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OPINION – Sebastian Brixey-Williams, Nicholas J. Wheeler

Securing Empathy to Prevent Misunderstanding among the Nuclear Five

High-level officials from the five nuclear weapon states recognised under the Treaty on the NPT...met in London for the tenth 'N5 Process' dialogue. Among the objectives of this wide-ranging dialogue is to better understand each others' nuclear doctrines and strategic intentions through an exchange of views, and so lessen the likelihood of a miscalculation or misunderstanding that could lead them to stumble into a nuclear conflict. They also discussed how they can contribute to fulfilling their responsibilities around disarmament, non-proliferation and the peaceful uses of nuclear technology within the context of the NPT Review Conference later this year.

Having failed to agree a statement in Beijing in 2019, where visceral distrust between the United States and Russia o v e r s h a d o w e d proceedings, many are hoping that the UK's chairing of the process this year will see substantive progress at a time when most experts perceive nuclear risks to be on the rise. In January, scientists moved the Bulletin of the Atomic Scientists' 'Doomsday Clock,' that symbolically registers humanity's proximity to

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existential threats, including nuclear annihilation, climate crisis, and cyber-based disinformation, to 100 seconds to midnight for the first time.

A key driver behind the growing fear of nuclear conflict is that the nuclear weapon states are seen to be failing to live up to their special responsibilities, both as the principal leaders of nuclear disarmament within the NPT, and as the Permanent Five members of the United Nations Security Council tasked with maintaining international peace and security under the UN Charter. Decision-makers in Russia and the United States, the two powers with the greatest nuclear

arsenals, and hence the greatest responsibility to lead a risk reduction agenda, have ratcheted up their nuclear threats and failed to agree even basic principles in the last few years.

Meanwhile, the Trump administration has complicated the search for shared principles that might reduce the risks of nuclear conflict by putting pressure on China to join a new trilateral strategic arms control negotiating process, which has never been done before. The result is a strong pushback from China and suspicion on the part of both Moscow and Beijing of US intentions.

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Officials involved in the N5 Process report that increased working level engagement is bearing some fruit: foreign and defence ministry officials are now able to directly communicate with their equivalents and negotiators have a better understanding of each other's doctrine and posture than they did before. In this regard, the nuclear weapon states have produced a glossary of key nuclear terms, much derided amongst disarmament activists, but an essential step in ensuring that all countries are speaking a common language.

Arms control experts hope this glossary will be expanded with new terms in the coming meeting. In addition the N5 have been discussing increasing transparency around nuclear forces, a Fissile Material Treaty cutting-off the production of new weaponizable nuclear material, and joint-signature of the Protocol to the South East Asian Nuclear Weapon-Free Zone (also known as the Bangkok Treaty).

Against the backdrop of increased competition and distrust, the world is watching for a clear statement of aspiration that disavows the use of nuclear weapons in any but the most extreme circumstances, and which unequivocally affirms the continued importance of the NPT to all parties. On this point, the nuclear weapon states should issue an agreed statement that captures the spirit, if not the exact words, of the famous 1985 Reagan-

Gorbachev statement at their summit in Geneva where the two leaders agreed that 'a nuclear war cannot be won and must never be fought'. China had tried to secure five-power agreement to restate the Reagan-Gorbachev language last year, but this failed to secure a consensus, and there seems little appetite for reissuing the 1985 wording in London. However, not to issue some kind of statement – either or in the run up to the 2020 NPT Review Conference – would be a missed opportunity. A renewed

statement would establish a clear principle by which the N5 could hold each other accountable for their future strategic behaviour.

Such a statement should signal an acceptance of mutual vulnerability based on the ability of the other side to strike back, and include wording – as the 1985 Joint US-Soviet Statement did – that neither side would 'seek to achieve military superiority,' a deep and mutual fear among US and Russian decision-makers today.

The Reagan-Gorbachev statement of November 1985 is remembered as the moment the superpowers took the first tentative steps away from Cold War confrontation. It only happened because Ronald Reagan and Mikhail Gorbachev wanted to meet face-to-face to reassure each other about their peaceful intentions. Reagan had come to realise that the Soviet Union did not believe US assurances of its good intentions, and Gorbachev appreciated that Soviet conventional and nuclear capabilities were provoking great anxiety in Western capitals. In other words, both realised that their own state's actions had played a role in making the other feel insecure. Without this reciprocal empathy towards each other's security concerns – what has been called 'security dilemma sensibility' – there would have been no summit, and no statement.

What is needed is for officials and higher-level diplomatic contacts among the N5 to demonstrate – as Reagan and Gorbachev did – empathy towards

each other's security fears. With a more positive climate, the N5 process of dialogue could be a key institution to foster new initiatives for trust and cooperation among the five, and, perhaps, in future, establishing common principles that can be extended to the other nuclear possessor states.

Source: Sebastian Brixey-Williams is the director of the Programme on Nuclear Responsibilities; Prof Nicholas J. Wheeler is the academic lead of the programme on Nuclear Responsibilities. <https://www.europeanleadershipnetwork.org/commentary/securing-empathy-to-prevent-misunderstanding-among-the-nuclear-five/>, 14 February 2020.

OPINION – Utpal Bhaskar

Safeguarding Indigenous Nuclear Programme should be India's Top Focus

With the US offering nuclear power plants to India, experts believe that there should be no 'attrition' of India's indigenous nuclear programme. The US was instrumental in getting India out of its nuclear isolation with the 2008 civil nuclear deal. India is, however, still to sign a final deal for planned six nuclear reactors with US-based Westinghouse Electric Co. which in 2017 had filed for bankruptcy before it was acquired by Brookfield Business Partners in 2018.

It is expected that a pact would be signed between Westinghouse and state-run Nuclear Power Corp. of India Ltd, or NPCIL, during US President Donald Trump's visit. "We need nuclear power as a non-fossil fuel energy. As a baseload source of power, it is cleaner than coal-fired electricity. China is adding a large nuclear capacity as baseload to

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balance their large and growing renewable energy portfolio," said Anil Razdan, India's former power secretary.

Given India plans to add 175 gigawatts of renewable energy from infirm sources such as wind and the sun, the nuclear projects should help provide the baseload to balance the power grid. Besides partnering with India in research and development and advanced

nuclear technology, the US has offered nuclear power plants in three sizes—small modular, micro, and bigger plants of at least one-gigawatt capacity.

This comes against the backdrop of the National Democratic Alliance government exploring the supply of small nuclear power reactors to power-starved countries in Africa. Also, Russia's Rosatom State Atomic Energy Corp. is interested in partnering with Indian companies to work on small- and medium-sized nuclear reactors, *Mint* reported on 8 November.

India has 22 commercial nuclear power reactors with an installed capacity of 6,780MW, which are run by NPCIL. Its nuclear energy plans include building a dozen nuclear power reactors totalling 9,000 MW. While nine reactors totalling 6,700MW is under construction, the Centre has also given in-principle approval to build nuclear capacities totalling 25,248MW in five locations.

"The Indian nuclear equipment manufacturing industry needs indigenous reactors for its own sustenance," said Razdan. Interestingly, since India

and the US signed the historic civil nuclear cooperation deal on 10 October 2008, India hasn't been able to add any nuclear power generation capacity. "Without the US, we couldn't have got fuel for our nuclear reactors," said an Indian government official requesting anonymity.

We need nuclear power as a non-fossil fuel energy. As a baseload source of power, it is cleaner than coal-fired electricity. China is adding a large nuclear capacity as baseload to balance their large and growing renewable energy portfolio," said Anil Razdan, India's former power secretary.

Source: <https://www.livemint.com/news/india/safeguarding-indigenous-nuclear-programme-should-be-india-s-top-focus-11582481319108.html>, 24 February 2020.

OPINION – Radwan Jakeem

Towards Nuclear Disarmament with Monitoring and Verification

With the international community persistently striving for a world free of nuclear weapons, verification systems and methods are crucial to understanding the complex challenges of accurately monitoring and verifying future nuclear disarmament activities which will likely subject countries to more intrusive verification than ever before. Learning from verification experience gained by the U.S. and Russia and dialogues at the International Partnership for Nuclear Disarmament Verification (IPNDV), the five permanent members of the UN Security Council in particular and interested States in general can contribute to an effective nuclear weapons ban as envisaged by the Treaty on the Prohibition of Nuclear Weapons (TPNW).

IPNDV, which started five years ago with the participation of more than 25 countries is a public-private initiative of the U.S. State Department with the NTI designed to build capacity among both states with and without nuclear weapons, and develop technical solutions for monitoring and verification challenges.

Over the past three decades, the number of nuclear weapons has decreased considerably – reportedly to about 14,500 – from the peak arsenals of the Cold War. Key to these dramatic reductions, according to disarmament experts, has been the ability of countries to verify each other's compliance with implementing the arms control treaties.

In order to lay a solid foundation for further

reductions in nuclear weapons and advance nuclear disarmament goals enshrined in the Treaty on the NPT, an accurate assessment of monitoring and verification issues across the nuclear weapons lifecycle is of vital importance – from production of fissile material and warheads, warhead inventories, the dismantlement of nuclear weapons, and the disposition of nuclear material resulting from the dismantlement process.

Article VI of the NPT urges each of the Parties to the Treaty to undertake “to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control”.

The IPNDV established technical working groups in

Phase I and Phase II to steer and facilitate its work. During the first multi-year phase (2015-2017), experts in these groups laid significant groundwork in identifying potential procedures and technologies that can be used across the 14 steps in the nuclear dismantlement “lifecycle”.

The work resulted in more than 35 detailed reports and papers published on the IPNDV website. Moving forward into Phase II of the Partnership, the three working groups made plans to take their work from “paper to practice” by preparing hands-on activities, such as exercises and technology demonstrations.

These activities included an exercise on verification of non-diversion of materials around a simulated nuclear warhead dismantlement called “NuDiVe”, led by Germany and France, and a Belgian-led demonstration assessing technology methods to detect the presence or absence of nuclear material. Both activities included participants from several of the 25+ IPNDV partner countries.

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The seventh International Partnership for Nuclear Disarmament Verification plenary meeting brought 89 representatives from 24 countries, plus the European Union, to Ottawa, Canada from December 3-5, 2019 to complete Phase II and to begin planning for Phase III.

The meeting included presentations about practical exercises and technical demonstrations that took the Partnership's findings "from paper to practice". Partners focused on technical gaps and policy questions that they were scheduled to address in Phase III which will officially kick-off in March 2020 when the government of Switzerland will host a symposium on March 18-19 in Geneva, highlighting the work of the IPNDV and its place in the broader context of nuclear disarmament verification. The symposium will feature panel discussions, an interactive exhibition that showcases the work of the IPNDV, and a poster session that highlights on-going research in the field of nuclear disarmament verification.

The symposium and exhibition—to be held just a few weeks before the NPT Review Conference from April 27-May 22 at UN Headquarters in New York—will highlight: the work of IPNDV during the first two Phases of the Partnership's work; the potential role, and limits of technology in nuclear disarmament verification; the utility of practical disarmament verification exercises and demonstrations; and the IPNDV's work in the broader context of nuclear disarmament. The poster session will feature work on scientific, technology, and procedural issues related to nuclear disarmament verification.

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The IPNDV's *Phase II Summary Report: Moving from Paper to Practice in Nuclear Disarmament Verification*, released in January 2020, addressed verification of nuclear weapon declarations, verification of reductions, and technologies for verification. After the plenary meeting, IPNDV participants visited the Canadian Nuclear Laboratories' Chalk River Site, the historical home to Canada's first nuclear reactor. Participants

observed demonstrations of experimental techniques for verifying the presence or absence of weapons-grade nuclear materials. These are important tasks for the nuclear disarmament verification process.

The Chalk River demonstration was one of

five practical exercises and technology demonstrations conducted during Phase II to advance the Partnership's ability to identify technologies and procedures that could be applied across all stages of the nuclear weapons dismantlement lifecycle.

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Source: <https://www.eurasiareview.com/15022020-towards-nuclear-disarmament-with-monitoring-and-verification/>, 15 February 2020.

OPINION – James Holmes

Yes, China’s New DF-100 Anti-Ship Missile are a Big Problem

Beijing knows its new weapons can hold Washington’s navy at risky. But is there any way for America to counter this danger? So China’s PLA unveiled new weaponry during its October 1, 2019 military parade? Color me gobsmacked. If China’s rise to martial eminence has shown one thing, it’s that PLA commanders and their political overseers delight in surprising and trolling Western observers. They excel at developing new hardware in secret, then springing it on the world and watching the ensuing gabfest consume the China-watching community.

And sure enough, launchers bearing “DF-17” and “DF-100” missiles—weapons both supposedly capable of superfast speeds yet hitherto unknown to outsiders—rumbled through Tiananmen Square to help commemorate the seventieth anniversary of the founding of the People’s Republic of China. (The DF-41 intercontinental ballistic missile also made its public debut on October 1, but Westerners have known about that one for some time.) Alternatively, foreign intelligence services knew about these “birds” but opted not to disclose it in open sources for fear of revealing how they came by the information.

It’s unclear whether the DF-100 is a cruise or ballistic missile. The “DF” nomenclature seems to indicate it flies a ballistic trajectory, while *Jane’s* depicts the bird as a supersonic cruise missile. It may straddle the difference between ballistic and sea-skimming missiles, arcing high into the atmosphere but following a flatter trajectory than a ballistic missile. It would come at U.S. Navy task forces from yet another axis, augmenting anti-ship cruise and ballistic missiles and undersea munitions such as torpedoes or sea mines. Whatever the case, the

new anti-ship missile purportedly reaches hypersonic velocity, meaning five or more times the speed of sound, during at least part of its flight. That boosts its chances of getting through U.S. Navy defenses. Defenders would have little time to more than snap shots.

Notes the *South China Morning Post* in its reportage on the parade, the DF-100 boasts a firing range estimated at 2,000-3,000 km (roughly 1,200-1,800 statute miles) and is “mainly designed for big targets at sea.” By *big targets* the *SCMP* chroniclers presumably mean U.S. or allied aircraft carriers. But such a weapon could likewise target amphibious transports, escort cruisers or destroyers steaming in company with flattops, or logistics ships that ferry vital fuel, munitions, and stores to the fleet as it plies the sea.

So let’s not assume too much about the purposes PLA rocketeers have in mind for their new toy. “Anti-access” defenses can defeat American purposes by assailing softer targets than carriers or surface combatants. If PLA defenders have that option, why not exercise it? The brawniest fleet accomplishes little without logistical support. Pounce on the U.S. combat logistics fleet and you starve the battle fleet of stores; starve the fleet of stores and it goes away before long. The PLA might well tread the path of least resistance to tactical, operational, and strategic success.

Three-pointers on how to interpret the latest revelations. First, martial might is basic to the “Chinese dream,” President Xi Jinping’s statement of national purpose. China watchers sometimes mistake the Chinese dream for an economic program, and amassing wealth is certainly part of it. But wealth is a means to the end of great power, not an end in itself. Communist China aspires to fulfill its dream, and banish bad memories of its “century of humiliation” at the hands of seaborne conquerors, by achieving “the

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great renewal of the Chinese nation.”

Tightening the sinews of national power—including military power—is part and parcel of Xi’s reverie. Hence the prominence of martial pageantry on anniversaries such as October 1.

Second, China’s proclivity for guile and deception was on display at the military parade, as on all such occasions. Notes the Center for Strategic and International Studies: “The People’s Republic of China is in the process of building and deploying a sophisticated and modern missile arsenal, though one shrouded in secrecy due to intentional ambiguity and unwillingness to enter arms control or other transparency agreements.” The approach is true to form. China’s way of diplomacy and war has been predicated on deception as long as there has *been* a China.

Strategic grandmasters from Sun Tzu to Mao Zedong have harped on its value, portraying evasiveness as a way to hold down the costs, perils, and duration of war when China is the stronger contender, or to turn the tables on the strong when China is the lesser contender and needs to prolong the struggle. It is a fixture in Chinese statecraft no matter the situation or correlation of forces. Sun Tzu exhorts commanders and sovereigns to keep foes scurrying about, while Mao proclaims that all warfare is grounded in deception. Small wonder Beijing has made a habit of trumpeting once-*clandestine* military projects when the time is ripe. It’s a way of molding perceptions of Chinese martial prowess, making China appear purposeful and powerful, while at the same time keeping opponents guessing.

And third, military planners think in terms of “operational factors,” namely space, time, and force. To prevail in a given theater, commanders must stage enough force in a particular geographic space for long enough to accomplish

the goals entrusted to them by senior military and political leadership. That might mean mustering enough strength to defeat hostile forces on the scene; it might mean deploying just enough force to balk an opponent’s strategy and stave off defeat. Denying an enemy leisure and elbow room limits its ability to bring armed force to bear, fulfilling its mission. It confers operational and strategic advantage on the competitor able to control these operational factors.

So has it always been. Sea captains dreaded venturing within reach of shore fortresses during the ages of sail and steam. Gunnery ranges were short, meaning the operating space was small. Gun projectiles traversed the operating space within seconds, meaning warning times were short before

hostile gunfire crashed into a warship’s hull. Worst of all, fortresses mounted guns that were larger than a ship’s, boasted more firepower, and had bigger stockpiles of ammunition from which to reload and keep firing. To accomplish their goals, fleets commonly had to operate within zones where space, time, and force were all the adversary’s allies. Hence the

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adage attributed to Lord Horatio Nelson, Great Britain’s god of naval war: “a ship’s a fool to fight a fort.”

Anti-ship ballistic and cruise missiles—latter-day counterparts to cannon fired from land—replicate this dynamic from the age of close-range gunnery. Precise, fast-flying, long-range missiles such as the DF-100 compress space and time for China’s offshore antagonists. PLA firepower could rain down at an instant’s notice if a U.S. or allied fleet ventures within hundreds of miles of Asian seacoasts. It’s as though the fleet is prowling a few miles offshore rather than operating in the vastness—and relative sanctuary—of oceanic space. Hence the effort and resources Beijing has poured into anti-access defenses. It’s an operationally sound way of sea war.

We often debate whether Communist China thinks like an open-ocean maritime power in the mold of the U.S. Navy, Britain's Royal Navy in its heyday, or the Dutch, Spanish, or Portuguese navies deep in the recesses of the age of sail, or whether it thinks like the coastal-defense power it was from the inception of the People's Republic seventy years ago. It's an important topic. The answer could reveal whether Beijing entertains defensive or offensive ambitions, and thus whether it will keep the PLA Navy close to home or operate it across the seven seas as a free-range navy.

Yet the question is less and less important as anti-ship and anti-air weapons and sensor technology matures, bringing more and more oceanic space within reach of "coastal" defenses. An 1,800-mile radius from mainland shorelines encloses an awful lot of sea space, including expanses that mariners regard as "blue water"—the high seas where great navies roam. In a sense, then, the family of missiles PLA weaponeers have fielded in recent decades—including the DF-100—lets China have it both ways in Pacific waters, and to a lesser degree in the Indian Ocean. The PLA can remain true to its tradition of coastal defense while at the same time deploying a blue-water navy.

If so, Beijing may ease into its new standing as a globe-spanning sea power rather than undergo a wrenching transition. Westerners may discern a disjuncture in Chinese maritime strategy where none exists. That's a sobering thought.

Source: James Holmes is J.C. Wylie Chair of Maritime Strategy at the Naval War College. <https://nationalinterest.org/blog/buzz/>

yes-chinas-new-df-100-anti-ship-missile-are-big-problem-124286, 18 February 2020.

OPINION – SD Pradhan

Sino-Pak Nuclear Proliferation Activities and Turkey

Pakistan's nuclear proliferation activities once again are in the news following the detention of a ship (Da Cui Yun) on the 3rd February at the Kangla port bearing a Hong Kong flag and bound for Port Qasim in Karachi for wrongly declaring autoclave, which can be used in the launch process of ballistic missiles, as an industrial dryer. Autoclave is critical for producing silica sheets under controlled pressure for the solid fuel to be used in the ballistic missiles.

Not only the item was wrongly declared but more importantly, the ship belonged to a Chinese company COSCO, which was earlier sanctioned by the US. Significantly, the destination of the ship was Port Qasim in Karachi, where the Space and Upper Atmosphere Research Commission (SUPARCO), responsible for Pakistan ballistic missile programme, is based. These point to the continuing Pak-China proliferation activities with impunity.

This is not the first time that a Pak bound ship was detected carrying missile material and wrongly declaring them to avoid detection. During the Kargil conflict, the North Korean ship Ku Wol San was seized at the Kangla port. This ship was carrying missile components, metal casings and Scud missile manuals to Pakistan, which were declared as the water purifying equipment.

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network as that can have adverse impact on India's security environment. The linkages with Libya, Iran and North Korea are well known. Experts assess that it could be supplying nuclear and missile related material to Turkey as well. A study by the London based think tank IISS had brought out that AQ Khan network was assisted by the Turkish companies, which imported nuclear related material from Europe, manufactured centrifuge parts and shipped them to Pakistan and other countries. It is strongly believed that Turkey could be possessing a number of centrifuges, with the assistance from Pakistan.

When last year, Recep Tayyip Erdogan President of Turkey spoke in favour of producing nuclear weapons at a party convention, the US media pointed out the possibility of Turkey having a nuclear bomb project. The Pak-Turkey clandestine collaboration in nuclear and missile fields appears to be growing very fast. The role appears to have been reversed. While earlier Turkish companies were importing material from Europe and providing them to Pakistan, now Pak is illegally importing nuclear related material from China for Turkey.

India needs to carefully watch the implications of this development. Turkey of late has been taking up the Kashmir issue on behalf of Pakistan. Last year, the Turkish President raised the Kashmir issue at the UNGA and on the 15th February this year while addressing the Pak Parliament, he again raked up the issue and vowed that Ankara would support Pakistan's stand. Declaring that 'today the issue of Kashmir is as close to Turkey as it is to Pakistan', he assured his country's unflinching support on this issue as also on making joint efforts to take out of the grey list of the FATF. He, in his address to Pak parliament, likened the "struggle" of the Kashmiris with that of his country in the World War I (in the battle of Gallipoli) against the foreign domination.

While this was highly illogical, it reflected the growing closeness between the two countries. The Turkish President's statements against India recently have become shriller and louder which could be because of the Turkish increasing dependence on Pakistan for nuclear related material. This linkage needs to be brought to the notice of the International Community.

Source: Times of India, <https://timesofindia.indiatimes.com/blogs/ChanakyaCode/sino-pak-nuclear-proliferation-activities-and-turkey/>, 19 February 2020.

OPINION – Cory Bernardi

Nuclear Energy is Hardly an Option — It's a Must

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Arguably the worst government contract in Australia's history was entered into for shameless political expediency. In an attempt to prop up the re-election prospects of former Liberal minister Christopher Pyne, the Turnbull government inked a deal that undermined our defence capability while also guaranteeing an

-explosion in defence spending.

This egregious combination of pork-barrelling, budget blowouts, dumb defence decisions and ministerial incompetence is not a rarity in modern politics but it has never been seen on the scale of the decision to award Australia's new submarine contract to the French defence contractors.

Only the vainglorious could believe that redesigning a nuclear submarine to use diesel power would deliver the outcomes Australia needs from its future submarine fleet. In fact, it's difficult to see how any diesel-powered submarines could really fulfil our national requirements. They are ideal for shallow-water stealth missions but lack the long-term surveillance and strategic capability of the nuclear vessels.

However, the diesel vs nuclear option wasn't even

a consideration because of a more enduring political stupidity than ministerial boondoggles. The decision to prohibit the development of a nuclear industry in Australia, on the basis of multi-decade alarmist claptrap, has cost this country dearly.

While not wishing to appease climate-change catastrophists, the only viable response to their demands for carbon dioxide abatement while maintaining our standard of living is nuclear power. That this successful, safe and proven option is not countenanced by the green lobby demonstrates how its alarmism is as fake as its save-the-world rhetoric.

An Australian nuclear industry would serve our country in myriad ways. Most obviously, it would open up the opportunity for emissions-free baseload power using one of our most abundant resources. In coastal areas, the cooling process could be coupled to a desalination plant that would provide almost limitless fresh water for irrigation or potable use. The irrigation potential of such a process could transform vast swaths of our arid regions, enabling higher-value crops to replace dryland farming commodities.

There are 440 nuclear power reactors worldwide, generating about 10 per cent of the world's electricity. They are the second largest source of low-carbon power, operational in 30 countries worldwide but exporting electricity to many more.

Many of these countries depend on Australia's mined uranium to operate but it is an advantage our political class denies to its own citizenry.

Australia's known uranium resources are the world's largest and comprise about a quarter of our energy exports, yet we are unable to use them

for domestic benefit, with the single exemption of a multipurpose reactor located in the Sydney suburb of Lucas Heights.

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While Australia's 20-megawatt Open Pool Australian Lightwater reactor is used primarily for medical, scientific and research purposes, its suburban locale demonstrates how the green-inspired fictional horror of a nuclear industry is more political expediency than lived reality.

However, it is this fictionalised nuclear horror story that has seen successive governments unprepared to embrace the unbridled potential that nuclear offers. Our leading scientists have told me that modern nuclear technology is safer than most comparable options, irrespective of the claimed climate benefits.

Nuclear critics often cite the storage and processing of waste as a deal-breaker for nuclear power, but they conveniently ignore the capacity of countries with less political and geological stability than Australia to manage and profit from the exact same process. Few turn away from

prestigious French wines or France's lucrative tourism industry because that country generates 75 per cent of its power through nuclear fission, while also storing and processing nuclear waste.

The same can be said of many other countries where

governments have had the temerity to take on the hypocritical green lobby and its regressive anti-human stance. Unfortunately, this political cowardice doesn't just affect our power potential. It now has had a demonstrable impact on our national defence capability as regards the Turnbull submarine contract.

Rather than acknowledge the respective benefits that nuclear and diesel submarines offer, we have embraced the worst of both worlds by requisitioning a nuclear sub powered by diesel engines simply because political cowardice won't support the development of a nuclear industry here.

If it weren't for this political intransigence, we could be ready to build German or Japanese--designed diesel submarines in Australia while strengthening our relationship with the US through commissioning its nuclear boats for our domestic use. The end result will be billions in wasted dollars, decades of delay and a shameful compromising of our national defence capability.

Australia's determination not to embrace the economic, defence, environmental and research potential that a nuclear industry offers marks the greatest political failure of the past two decades. It has cost our nation significant global investment and scientific advances through collaboration on new nuclear technologies.

Nowhere is this better demonstrated than the worst defence contract in the history of the nation. If it does nothing else in the national interest, the Morrison government would be wise to tear up the existing submarine contract and push the parliament to end the moratorium on a nuclear industry in Australia.

Source: Cory Bernardi was a senator for South Australia from 2006 to this year. <https://www.theaustralian.com.au/commentary/nuclear-energy-is-hardly-an-option-its-a-must/news-story/e7c0da6dc0d7d2a5eb17dcb99083d7c0>, 27 February 2020.

NUCLEAR STRATEGY

PAKISTAN

Pakistan Tests Cruise Missile Ra'ad-II with 600km Range

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Pakistan on 18 Feb 2020 conducted successful flight test of ALCM Ra'ad-II, which has further expanded country's deterrence capabilities, the ISPR said. A press release issued by the military's media wing stated that Ra'ad-II has a range of 600km and "significantly enhances"

the military's air-delivered strategic standoff capability on land and at sea.

The weapon system is equipped with the state of the art guidance and navigation systems ensuring the engagement of targets with high precision, the statement added. The successful flight test was witnessed by Director General SPD Lieutenant General Nadeem Zaki Manj, Chairman NESCOM Dr Nabeel Hayat Malik and other senior officers from

the SPD, strategic forces and strategic organisations.

Lt Gen Manj termed the test as a "major step towards complementing Pakistan's deterrence capability". He also lauded the technical prowess, dedication and commitment of scientists and engineers who contributed whole-heartedly to develop the weapon system and made the

launch a success. ... Last month, the ISPR had said that Pakistan conducted a successful training launch of surface to surface ballistic missile Ghaznavi, capable of delivering multiple types of warheads up to a range of 290 kilometers.

Source: <https://www.thenews.com.pk/latest/615958-pakistan-carrys-out-successful-flight-test-of-cruise-missile-raad-ii>, 18 February 2020.

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USA

The US Navy’s New Nuclear Cruise Missile Starts Getting Real Next Year

The Pentagon intends to create a program of record for a new nuclear-armed, submarine-launched cruise missile in its next budget request, with the goal of deploying the weapon in 7-10 years, according to a senior defense official. Speaking on condition of anonymity during a visit to Minot Air Force Base, the official noted that the department is going through an analysis of alternatives, or AOA, process for the weapon, which was first announced during the rollout of the Nuclear Posture Review.

“We requested \$5 million in FY20, which Congress gave us. There’s nothing in the ‘21 budget because we’ll just continue to use the \$5 million to do the AOA,” the official explained. “But in FY22, I hope that you’ll see a budget request that will begin the program of record for the sea-launched cruise missile.” “You put these on submarines, the Russians won’t know where they are,” the official added. “They’ll hate it. They’ll absolutely hate it.”

As part of the Nuclear Posture Review, rolled out in early 2018, the Trump administration said it would seek two new nuclear capabilities: a low-yield warhead for the submarine-launched ballistic missile, and a sea-launched nuclear-capable cruise missile. The first goal is complete, with the warhead, known as the W76-2, deployed for the first time in late 2019.

The official said the department is still sorting how much money the program might cost, but pointed to the estimated price tag for the Long

Range Standoff Weapon — or LRSO, a new air-launched cruise missile — as a rough estimate. That weapon is projected to cost the Defense

Department about \$8 billion to \$9 billion and a similar amount for the National Nuclear Security Administration, which is charged with developing the warhead, the official said.

“Do you put it on a surface ship? Do you put it on a submarine? Do you use a new missile or an existing

missile? How far does it have to travel? We’re looking at all of this. And then you also have to look at the concept of operations. How you want them to operate? Do you store the weapons on the sub all the time, or do you bring them into port and bring them in a crisis?” the official said.

Strategically, adding the cruise missile would allow the nuclear-armed Navy to go from 12 ships to 20 or 30, which would be “huge” in changing the strategic calculus for China and Russia, the official noted.

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A conventional Tomahawk weapon has a rough range of 1,250–2,500 kilometers, and the range on the new SLCM would likely be longer, as a nuclear warhead weighs less than a conventional payload. The Navy is already investing in its Next Generation Land Attack Weapon, which could provide a more updated system on which to base the SLCM.

The official emphasized that the weapon doesn’t need to be a brand-new design, saying: “It doesn’t have [to] be a big deal” to design and procure. “The SLCM doesn’t have to be a big deal. Could be the same warhead. We’re going to look into that,” the official added. A conventional Tomahawk

weapon has a rough range of 1,250–2,500 kilometers, and the range on the new SLCM would likely be longer, as a nuclear warhead weighs less than a conventional payload. The Navy is already investing in its Next Generation Land Attack Weapon, which could provide a more updated system on which to base the SLCM. The warhead could be a modification of the W80-4, the warhead from NNSA that will

be paired with the LRSO.

Critics of the idea argue that another nuclear weapon adds little to the arsenal, while eating into a naval budget that is already under strain. "A new SLCM would be a costly hedge on a hedge," said Kingston Reif of the Arms Control Association. "The United States is already planning to invest scores of billions of dollars in the B-21 [bomber], LRSO and F-35A [fighter jet] to address the [area-access/area denial] challenge. The Navy is unlikely to be pleased with the additional operational and financial burdens that would come with re-nuclearizing the surface or attack submarine fleet."

Additionally, "arming attack submarines with nuclear SLCMs would also reduce the number of conventional Tomahawk SLCMs each submarine could carry," Reif said.

Regardless of the details for the weapon, the official expects the Pentagon is 7-10 years away from deploying the new SLCM — and that's if Congress backs the plan. Democrats have raised objections to the Trump administration's plans for new nuclear weapons before, but ultimately did not block the W76-2 project from moving forward. "I don't know if Congress is going to make a big deal about it or not because there's really no money involved" in fiscal 2021, the official said. "But it is a new weapon system, and unlike the W76-2, where you're replacing a large warhead for a small warhead, here you're actually introducing more deployed capabilities. But again, it's 7-10 years."

When the Nuclear Posture Review was rolled out, officials emphasized that the SLCM could be used as a bargaining chip in arms control negotiations with Russia. Despite a number of arms control agreements being on the ropes, the official again argued that the SLCM could "give us some leverage to bring [Russia] back to the arms control

table."

Source: Aaron Mehta, https://www.defensenews.com/smr/nuclear-arsenal/2020/02/21/the-navys-new-nuclear-cruise-missile-starts-getting-real-next-year/?utm_source=clavis, 22 February 2020.

BALLISTIC MISSILE DEFENCE

INDIA

How Cutting Edge NASAMS-II Tech Bolsters New Delhi's Security Apparatus

The NASAMS-II, developed by Norwegian defence developer Kongsberg Defence & Aerospace, in collaboration with Raytheon, is primarily used to effectively guard against aerial threats in the form of fighter aircraft, helicopters, unmanned aerial vehicles, and missiles. Developed using a modular design, the NASAMS allows operators to tailor the weapon's configuration to suit specific mission parameters.

... In June 2019, it was reported that India was looking to acquire the highly regarded National Advanced Surface to Air Missile System-II (NASAMS-II) from the United States, as it looks to bolster its security

apparatus in the National Capital Region. India had submitted a formal 'letter of request' to purchase the air defence system in July 2018.

The NASAMS-II, developed by Norwegian defence developer Kongsberg Defence & Aerospace, in collaboration with Raytheon, is primarily used to effectively guard against aerial threats in the form of fighter aircraft, helicopters, unmanned aerial vehicles, and missiles.

The air defence system employs "network-centric, open architecture" that improves its survivability against electronic jamming techniques. Its base weapon is the AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM). The defence system

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The NASAMS-II can be fitted with multiple missile launchers, each capable of launching a maximum of six surface-to-air missiles. Equipped with 360-degree defence capabilities, the system can be used in both day and night operations and transported via rail or truck. The mobile missile launchers can be activated remotely via a Fire Distribution Center (FDC) located up to 25 km away. In total, up to 12 launchers can be installed, firing 72 missiles against 72 separate targets.

The NASAMS was first deployed in Washington DC in 2005 but is designed for operations in sub-tropic, arctic and desert conditions as well. One of the key features of the NASAMS system is its flexible configurations.

Source: Defence Aviation Post, <https://www.defenceaviationpost.com/2020/02/how-cutting-edge-nasams-ii-tech-bolsters-new-delhi-security-apparatus/>, 20 February 2020.

NUCLEAR ENERGY

CHINA

China's Nuclear Power Output Jumps 18% Year on Year

China's nuclear electricity generation rose by 18.1% last year, to 348.13 TWh, which is up from 286.15 TWh in 2018, figures from China's National Energy Administration show. Nuclear's share of total electricity production was 4.88% last year, up from 4.22%.

According to the National Development and Reform Commission, China aims to have 200 GWe of nuclear generating capacity in place by 2035, out of a total generating capacity of 2600

GWe. Under those plans, thermal power plant capacity is expected to increase from 1190.6 GWe in 2019 to 1300 GWe in 2035.

Its nuclear generating capacity increased by 9.1% year on year, from 44.64 GWe to 48.74 GWe, which followed an 18% increase in capacity between 2017 and 2018. Two power reactors were connected to China's grid in 2019 – Yangjiang unit 6 and Taishan unit 2. Total electricity generating capacity grew 5.8% in 2019, to 2010.7 GWe, from 1899.0 GWe in 2018.

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There are a further 12 reactors under construction in China, with a combined capacity of 12,244 MWe. Another 42 units are planned, which will add 48,660 MWe of capacity, with more reactors proposed. China's total electricity generation totalled 7142.2 TWh in 2019, a 5.2% increase from the 6791.42 TWh produced in 2018. The majority of its

electricity is still produced by thermal power plants (predominantly from coal), which accounted for 72.3% of output last year. Hydro, wind and solar provided 16.1%, 5.0% and 1.6%, respectively.

Source: Eurasia review, <https://www.eurasiareview.com/25022020-chinas-nuclear-power-output-jumps-18-year-on-year/>, 25 February 2020.

NETHERLANDS

Don't Close Down Nuclear Power Stations Just Yet: KNMI Chief

Nuclear power should not be excluded as a way to meet climate goals, the director of the Dutch meteorological institute KNMI has told the Financieele Dagblad in an interview, to be published on Saturday. The cabinet's climate plans do not include nuclear energy although economic affairs and climate minister Eric Wiebes is currently investigating what its role may be, the paper said. Gerard van der Steenhoven said that if it were up to him he would keep nuclear power stations open

for longer. The Netherlands' only nuclear power plant, Borssele, is scheduled to close in 2033.

'Considering the major problems, we are faced with, I would continue with the nuclear power stations in Europe, and that includes Borssele in the Netherlands. Nuclear power forms an important part of the energy supply,' he told the FD. The debate about the use of nuclear energy comes in the wake of the news that the Netherlands trails the rest of Europe in terms of renewable energy, putting in doubt the country's ability to meet long-term climate goals without recourse to nuclear power. However, the European Green Deal, which aims for an energy neutral Europe by 2040 and which was brokered by Euro commissioner Frans Timmermans, excludes nuclear power because of the high costs associated with it.

Source: <https://www.dutchnews.nl/news/2020/02/dont-close-down-nuclear-power-stations-just-yet-kgmi-chief/>, 21 February 2020.

UAE

Barakah Nuclear Power Plant Takes a Big Step Forward to Delivering UAE's Clean Energy Future

The first unit of the Barakah nuclear power plant in UAE has received its operating license from the UAE's Federal Authority for Nuclear Regulation, giving the go-ahead for 60 years of operations. Agneta Rising, Director General, World Nuclear Association commented, "This is a big step towards the start-up of Barakah, which will soon supply clean and reliable electricity to the UAE for generations to come."

When the plant begins operations the UAE will become the latest newcomer country to join more than thirty already using nuclear energy to meet their clean energy needs. Also expected to join this

group is Belarus, which is due to start operations at Ostrovets later this year. Reactors are under construction in two other newcomer countries, Bangladesh and Turkey, and projects are in development in Uzbekistan and Egypt.

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When all four units at Barakah are complete the plant will supply 5,600 megawatts of electricity, meeting up to 25% of the UAE's electricity needs. It will help avoid around 20 million tonnes of carbon emissions every year, equivalent to removing 3.2 million cars from the roads.

When all four units at Barakah are complete the plant will supply 5,600 megawatts of electricity, meeting up to 25% of the UAE's electricity needs. It will help avoid around 20 million tonnes of carbon emissions every year, equivalent to removing 3.2 million cars from the roads. The UAE Energy Plan for 2050 is targeting an energy mix that combines renewable, nuclear and other clean energy sources to meet the UAE's economic requirements and environmental goals.

With the operating license granted Nawah, the plant's operator, has begun the process of fuel loading, where 241 fuel assemblies will be lowered by crane into

position in the reactor vessel. Following tests, start-up of the nuclear chain reaction and connection to the grid is expected later this year.

Source: <https://www.world-nuclear.org/press/press-statements/barakah-nuclear-power-plant-takes-a-big-step-forwa.aspx>, 19 February 2020.

URANIUM PRODUCTION

USA

Trump's \$1.5bn Uranium Bailout Triggers Rush of Mining Plans

President Donald Trump's \$1.5 billion proposal to prop up the country's nuclear fuel industry has emboldened at least one company to take steps toward boosting operations at dormant uranium mines around the West, including outside Grand Canyon National Park.

The company, Canada-based Energy Fuels Inc., announced a stock sale and said it would use the proceeds for its uranium mining operations in the US West. The Trump administration asked Congress for \$1.5 billion over 10 years to create a new national stockpile of US-mined uranium, saying that propping up US uranium production in the face of cheaper imports is a matter of vital energy security. Approval is far from certain in a highly partisan Congress.

Some Democratic lawmakers, and market analysts across the political spectrum, charge that the Trump administration's overall aim is really about helping a few uranium companies that can't compete in the global market, and their investors. Demand for the nuclear fuel has languished worldwide since Japan's 2011 Fukushima disaster. US uranium production has plummeted 96 percent in the last five years, the US Energy Information Administration reported.

Energy Fuels Inc., a Toronto-based corporation that is the leading uranium mining company in the US, announced it was selling stock and putting the nearly \$17 million in proceeds into its mining operations in Utah, Wyoming, Arizona, Texas and elsewhere in response to Trump's 2021 budget. Company spokesman Curtis Moore said that could mean opening a mine about 15 miles from the Grand Canyon's South Rim entrance.

Environmentalists and Democrats have opposed uranium mining outside the national park, mainly over concerns it could contaminate water resources. Republicans say mining could bring much-needed jobs to the region. Energy Fuels had been one of the main mining companies seeking US taxpayer support for domestic uranium mining. It also helped sell the Trump administration on cutting the size of Bears Ears National Monument

in Utah to open more land for possible future mining, and oil and gas development. Energy Fuels has no mining claims or land inside the former territory of Bears Ears, Moore said. "So, that's a hard no," he said, to any suggestion it planned any immediate uranium development there.

The Trump administration asked Congress for \$1.5 billion over 10 years to create a new national stockpile of US-mined uranium, saying that propping up US uranium production in the face of cheaper imports is a matter of vital energy security.

a position to use some of the money to put that small mine into production," Moore said. Trump made the request for a new national uranium reserve in his 2021 budget request. It was the latest illustration that trying to rescue the US nuclear and coal industries is a political priority for the Republican president, who often invokes national security as justification.

The move has a range of critics. "It's not the responsibility of the taxpayer to bail out an industry, whether that's uranium, solar, coal, what have you," said Katie Tubb, a senior energy policy analyst at the conservative Washington Heritage Foundation. The Energy Department said the plan would boost work for at least a couple of the US West's nearly dormant uranium operations. Residents near another of the mines, in Utah, say they fear an increase in radioactive threats.

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"Whatever Trump does, we'll be standing our ground to let the people know that we're not going to give up," said Yolanda Badback, a resident of White Mesa, a town of about 200 people who are members of the Ute Mountain Ute Tribe near a uranium mill in southern Utah.

Trump's plan would need approval from a highly

Launching operations at the company's Canyon Mine claim outside the Grand Canyon is definitely on the table, however, if Congress approves Trump's proposal, he said. "Depending on how things go in the coming weeks and months, we may be in

partisan Congress. Rep. Raul Grijalva, an Arizona Democrat and chairman of the House Natural Resources Committee, has opposed Trump's effort to make domestic uranium mining a strategic issue. His aides said they needed to see more details from the administration on the stockpile proposal. Sen. John Barrasso, a Wyoming Republican and chairman of the Senate Environment and Public Works Committee, backed Trump's proposal. "The United States should not be dependent on foreign imports of uranium. It is a risk to our national security," Barrasso said in a statement.

Demand for nuclear and coal power sources has fallen against marketplace competition from ever-cheaper natural gas and renewable wind and solar. Trump has been unable to stop a string of coal and nuclear power plant closures. The US nuclear industry has sought help from the Trump administration, including asking for taxpayer subsidies to promote use of US uranium. US nuclear power plants in 2018 got 90 percent of their uranium from Canada, Kazakhstan and other foreign suppliers and only 10% from US mines.

Trump in 2019 rejected a request from US uranium mining operators that he set a minimum quota for domestic uranium. But he agreed to set up a task force of national security, military and other federal officials to look for other ways to revive domestic production of the whole nuclear fuel supply chain. That task force's findings are expected within two weeks. Trump's budget proposal would be part of an effort "to put the US back in the nuclear game around the world," Energy Secretary Dan Brouillette said.

While Trump has called propping up US uranium mining essential to national security, the Energy Department acknowledged in its budget presentation that "no immediate national security need has been identified" for the uranium reserve. The same document contends that the funds aren't meant to "disrupt market mechanisms." "That is

exactly what it is designed to do," said Luke J. Danielson, president of Colorado-based Sustainable Development Strategies Group, which advises foreign governments about mineral policies. "The history of the government of trying to subsidize the energy sector and pick winners and losers is abysmal," Danielson added.

Many Democratic lawmakers have challenged Trump's security argument for domestic uranium. Existing uranium reserves and production and trade with allies Australia and Canada were already adequate to securing the US uranium supply, Rep. Alan Lowenthal, a California Democrat, said last year.

... Energy Fuels recently laid off nearly one-third of the company's 79 employees at the White Mesa Mill and La Sal Complex mines, both in Utah, he said. At White Mesa in Utah, Badback and other nearby residents participate in a yearly protest walk to draw attention to negative impacts the mine has on an otherwise wide open and remote stretch of land.

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Source: ARABNEWS, <https://www.arabnews.com/node/1628206/business-economy>, 15 February 2020.

NUCLEAR COOPERATION

RUSSIA-EGYPT

Russia Lends Egypt \$25 Billion for Dabaa Nuclear Power Plant

Atomstroyexport, a subsidiary of Russia's State Atomic Energy Corporation, or Rosatom, announced Feb. 17 that three Egyptian companies were awarded a tender offer for constructing the first phase of Egypt's Dabaa nuclear power plant. The three Egyptian companies, competing among 10 others, are Petrojet, Hassan Allam and the Arab Contractors.

The Egyptian government intends to start negotiations within the next few days with the Egyptian Nuclear and Radiological Regulatory

Authority to obtain permission to start implementing the Dabaa nuclear plant project. The plant will be constructed in the Dabaa area of Marsa Matrouh governorate in the west of the country.

The Dabaa plant is the first nuclear plant for peaceful uses, with a total capacity of 4.8 gigawatts. The project is financially supported by Rosatom through a Russian loan amounting to \$25 billion. An official source at the Ministry of Electricity and Renewable Energy told the newspaper Al-Youm Jan. 18 that the Nuclear Stations Authority will obtain permission to establish the nuclear plant in the middle of this year, after completing the procedures for the plant and technical reports. The source asserted that setting the concrete foundations for the first nuclear reactor will take place in mid-2021.

On Feb. 3, the head of the Nuclear Stations Authority at the Egyptian Ministry of Electricity, Mohamed Khayat, affirmed in press statements to the government newspaper Akhbar Al-Youm that Moscow would start building the Dabaa nuclear plant in early 2020.

Egypt signed on Nov. 19, 2015, an agreement with Russia to complete the Dabaa nuclear plant project with four reactors each with a capacity of 1,200 megawatts each. On May 19, 2016, the Egyptian Official Gazette published Egyptian President Abdel Fattah El-Sisi's decision No. 484 of 2015, ratifying the agreement signed between Moscow and Cairo. This agreement granted Egypt a Russian government loan to construct the first nuclear power plant in Egypt — the Dabaa plant.

Under said agreement, Egypt will obtain a \$25 billion loan from Russia to finance the works,

services and shipments related to building and operating equipment for the power units at the Dabaa plant.

... Under this agreement Egypt will use the loan to finance 85% of the total value of the building, construction, insurance and all other related works. Egypt would bear the remaining 15% in the form of installments. The loan is for 13 years at a 3% annual interest rate. If Egypt fails to repay any of the annual interest within 10 working days,

it shall be subject to arrears of 150% of the interest rate calculated on a daily basis.

Meanwhile, Ayman Hamza, a spokesman for the Egyptian Ministry of Electricity and Renewable

Energy, argues that the "Russian loan of \$ 25 billion is not a burden on Egypt. Although it is a huge amount, Egypt will pay its value by selling the energy generated from the nuclear reactors. This project would not be costing Egypt anything."

... In turn, Amjad al-Wakeel, head of Egypt's Nuclear Power Plants Authority, which is affiliated with the Ministry of Electricity and Renewable Energy, told Al-Monitor that the Dabaa nuclear

plant project will bring Egypt \$264 billion in revenues over a period of 60 years, which is the lifespan of the nuclear plant. With regard to safety and security factors, Wakeel confirmed that all technical licenses and initial safety reports submitted by Rosatom had been completed and Egypt agreed to them with the help of a large number of foreign consultants and

experts specialized in this field. ...

Source: <https://www.al-monitor.com/pulse/originals/2020/02/power-plant-nuclear-egypt-russia-loan.html>, 26 February 2020.

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NUCLEAR SECURITY

GENERAL

140 Countries Commit to Enhancing Global Nuclear Security

Government ministers and other high-level representatives from more than 140 countries adopted a declaration at a major IAEA conference to enhance global nuclear security and counter the threat of nuclear terrorism and other malicious acts. From a possible cyber attack on a nuclear power plant to the illicit trafficking of radioactive materials, nuclear security is a growing international concern. The IAEA and its Member States have in recent years intensified their efforts to strengthen nuclear security but agree that more action is needed.

“Nuclear and radioactive material is a magnet for groups with malicious intent that see in this material a possibility to create panic and bring distress and pain to our societies,” IAEA director general Rafael Mariano Grossi said at the opening of the week-long conference at IAEA headquarters, shortly before the declaration was adopted by the participants, including more than 55 ministerial-level representatives.

Nuclear technology and science help improve the lives of millions of people around the world, however, the nuclear and radioactive materials used to produce those benefits must be secured at all times to prevent them from falling into the wrong hands. Nuclear security involves preventing, detecting and responding to malicious acts with nuclear material, radioactive substances or their associated facilities.

In the declaration, IAEA Member States reaffirmed

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The IAEA's activities to strengthen nuclear security include training nearly 13,000 experts, donating radiation detection equipment to 33 countries and providing support to 17 major public events, including World Youth Day in Panama.

the common goals of nuclear non-proliferation, nuclear disarmament and the peaceful uses of nuclear energy and recognized that nuclear security contributes to international peace and security. “We remain concerned about existing and emerging nuclear security threats and committed to addressing such threats,” the ministerial declaration said.

“We encourage Member States to implement threat mitigation and risk reduction measures that contribute to improving nuclear security, including, but not limited to, ensuring the protection of nuclear and other radioactive materials and facilities.”

Nuclear security is a national responsibility, but the central role of the IAEA in facilitating and coordinating international cooperation in this area was also highlighted at the conference and in the declaration. ...

Since the last conference, the IAEA's activities to strengthen nuclear security include training nearly 13,000 experts, donating radiation detection equipment to 33 countries and providing support to 17 major public events, including World Youth Day in Panama, which was attended by Pope Francis and the presidents of seven Latin American countries, and major sporting competitions.

Source: <https://www.powerengineeringint.com/nuclear/140-countries-commit-to-enhancing-global-nuclear-security/>, 11 February 2020.

QATAR

Qatar Affirms Support to IAEA in Nuclear Security Field

Qatar has affirmed that the peaceful uses of nuclear energy, especially in the areas of health, agriculture, industry and the environment, are a

strategic bet and part of its plan for comprehensive economic and social development within the Qatar National Vision 2030.

Delivering a speech before the International Ministerial Conference on Nuclear Security, organized by the International Atomic Energy Agency in Vienna, Ambassador of Qatar to Austria and its Permanent Representative to the United Nations and international organisations in Vienna, Sultan bin Salmeen al-Mansouri said Qatar has adopted appropriate legislation to enhance the safety and security of radioactive materials and is co-operating with the IAEA to promote the Agency's efforts in the field of nuclear security and safety. HE al-Mansouri said that nuclear security is an important component of the international peace and security system, so seeking full and comprehensive implementation of the obligations of states in the field of non-proliferation and nuclear disarmament will contribute to strengthening nuclear security.

He explained that effective national nuclear security systems will contribute to developing the peaceful uses of nuclear energy and in strengthening international efforts to combat nuclear terrorism, expressing his aspiration that the relationship between nuclear security and peace and international security be present in the discussions and in future plans to achieve the main goals and priorities in the field of nuclear security. HE al-Mansouri pointed out that this conference is an opportunity to assess the progress made in the field of nuclear security, to enhance it, to support the collaboration between nuclear security and safety, and to support the Agency's efforts to introduce further improvements to its nuclear security activities, and to maintain the highest safety and security standards in nuclear activities, including facilitating the missions of international advisory missions to atomic energy, with the aim of

reviewing frameworks and structures concerned with nuclear security in states, as well as ways to protect radioactive sources worldwide.

About Qatar hosting one of the most important mass events in the sports field, which is the FIFA World Cup for 2022, HE al-Mansouri revealed that the Qatari authorities specialised in organising the championship are preparing from now to co-ordinate with the IAEA, to benefit from the experiences possessed by the agency in implementing nuclear security measures during major events, and similar to what happened in such activities in other countries of the world. HE al-Mansouri concluded by stressing that great progress has been made in the field of nuclear technology security in recent years, but there is still much work to be done to spread and strengthen the culture of nuclear security on a large scale.

HE al-Mansouri said that nuclear security is an important component of the international peace and security system, so seeking full and comprehensive implementation of the obligations of states in the field of non-proliferation and nuclear disarmament will contribute to strengthening nuclear security.

Source: <https://menafn.com/1099694199/Qatar-affirms-support-to-IAEA-in-nuclear-security-field>, 12 February 2020.

NUCLEAR SAFETY

GENERAL

Ministers at IAEA Conference Highlight Importance of Strong Global Legal Framework for Nuclear Security

Ministers attending the IAEA International Conference on Nuclear Security (ICONS 2020) agreed on the importance of effective international legal instruments for strengthening global nuclear security and recognised the need for all countries that have not already done so to adhere to the CPPNM and its Amendment.

"A nuclear security incident in one country could have effects far beyond that country's borders, so it is vital that all of us remain ahead of the curve in guarding against nuclear terrorism and other malicious acts," IAEA Director General Rafael

Mariano Grossi told a ministerial-level side event on the CPPNM and its Amendment. "Achieving universality of the amended CPPNM is key to our efforts to prevent acts of nuclear terrorism and other malicious acts, and supporting this goal is a priority for the Agency."

The original CPPNM entered into force in 1987 and covers the physical protection of nuclear material used for peaceful purposes during international transport; the criminalisation of certain offences; and international co-operation. The Amendment, which entered into force in 2016, extends the scope of the CPPNM to also cover nuclear facilities and nuclear material used for peaceful purposes in domestic use, storage and transport. It further adds criminal offenses related to illicit trafficking and sabotage of nuclear material or a nuclear facility, as well as provides for strengthened international co-operation. The CPPNM and its Amendment remain the only internationally legally binding undertakings in the area of physical protection of nuclear material and nuclear facilities used for peaceful purposes. Currently there are 160 Parties to the CPPNM and 123 Parties that have also joined the Amendment.

Participants in the side event's panel included Zubairu Dada, Minister of State for Foreign Affairs of Nigeria, Fabio Mendes Marzano, Vice Minister for National Sovereignty and Citizenship at the Ministry of Foreign Affairs of Brazil, Isnaraissah Munirah Majilis, Deputy Minister of Energy, Science, Technology, Environment and Climate Change of Malaysia and Ghislain D'Hoop, Belgium's Ambassador in Vienna and Permanent Representative to the international organizations located here.

Participants discussed their States' efforts to

support a strong and effective legal framework for nuclear security and the IAEA's role in universalization of legal instruments for nuclear security. Swiss Ambassador Benno Laggner moderated the discussion.

"We believe that an effective global nuclear security regime would benefit significantly from a universal application of the international legal instruments in the field of nuclear security because the chain is only as strong as its weakest link" said Mr Dada. "Nigeria calls on all States that have yet to ratify the CPPNM and its Amendment to consider doing so. We also urge

A nuclear security incident in one country could have effects far beyond that country's borders, so it is vital that all of us remain ahead of the curve in guarding against nuclear terrorism and other malicious acts," IAEA Director General Rafael Mariano Grossi told.

the Secretariat to continue its useful work of promoting universalization, and we consider that it is best suited to continue to take the lead in this regard."

Source: IAEA, <https://www.iaea.org/newscenter/news/ministers-at-iaea-conference-highlight-importance-of-strong-global-legal-framework-for-nuclear-security>, 18 February 2020.

NUCLEAR PROLIFERATION

IRAN

Iran's Nuclear Chief: U.S. JCPOA Move Undermining Diplomacy

The head of the Atomic Energy Organization of Iran (AEOI) said that the unilateral pullout of the U.S. from the 2015 nuclear deal, officially known as the JCPOA, has dealt a blow to

the agreement which proved the toughest international issues could be tackled diplomatically.

"It was a dominant belief that the JCPOA could set a model in this regard But, unfortunately, this euphoria didn't last long. With the embedded irrationality in the U.S. administration's mindset, such optimism is fading away so quickly," Ali Akbar

We believe that an effective global nuclear security regime would benefit significantly from a universal application of the international legal instruments in the field of nuclear security because the chain is only as strong as its weakest link.

Salehi told the "International Conference on Nuclear Security" in Vienna, Austria, Press TV reported.

Salehi urged the European Union, as a main stakeholder of the deal, to play its role in keeping the JCPOA alive by living up to its commitments without paying heed to the Trump administration's "unjust pressures." "Unfortunately, the U.S. administration has not yet come to its senses in recognizing the reality on grounds and keeps on inflicting harm on our people as well as the people of the entire region while creating and supporting terrorist groups such as ISIS (Daesh)," Salehi added.

... However, U.S. President Donald Trump, a stern critic of the landmark deal, unilaterally pulled Washington out of the agreement in May 2018, and unleashed the "toughest ever" sanctions in history against the Islamic Republic in defiance of global criticism. The move was intended to strangle the Iranian economy, especially through a total ban on Iran's oil exports.

Under Washington's pressure, the three European signatories to the JCPOA have so far failed to protect Tehran's business interests under the deal against the American bans. In May 2019, exactly one year after the U.S. quit the deal and imposed sanction on Iran, Tehran began to gradually reduce its commitments under the JCPOA to both retaliate for Washington's departure, and Europeans' failure to honor their commitments.

On January 5, Iran took a fifth and last step in reducing its commitments, and said it would no longer observe any operational limitations on its nuclear industry, whether concerning the capacity and level of uranium enrichment, the volume of stockpiled uranium or research and development. However, Iran has insisted if the Europeans honour their obligations it will immediately reverse its decisions.

EU foreign policy chief Josep Borrell has said that Europe must ensure Iran's benefits from the nuclear deal if it wants the deal to survive. "If

we want the Iran nuclear deal to survive, we need to ensure that Iran benefits if it returns to full compliance" he wrote in an article in the Project Syndicate published.

Borrell visited Iran on Feb. 3. He held talks with Foreign Minister Zarif, President Rouhani and Parliament speaker Ali Larijani. Elsewhere in his speech, Salehi said as a member state to the NPT, Iran maintains that in line with Article IV of the NPT, nothing "shall be interpreted as affecting the inalienable right of all the parties to the treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination."

The AEOI chief emphasized that nuclear security and safety measures must be utilized to support such objectives and functions. Late last month, a group of Iranian lawmakers submitted a motion to the parliament calling for Iran's withdrawal from the NPT after the three European signatories to the JCPOA failed to meet their contractual commitments following the U.S. exit.

A member of the Parliament's Presiding Board, Mahmoud Sadeqi, said that the motion had been prepared after the

European trio triggered a dispute mechanism devised in the deal, which could lead to the restoration of UN Security Council sanctions against Iran. Salehi, a nuclear physicist, further said the IAEA is expected to assist its members "upon their request and on a non-discriminatory basis, in their efforts to enhance a sustainable nuclear security regime based on their national needs and priorities."

Iran believes that "nuclear security activities of the Agency should be funded with no string attached by the donors," he added. "Iran has taken upon itself to enhance further the mechanisms of its nuclear security throughout the country, through its own resources and also by utilizing the agency (IAEA) and other member states' potentials," the Iranian nuclear chief said.

He emphasized that the Islamic Republic is updating the regulations regarding the security of

EU foreign policy chief Josep Borrell has said that Europe must ensure Iran's benefits from the nuclear deal if it wants the deal to survive. "If we want the Iran nuclear deal to survive, we need to ensure that Iran benefits if it returns to full compliance."

radioactive sources and the relevant guidance on control and combating illicit trafficking of radioactive and nuclear materials.

Source: <https://www.tehrantimes.com/news/445049/Iran-s-nuclear-chief-U-S-JCPOA-move-undermining-diplomacy>, 11 February 2020.

NUCLEAR DISARMAMENT

GENERAL

UN Disarmament Chief Warns of 'Dark Side' of AI, as Liberals Tout Benefits

The United Nations' top disarmament official says governments need to pay more attention to the "dark side" of artificial intelligence, including the implications of so-called killer robots that could take military decisions out of human hands. The benefits of AI will be groundbreaking but governments need to take stronger measures to prevent bad military applications, including potentially catastrophic hacks of nuclear arsenals, said Izumi Nakamitsu, the UN's undersecretary-general for disarmament affairs.

Nakamitsu offered those views in a recent interview, just before the Trudeau government announced a new partnership with Britain to develop AI projects that could lead to breakthroughs in driverless vehicles and health care for seniors. The government has made AI a pillar of its economic-growth strategy because it views the development of the technology as a means to attract foreign investment and of creating a new sector of high-skilled jobs.

The government is using developments by leading researchers in Montreal and Toronto in "machine learning," the advanced algorithms that new supercomputers use to think in a way somewhat

like humans. "In all likelihood, I'll be in Japan in my old age, looked after by a robot. So it has a huge potential," Nakamitsu said on a trip to Ottawa. "All we are saying is let's try to make sure that the dark side, the negative impact, will be minimized. We need to make sure these technologies will benefit us, not the other way around."

The government said little about the security risks surrounding AI in the announcement with Britain, except that it needs to do more to protect the privacy of Canadians because the technology relies on amassing massive amounts of personal data. On 24 Feb 2020, Industry Minister Navdeep Bains announced a \$5-million investment in a joint British-Canadian venture to fund research into AI challenges, including the development of transport systems, assisting neurosurgeons and helping to better detect and monitor global disease outbreaks.

Bains said in an interview that his top priority is hearing back from an advisory panel on how to make legislative changes to better protect data privacy. "For artificial intelligence to really flourish and have a positive impact on society, you need vast amounts of data as well," said Bains. "As we move forward with that, hopefully we'll be able to tackle some of these issues with respect to weaponization, military and ethical use of AI."

While there could be positive military applications for the new technology, including making missile targeting more precise to minimize civilian casualties, Nakamitsu said legitimate questions remain about whether the weapons themselves could make the actual decisions about when to open fire and what to shoot at — something that should be left to

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humans.

She said she supports the Campaign to Stop Killer Robots, an international movement that has spread to about 60 countries including Canada, that is advocating for a treaty to ban autonomous weapons. Nakamitsu said she's worried about threat of hacking of nuclear arsenals. Nakamitsu wants Canada to do more to promote nuclear disarmament, especially if it succeeds in its campaign for a two-year temporary seat on the UN Security Council. ...

Foreign Affairs Minister Francois-Philippe Champagne made no mention of disarmament issues as he outlined Canada's priorities on foreign policy as it campaigns for the June election to the UN body. Meanwhile, Prime Minister Justin Trudeau's office has not responded to multiple requests by the Canadian Network to Abolish Nuclear Weapons, a coalition of non-governmental organizations, to take up the mantle of fighting for nuclear disarmament.

In Ottawa, Nakamitsu met with parliamentarians and grassroots anti-nuclear advocates, but she had no meetings with Trudeau's cabinet or his staff. In Europe, the reception she receives is at a higher political level. She recently addressed the European Parliament's defence committee. She said Europeans are concerned because the U.S. and Russia scuttled their Intermediate Range Nuclear Forces, or INF, treaty that dated back to the Cold War. They are also seized by the Trump administration's withdrawal of the U.S. from the Iran nuclear deal that included France, Britain, Germany and China, which was designed to keep Tehran from developing nuclear weapons technology. ...

Source : *The Province*, <https://theprovince.com/pmn/news-pmn/canada-news-pmn/un-disarmament-chief-warns-of-dark-side-of-ai-as-liberals-tout-benefits/wcm/4d9fcceb-b7e5-48f9-bd2d-c0f211a7f0b9>, 24 February 020.

NUCLEAR TERRORISM

GENERAL

IAEA Database Shows Continued Incidents of Trafficking and Loss of Control of Nuclear and Other Radioactive Material

The IAEA last year received notifications of nearly 190 incidents of nuclear and other radioactive material being out of regulatory control, including some cases of trafficking and other criminal activities. The data – submitted to the IAEA's ITDB by countries on a voluntary basis – was highlighted in an annual fact sheet published during IAEA ministerial conference on strengthening nuclear security and countering the threat of nuclear terrorism.

With 140 participating States, the database plays an important role in fostering international cooperation and information sharing among countries. By reporting lost or stolen material to the ITDB, countries increase the chances of its recovery and reduce the opportunities for it to be

used in criminal activities. The information is shared with the IAEA, other Member States and relevant international organizations supporting the retrieval of lost or stolen material and the prosecution of suspected criminals. ...

The focus of nuclear security is to prevent, detect and respond to potential nuclear security events. Its objective is to protect people, property, society and the environment from the harmful consequences of criminal or other intentional misuse of nuclear and other radioactive material.

In 2019, 189 incidents were reported by 36 States, indicating that unauthorized activities and events involving nuclear and other radioactive material, including incidents of trafficking and malicious use, continue to occur. Six of the incidents were related to trafficking or malicious use, continuing a slight downward trend since a peak of 20 such incidents around 15 years ago. For the other 183 incidents, there was either insufficient

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information to determine any connection with trafficking or malicious use or sufficient information to determine there was none. Over the last ten years, the average number of incidents submitted to the ITDB has been 185 per year.

At the conference, government ministers and other high level representatives from more than 140 countries adopted a declaration to enhance global nuclear security, including a specific commitment "to combatting illicit trafficking of nuclear and other radioactive material and to ensure that the material cannot be used by non-State actors for malicious purposes."

Source: IAEA, <https://www.iaea.org/newscenter/pressreleases/iaea-database-shows-continued-incidents-of-trafficking-and-loss-of-control-of-nuclear-and-other-radioactive-material>, 13 February 2020.

SYRIA

Syria Warns of 'Terrorists' Using Nuclear Weapons as War Worsens at Home

A senior Syrian official warned world powers of the potential of militant groups gaining access to nuclear weapons as a war at home worsened among both domestic and international forces.

Bassam Sabbagh, Syria's permanent representative to the United Nations IAEA, told an agency gathering that "the issue of nuclear security has emerged during the past decade as an important issue that calls the attention of the international community and that the convening of this conference for the third time reflects the increasing importance of nuclear security as a common global area of concern," according to the official Syrian Arab News Agency.

The diplomat argued that criminal or "terrorist" groups could potentially get their hands on and use nuclear or radioactive material to advance

their agendas, presenting a major threat to global security, especially as borders are increasingly violated and cyberwarfare becomes increasingly commonplace. He invited foreign delegates to visit Syria and pool their efforts against such risks.

Criminal or "terrorist" groups could potentially get their hands on and use nuclear or radioactive material to advance their agendas, presenting a major threat to global security, especially as borders are increasingly violated and cyberwarfare becomes increasingly commonplace.

Though a nearly nine-year nationwide civil war has calmed in many parts of the country, it has intensified in the northwest in recent months. Here, failing cease-fires between Russia and Turkey have given way to a government offensive in Idlib, the last province largely under the control of rebels and jihadis battling overthrow President Bashar al-Assad.

Despite Moscow's efforts to prevent direct hostilities between the forces of Ankara and Damascus, recent deadly exchanges threatened to erupt into a wider conflict between neighboring states in the Middle East.

Israel is the only country believed to possess nuclear weapons in the region, though it does not officially acknowledge such a program. The country, however, admitted its role in conducting airstrikes targeting nuclear reactors in Iraq in 1981 and in Syria in 2007 and has also been accused of participating jointly with the United States in efforts to sabotage Iran's nuclear activities.

Nuclear security applies to every country, whether it does or does not have nuclear and other radioactive material. Threats to nuclear security know no borders and the IAEA is the focal point for international cooperation to ensure that we can all work together to address and respond to this global challenge.

IAEA Director General Rafael Mariano Grossi said in his opening statement at the nuclear conference that "Nuclear security applies to every country, whether it does or does not have nuclear and other radioactive material. Threats to nuclear security know no borders and the IAEA is the focal point for international cooperation to ensure that we can all work together to address and respond to this global challenge."

The war in Syria has demonstrated a particular tendency to cross international boundaries, with groups coming from across the region and beyond to back multiple, opposing factions. Though nuclear weapons have yet to factor into the

conflict, the U.N.'s Organization for the Prohibition of Chemical Weapons has recorded multiple uses of chemical warfare, the majority of which it has blamed on the Syrian government. Syria and its allies have denied such allegations, blaming insurgents for staging such attacks in a bid for international support. The Russian military warned, without evidence, that members of the Syria Civil Defense, also known as the White Helmets, would release footage of a fake chemical attack in Idlib, where the Syrian military has recently made gains. ...

Source: Tom O'Connor, Newsweek, <https://www.newsweek.com/syria-nuclear-weapons-terrorists-war-worsens-1486819>, 11 February 2020.

NUCLEAR WASTE MANAGEMENT

GENERAL

Transforming Nuclear Waste into Wealth

Nuclear waste is wealth, as long as its management and regulation are given utmost importance by the states, said CP Kaushik, associate, director, Nuclear Recycle Group, BARC. He was speaking during the international conference on

nuclear waste management conducted at Symbiosis Law College. Experts from across the globe gave inputs as to how India and the world need to focus on nuclear energy since its applications are increasing.

Kaushik, who was invited to give the inaugural address, said, "India being a developing country needs to bridge the gap between supply and demand of electricity to meet the growth. Nuclear waste is wealth, as long as its management and regulation are given utmost importance by the states.

"Nuclear energy's importance cannot be denied since its applications are increasing. For example, it has become indispensable in the medical field. India is in the "international driver-seat" for utilisation of nuclear technology for power production and societal benefits" he said.

The conference also showcased lecturers from

Germany wherein experts spoke on how the country is now looking towards alternative sources of energy which are considered to be less risky than nuclear sources of energy. Thomas Schomerus, professor in energy and environmental law, Leuphone University, Germany, spoke on 'German Nuclear Energy Law and the final disposal of Radioactive Waste'. He spoke about the Atomic Energy Act in Germany that is phasing out the mechanism and preventing distribution of further nuclear plant permits. In the final part of his address, Schomerus spoke of the final disposal of radioactive waste and how Germany lacks a viable repository to dispose of high-level nuclear waste.

The international conference is aimed at making the participants aware of status and need of nuclear waste management, spreading awareness among legal practitioners, research institutes, industry, authorities, students, academics and

non-governmental organisation and most importantly, promoting interdisciplinary collaboration and exchange of ideas with the aim of creating a well-rounded position paper on nuclear waste disposal.

The conference saw dignitaries including convenor of the conference, Shashikala Gurpur, Fulbright scholar, director, Symbiosis Law School, Pune; Yogesh Patil, head research and publication, Symbiosis Centre for Research and Innovation; Anupam Saraph, professor, Symbiosis Institute of Computer Studies and Research; Thomas Schomerus, professor in energy and environment law, Leuphone University, Germany and Dörte Fouquet, partner, Becker Buttner Held (Specialised Energy and Infrastructure Law Firm) Brussels, Belgium.

The conference consisted of two plenary sessions. The first plenary session was on the topic of legal regime of energy and nuclear waste management in India with JKoley, head, directorate of regulatory inspection, AERB and Thomas Schomerus as the honourable panellists followed by the second plenary session, focusing on the topic of 'Integrated waste management system' by Dörte Fouquet, CP Kaushik, associate director, nuclear

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recycling group, BARC.

Source: *Hindustan Times*, <https://www.hindustantimes.com/cities/transforming-nuclear-waste-into-wealth/story-aOtp25gTvyI9SlutPXSTEJ.html>, 15 February 2020.

USA

Recycled Nuclear Waste will Power a New Reactor

Idaho National Laboratory sprawls across nearly 900 square miles in the southeastern corner of its namesake state. Home to America's first nuclear power plant, INL has served as the proving grounds for the future of nuclear energy technology for decades. Along the way, the lab has generated hundreds of tons of uranium waste that is no longer efficient at producing electricity. The spent fuel resides in temporary storage facilities while politicians duke it out over where to bury it.

Most of this spent fuel will probably end up underground, although where and when are open questions. As it turns out, a lot of people aren't thrilled by the idea of having nuclear waste buried in their backyards. But at least some of the spent fuel may have a second chance at life feeding advanced nuclear reactors that will be smaller and safer than their predecessors. For the past year, scientists at INL have started recycling spent uranium to meet the fuel needs of a new generation of small commercial reactors.

INL tapped the nuclear energy startup Oklo as the first company to gain access to its stock of recycled uranium fuel. Oklo's reactor, known as Aurora, will be a lot different from the reactors on the grid today. Each of America's 96 nuclear reactors are housed on sprawling campuses and are capable of providing anywhere from 600 to 4,000 megawatts of power. Aurora, meanwhile, will look like a small A-frame cabin and generate

just 1.5 megawatts. Oklo's reactor also departs from legacy nuclear systems in its fuel of choice. Known as "high-assay, low-enriched uranium" or Haleu, this fuel packs more energy into a smaller package.

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In nature, uranium ore mostly consists of the isotope uranium-238 and a sprinkling of uranium-235. Only uranium-235 can sustain the fission reaction that makes nuclear reactors tick, so turning the ore into usable fuel requires separating the uranium-238 out in a process called enrichment. Today, all the nuclear reactors in the US

only use fuel enriched to less than 5 percent, but Haleu fuel is enriched to anywhere from 5 to 20 percent. According to Jacob DeWitte, the co-founder and CEO of Oklo, the fuel used in Aurora will be at the higher end of that range.

... INL's decision is a big step forward for Oklo and advanced nuclear energy systems in general. The lab is currently the only facility in the US capable of producing Haleu fuel, which means any advanced nuclear system that uses the fuel must secure the lab's blessing before it can begin demonstrating its reactor.

Oklo is currently preparing an application to build its first Aurora reactor and plans to submit it to the Nuclear Regulatory Commission for review next month. ... Assuming everything goes according to plan, Oklo's Aurora would be the first American reactor to run on Haleu derived from spent nuclear fuel.

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DeWitte says the Aurora demonstration reactor will require several thousand

pounds of Haleu fuel. It's a tall order considering that until a few months ago, the fuel was effectively nonexistent in the US. INL estimates that it has enough spent nuclear fuel on site to produce up to 10 metric tons of Haleu. After a year of recycling the spent fuel, the lab has produced over 1,000 pounds of near-fuel-grade

material, but Jess Gehin, chief scientist at INL's nuclear science and technology directorate, expects to increase this production rate as the lab refines its processes.

INL is using spent fuel from the Experimental Breeder Reactor-II, a nuclear power station that provided electricity for much of the lab for nearly 30 years and also used recycled fuel. To turn the reactor's spent fuel into Haleu, INL scientists first separate the uranium-235 from unwanted elements, such as plutonium, produced during the reactor's operation. This involves soaking the spent fuel in a bath of molten salt and then zapping the concoction with a big dose of electricity to heat it to nearly 1,000 degrees Fahrenheit.

Since the uranium-235 used in the Experimental Breeder Reactor was enriched to 67 percent, it must also be blended to bring it to enrichment levels below 20 percent by mixing the uranium-235 with other isotopes that can't be used as fuel. Finally, the downblended uranium-235 is converted into small pucks just a few centimeters across that can be used as feedstock for the fuel fabrication process. ...

The National Energy Institute predicts that by 2030 America's annual demand for Haleu fuel will be 100 times larger than it is today, driven largely by

the expansion of advanced commercial reactors like Oklo's Aurora. INL won't be able to supply all this fuel on its own, nor was it meant to. Its job is to produce enough of the stuff to allow Oklo and other companies working on advanced nuclear energy to demonstrate their reactors. To truly meet the surge in demand, the US will need a robust commercial supply chain.

Last year, Department of Energy officials announced they had awarded the nuclear energy company Centrus a \$115 million contract to kickstart the commercial production of Haleu fuel at the Centrus uranium enrichment plant in Ohio. Earlier this month, the department gave another nuclear energy company, BWX Technologies, a \$3.6 million contract to produce the fuel, which BWX plans to deliver by 2024.

Unlike Idaho National Laboratory, these companies will be enriching uranium to produce Haleu rather than downblending highly enriched uranium from spent nuclear fuel. Even though Oklo's reactors can run on recycled nuclear fuel, the first units to hit the grid will almost certainly be powered by fresh uranium fuel. ...

Source: Daniel Oberhaus, <https://www.wired.com/story/recycled-nuclear-waste-will-power-a-new-reactor/>, 27 February 2020.



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