities owned by the U.S. Department of Energy.

Exceeding 400 transuranic waste shipments to WIPP this year is a positive indication of the cleanup work we're enabling throughout the nation," he said. "WIPP's mission to safely receive and dispose of waste shipments is instrumental to cleanup efforts at Los Alamos and other waste-generating sites, and we safely exceeded our goal at WIPP in 2023.

Source: https://asia.nikkei.com/Politics/Japan-adds-Chinese-nuclear-weapons-lab-and-others-to-WMD-concern-list, 06 December 2023.

NUCLEAR WASTE MANAGEMENT

USA

More Than 400 Shipments of Nuclear Waste Came to Carlsbad-Area Repository in 2023

About 400 shipments of nuclear waste from around the country were disposed of at a repository near Carlsbad this year, and federal officials said this exceeded their goal for 2023. The Waste Isolation Pilot Plant, about 30 miles east of Carlsbad, takes in shipments of transuranic (TRU) nuclear waste from laboratories and facilities owned by the U.S. Department of Energy. TRU waste is made up of clothing materials, equipment and other refuse irradiated during nuclear activities, and is shipped by truck to the WIPP site where it is buried permanently in a salt deposit about 2,000 feet underground. This year, the DOE's Carlsbad Field Office reported it reached its goal of 400 waste shipments in October, while it also avoided creating a backlog of waste from Los Alamos National Laboratory in northern New Mexico. In-state shipments became controversial earlier this year as the New Mexico Environment Department (NMED) called for the facility to prioritize New Mexico waste.

That objective took the form of a clause in the DOE's permit with NMED to operate WIPP for the next 10 years, requiring the federal agency to set aside space in the underground specifically for Los Alamos waste and to develop a plan to dispose of "legacy waste" leftover at the lab from the Cold War. Carlsbad Field Office Manager Mark Bollinger said the shipment goal in 2023 was achieved "safely" from Los Alamos and other sites in the DOE's complex. "Exceeding 400 transuranic waste shipments to WIPP this year is a positive indication of the cleanup work we're enabling throughout the nation," he said. "WIPP's mission to safely receive and dispose of waste shipments is instrumental to cleanup efforts at Los Alamos and other waste-generating sites, and we safely exceeded our goal at WIPP in 2023." But despite the push for more clean-up from within New Mexico, records show WIPP mostly took in waste from other states.

WIPP received 423 shipments in 2023, as of Thursday according to the latest DOE data, with 334 or 78 percent coming from Idaho National Laboratory. Los Alamos sent 49 shipments to WIPP during that same time frame, records show, about 11 percent of the total. Other major shippers this year were the Savannah River Site in South Carolina with 24 shipments as of Thursday, the DOE reported, and Oak Ridge National Laboratory in Tennessee with 18 shipments. Since opening in 1999, more than half of the waste disposed of at WIPP came from Idaho – 7,118 or about 52 percent of the total 13,749 shipments to the facility as of Dec. 2. And the DOE said it planned to ramp up shipments to an average of 17 per week in the coming months, a rate that would equal about 884 shipments if maintained every week of the year.

Tammy Hobbes, WIPP operations and TRU program manager with Salado Isolation Mining Contractors (SIMCO) – the DOE-hired contractor to oversee daily operations, touted the workforce that prepared waste for shipments while maintaining, she said, the safety of the facility. ... The safety of WIPP's operations was called into question by government watchdogs and state lawmakers this year. This surrounded the DOE's plans to increase the production of plutonium pits at both Los Alamos and Savannah River, a project that left some worried new weapons-based waste could come to WIPP despite its initial mission of cleaning up legacy waste.

And the DOE recently announced plans to "downblend" or dilute surplus weapons-grade plutonium to meet WIPP's acceptance standards before being shipped to WIPP. These efforts not only increased risks at the WIPP site, but also along its transportation routes, said Joni Arends with Concerned Citizens for Nuclear safety during a public forum held in Carlsbad. ...

Source: https://www.currentargus.com/story/news/2023/12/08/more-than-400-shipments-of-nuke-waste-came-to-carlsbad-area-repository/71823825007/, 08 December 2023.

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