



OPINION – Manpreet Sethi

Vol 18, No. 10, 15 MARCH 2024

India's Nuclear Power Journey: Why has it Grown in Fits and Starts?

On February 22, 2024, PM Modi dedicated units 3 and 4 of the Kakrapar Atomic Power Station (KAPS) to the nation. The construction of both units had started in November 2010 with a plan to complete it in five years. Eventually, it took double that time for KAPS 3 to go critical on July 22, 2020. It took another three years for some commissioning issues to be sorted out. Unit 4 achieved criticality on December 17, 2023 and was connected to the power grid just two days before the PM's latest visit. At 700 MWe capacity, KAPS 3 and 4 are the scaled-up versions of earlier variants of CANDU PHWRs that India first built with Canadian help.

Having graduated from the two 540 MWe that India had upscaled in the 2000s from the 220 MWe, they are currently the largest capacity reactors that India has indigenously designed and built. With these two, India now has 24 operational nuclear reactors with a total capacity of 8,180 MWe. The target now is to get to 22,480 MWe by the start of the next decade. NPCIL, currently India's only operator of nuclear reactors, announced in February 2024 that it will add 18 more nuclear reactors to produce another 13,800 MWe of

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electricity by 2031-32. India wishes to avail advantages of economies of scale by standardising the design of 700 MWe capacity reactors for 'fleet construction'. Ten of these have already been sanctioned to be built at Gorakhpur in Haryana, Kaiga in Karnataka, Chutka in MP and Mahi Banswara in Rajasthan and are at various stages of construction.

Will India be able to achieve these targets? Will these plants come up as expected, with one new plant being commissioned every year, as was announced by the Minister in charge of atomic

energy at the start of this decade? Scepticism is natural given the experience in India of the long gestation of nuclear plants. On many occasions, ambitious targets have had to be revised. Why has India missed targets so often? Why has the perception grown that India's nuclear power potential is overpromised but under-achieved?

Factors Responsible for the Fits and Starts Early

Initiation into Nuclear Energy:

The Indian nuclear programme was amongst the first high-end science and technology efforts to be announced after independence as PM Nehru was laying the foundation of modern India. He had a worthy teammate in Homi J Bhabha, the architect of India's nuclear programme, who had, in fact, written a letter on March 12, 1944, to the trustees of Sir Dorabjee Tata Trust proposing the establishment of an institute to train nuclear scientists. This was even before the use of atomic bombs by the USA.

Bhabha expressed his vision thus, "When nuclear energy has been successfully applied for power production, in say a couple of decades from now, India will not have to look abroad for its experts, but will find them ready at hand." Nehru too acknowledged the importance of atomic energy in his Presidential address to the Indian Science Congress in 1947, where he said atomic energy "may be used for war or may be used for peace. We cannot neglect it because it may be used for war...we shall develop it, I hope, in cooperation with the rest of the world and for peaceful purposes." Therefore, the initial focus was to tap the civilian potential of the atom. Accordingly, India legislated the Atomic Energy Act on April 15, 1948, leading to the creation of the Atomic Energy Commission on

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It may be recalled that internationally, too, this was the period of nuclear euphoria when people believed that nuclear electricity would be so cheaply produced that it would not require to be metered. US President Eisenhower announced the Atoms for Peace programme in 1953, where under the USA entered into nuclear cooperation agreements with many countries. This proved to be timely for India, as was Bhabha's chairmanship of the International Conference on Peaceful Uses of Nuclear Energy in 1955. In his opening address, he highlighted the importance of this energy for developing nations: "For the full industrialization of the underdeveloped countries and for the continuance of our civilization and its further development, atomic energy is not merely an aid, it is an absolute necessity."

Making use of his contacts abroad, Bhabha secured nuclear cooperation for India from a number of sources. In June 1954, he requested Sir John Cockroft, his colleague from Cambridge and an important figure in the British atomic programme, to help India build a low-power research reactor. 'Apsara,' a research reactor that he designed with initial fuel from the UK, went critical in August 1956. The second research reactor to attain criticality, in 1960, was CIRUS—a 40 MW reactor built with Canadian help and with the heavy water supplied by USA. Canada also helped India set up its first power reactor, a PHWR, at Rawat Bhatta in Rajasthan. Meanwhile, the US helped India construct two 200 MWe (later 160 MWe) BWRs at Tarapur.

Built through a turnkey project, Tarapur Atomic Power Stations (TAPS) went critical in 1969 and

provided India with valuable reactor construction and operating expertise, besides electricity to the grid. It should also be mentioned that Bhabha had conceptualised a three-stage plan for India's nuclear energy trajectory. After the first phase of construction of PHWRs, he planned the second phase with fast breeder reactors and then the third stage of thorium utilisation. The details of this plan and its relevance in today's times will be discussed in a future column, but suffice it to say that India's investment in nuclear energy was with a clear blueprint in mind. Nuclear energy was seen as a long-term commitment to achieve energy self-sufficiency.

First Shock of 1974: The plans, however, began to look shaky once India conducted a PNE in 1974. Washington perceived this as a betrayal of trust by India, for it had used the heavy water supplied for CIRUS and the plutonium produced therefrom in its nuclear explosive device. Hence, under US laws, it ceased all cooperation with India and also reneged on its contractual obligations to supply enriched uranium to fuel the two power plants at Tarapur.

India, however, maintains that it violated no contractual commitments in conducting the PNE since these, during the 1960s and 70s, were considered legitimate civil engineering purposes, with the US and USSR themselves conducting several PNEs. Notwithstanding this argument, India came under sanctions and was denied access to dual-use technology, the list for which went on expanding through the 1980s and 1990s. Therefore, India's nuclear power programme was forced, after 1974, to rely on indigenous R&D and domestic industrial efforts. This resulted in time delays and cost overruns for existing projects. Installed capacity in 1979-80 was about 600 MWe, and it could climb to no more than 950 MWe by 1987.

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In fact, after RAPS 1 went online in 1973, there was a long gap until 1981 when RAPS 2 started commercial power production. Only two other power plants, MAPS 1 and 2 at Madras, became critical in the 1980s. Four more—NAPS 1 and 2 at Narora & KAPS 1 and 2 at Kakrapar—came online in the 1990s. By 2000, the total nuclear energy generation stood at a mere 2,720 MWe. So, the PNE impacted the pace of India's nuclear power programme by putting a hard stop to ongoing nuclear cooperation and compelling India to rely on its own scientific and technological resources. It brought India onto the nuclear proliferation radar

and made it a victim of technology denial regimes, many of which were created as a consequence of the Indian action. Thereafter, the power programme struggled over the next two decades.

Second Shock of 1998: It was only by the second half of the 1990s that the nuclear power programme began to get back on its feet. Indigenous efforts led to the construction of the first 540 MWe nuclear reactor. Overall, seven

plants were under construction by 1998. That is when India chose to overtly demonstrate its nuclear weapons capability. Though this time, the pace of work on power reactors remained largely unaffected, constraints on further growth of the programme began to be felt in the early years of the new millennium.

These were felt not in nuclear technology, expertise or financing but in the availability of uranium as fuel for an expanding power programme. This challenge, and the desire of the DAE to rapidly enhance nuclear power production through the induction of additional imported, larger capacity power reactors, persuaded the government of the day to explore options for international civilian nuclear cooperation. A window of opportunity opened when President

Bush offered the promise of a constructive nuclear engagement with India. His vision was encapsulated in the joint Indo-US statement of July 18, 2005, signed when Prime Minister Manmohan Singh visited Washington. This was an implicit recognition of India as a rising economic power with substantial energy requirements and as a "responsible state with advanced nuclear technology".

Therefore, from being viewed as an outcast to being chastised for "illegal" nuclear weapons possession, the then Indian PM described it in the Indian Parliament as a step where: "The existence of our strategic programme is being acknowledged even while we are being invited to become a full partner in international civil nuclear energy cooperation".

Nuclear Accident at Fukushima, 2011: It took three years of negotiations between India and the USA to arrive at an agreement on civil nuclear cooperation. Debates within both countries examined the pros and cons of such engagement. Meanwhile, Washington had to amend its own legislation to enable cooperation with India, and New Delhi had to envisage and engage in a separation plan to distance its civil and strategic nuclear programmes. Finally, in 2008, after fixing all the necessary national and international requirements, signed the 123 Agreement.

Thereafter, the Nuclear Suppliers Group granted a waiver to India to partake in international nuclear commerce. Between 2008 and 2011, India signed

several MoUs with many countries for the import of uranium as nuclear fuel and also for the construction of large-capacity imported nuclear reactors.

Nuclear enthusiasm and dreams of rapid reactor expansion soared, only to be dashed by an accident at the Fukushima nuclear power plants in Japan in 2011. This cast a pall of gloom on nuclear energy programmes worldwide. Concerns about nuclear safety compelled governments to institute safety reviews and scale back expansion plans. India, too, became a victim of this even as it was getting ready

to take steps towards opening up its nuclear sector to entry of domestic and international private players.

Nuclear Liability Law, 2011: Fukushima brought attention to civil liability in case of an accident. In the case of India, the NPCIL, created in 1986, had been the sole designer, constructor and operator of all nuclear reactors in India. Accordingly, the liability rested with the government of India. But, as the prospects of entry of private players into the field grew after 2008, it became necessary to enact the required legislation.

Influenced by the experience of Fukushima, as also by that of the Bhopal Gas tragedy of 1984, when an accident in a gas plant run by an American company, Union Carbide, had led to the

death of 20,000 people, the government drafted a stringent Civil Liability for Nuclear Damages Act (CLNDA). In fact, at the time that the Act was being debated in India, the verdict for the Bhopal gas leak accident was announced, and the public mood

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India and the USA

was critical of the inordinate delay in providing compensation to the victims and the inadequacy of the compensation amount. Therefore, the opposition parties then insisted on a strong nuclear liability law.

As it came into being, the CLNDA made both the suppliers and operators liable in case of an accident. While this was done to assuage public concerns, it was seen as a harsh move by the private industry, and it turned away prospective nuclear suppliers from wanting to invest in the nuclear sector. Subsequently, to reassure the suppliers that they would not be held liable and that the NPCIL as operator would be the one in charge, the government provided clarifications through a special notification in 2015. In 2016, it also set up an insurance pool to facilitate confidence by covering suppliers' risk. A special Nuclear Liability Fund of Rs 2000 Crores was created to cover damages resulting from a nuclear accident in case they exceeded the limit specified at Rs 1500 Crores for nuclear power operators under the CLNDA.

However, private participation in the construction and operation of nuclear reactors in India has yet to see the light of the day. While private industry has long been engaged in supplying equipment to the NPCIL, the hope of their teaming up with NPCIL for a partnership has not yet occurred. Meanwhile, another public enterprise, the NTPC, did form a JVC named Anusakthi Vidyut Nigam Limited (ASHVINI) with NPCIL in 2011. Atomic Energy Act was amended in 2015 to enable such joint ventures of PSUs to build, own and operate nuclear power plants in India. Press reports of May 2023 indicated that the JV will build the 2 x 700MW Chutka Madhya Pradesh atomic power project and the Mahi Banswara Rajasthan atomic power

project, which has a 4 x 700MW capacity.

Meanwhile, in another attempt to rejuvenate the possibility of private participation, it was reported in February 2024 that India would seek funding

from private industries up to the tune of US\$ 26 billion to accelerate the nuclear power programme as a way of reaching India's commitment of 50 per cent electricity from non-fossil fuels by 2030. Under the proposed plan, private companies like Tata Power, Reliance Power, Adani Power and Vedanta, will

invest in the nuclear plants, acquire land, and undertake construction in areas outside the reactor complex of the plants since the right to build and run the stations and their fuel management will rest with NPCIL. But, the private companies are expected to earn revenue from the power plant's electricity sales and NPCIL would

operate the projects for a fee. It remains to be seen whether this hybrid model will receive enough traction from the domestic private industry.

The Future: With more than six decades of operational experience and 24 operating nuclear power plants, India's nuclear

establishment has shown its scientific and technological prowess. It is also clear that this experience can come in handy to enable India to meet its climate commitments. The benefit of nuclear energy as a baseload source of low-carbon electricity is unmatched by the currently popular renewable sources such as solar and wind. But nuclear energy can make a worthwhile contribution to electricity generation only if it can see rapid expansion. For this, the nuclear sector needs public-private partnerships. This partnership refers not only to NPCIL and private industry but also to a pact of trust between the nuclear establishment and the public. Interestingly, the international mood for providing

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help to India with nuclear fuel and technology is favourable. Fortunately, India also has the indigenous expertise and engineering experience to make the most of the time.

However, domestic outreach to the Indian public is imperative to explain to them the need for nuclear energy as an environmentally friendly source of electricity and the amount of effort put into nuclear safety and security. This could help overcome some of the scepticism. Several factors are responsible for why the Indian programme has not performed as well as it could have given the early start. This understanding is important to retain faith in this source of electricity generation, whose importance will only grow as climate change concerns require urgent mitigation and a growing economy demands more and more electricity.

The value of India's nuclear power programme should not be underestimated despite its low contribution to overall electricity production at this moment. If all things go right, including the

operationalisation of the prototype fast breeder reactor that would herald the start of the second stage of its programme, the sector could yet take off. Further discussions on the opportunities and challenges will continue in future issues of this column.

Source: https://capsindia.org/wp-content/uploads/2024/03/CAPS_NuClearnly-Put_MS_29_02_24.pdf, February 29, 2024.

OPINION – Joseph S. Nye, Jr.

Is Nuclear Proliferation Back?

Preparations are already underway at the United Nations for the 2026 Review Conference of the Parties to the NPT, which was originally signed in

1968. Many expect a contentious event. Some countries are having second thoughts about the principle of non-proliferation, because they wonder if Russia would have invaded Ukraine in

2022 if the latter had kept the nuclear weapons it inherited from the Soviet Union.

Such counterfactuals, in turn, have renewed others' fears of nuclear proliferation.

These concerns are not new, of course. In my memoir, *A Life in the American Century*, I revisit an equally contentious period in the 1970s, when I was in charge of US

President Jimmy Carter's non-proliferation policy. Following the 1973 oil crisis, the conventional wisdom was that the world was running out of oil and needed to turn to nuclear energy. However, it

was also widely – and wrongly – believed that the world was running out of uranium and therefore would have to rely instead on reprocessed plutonium (a byproduct of the uranium used in nuclear reactors).

According to some forecasts at the time, as many as 46 countries would be reprocessing plutonium

by 1990. The problem, of course, was that plutonium is a weapons-usable material. A world awash in the trade of plutonium would be at much greater risk of nuclear proliferation and nuclear terrorism. In 1974, India became the first country beyond the five listed in the NPT to launch what it euphemistically called a "peaceful nuclear explosion." It used plutonium reprocessed from American and Canadian uranium, which had been provided on the condition that it would be used for peaceful purposes only. France then agreed to sell a plutonium-reprocessing plant to Pakistan, whose prime minister, Zulfikar Ali Bhutto, had said the country would eat grass before letting India develop a nuclear monopoly in South Asia.

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Following the 1973 oil crisis, the conventional wisdom was that the world was running out of oil and needed to turn to nuclear energy. However, it was also widely – and wrongly – believed that the world was running out of uranium and therefore would have to rely instead on reprocessed plutonium (a byproduct of the uranium used in nuclear reactors).

Meanwhile, in Latin America, West Germany was selling a uranium-enrichment plant to Brazil, and Argentina was exploring its options for using plutonium. With other countries quietly doing the same, an incipient nuclear arms race was developing.

A decade earlier, US President John F. Kennedy had warned that the world would have 25 nuclear powers by the 1970s. Though the NPT was supposed to avert that scenario, it was beginning to look like his prognosis might come true. But Carter (who had experience as a nuclear engineer in the Navy) was determined to prevent this when he arrived in the White House. For my part, I had recently served on a Ford Foundation and Mitre Corporation commission on nuclear energy and non-proliferation – which included multiple eventual members of the Carter administration. While many feared that the world was headed for a plutonium economy and the spread of nuclear weapons, the Ford-Mitre Report called this conventional wisdom into question and argued that the safest way to use nuclear energy was with an internationally safeguarded “once through” fuel cycle that would leave the plutonium locked up in the stored spent fuel.

Carter accepted our report when we met with him in the White House. But our recommendation was wildly unpopular with the American nuclear industry and with senators from western and southern states whose facilities would be closed. It was also anathema to allies such as France, West Germany, and Japan, whose energy strategies (and exports) would be undercut. My job, when I entered the administration, was to

implement Carter’s policy, which resulted in heavy criticism from all the groups mentioned above. As an academic, it was a new experience to see my name in critical editorials and headlines, or to be

hauled before a Senate committee for a hostile grilling. When you are constantly being told you’re wrong, it is sometimes hard to remember that you might be right!

The question was how to break through the conventional wisdom that was driving the world toward a plutonium economy. We invited other countries to

join an International Nuclear Fuel Cycle Evaluation, so that we could examine subjects such as the availability of uranium supplies and the ability to safeguard plutonium. The INFCE was launched at a large conference in Washington, DC, in 1977, and its committees and working groups then met

for the next two years. It thus played a central role in Carter’s strategy to buy time, to slow things down, and to develop transnational webs of knowledge about the true costs and alternatives to what the nuclear industry regarded as the immutable nature of the nuclear-fuel cycle.

Over those two years, the INFCE did much to advance these objectives. The major nuclear-supplier countries

met in London in 1977, and agreed on guidelines to “exercise restraint” in the export of sensitive nuclear facilities. Soon thereafter, France and West Germany suspended their exports of controversial facilities. Where does nuclear non-proliferation stand today? The good news is that there are only nine countries with nuclear weapons, compared to the two dozen that Kennedy predicted by the 1970s. Moreover, the NPT has 189 parties and is one of the few arms-control agreements that the major powers still observe. The Nuclear Suppliers

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The bad news is that North Korea has abandoned its commitments under the NPT. It has achieved six nuclear explosions since 2006, and Kim Jong-un frequently rattles his nuclear saber in a destabilizing manner. In the Middle East, Iran has developed facilities for enriching weapons-grade uranium, and it is fast approaching the threshold of becoming the tenth nuclear-weapons state. Many observers fear that if it does so, it may precipitate a proliferation cascade across the region, with Saudi Arabia quickly following suit. These are worrying developments. As my experience in the 1970s shows, it is when conditions seem especially dire that efforts to slow the spread of nuclear weapons must be maintained. Otherwise, the world will become a far more dangerous place.

The second gathering of signatories late last year revealed a host of treaty flaws. Any hope that member states and civil society would staunchly self-police the treaty were dashed. They all turned a blind eye to the involvement of Kazakhstan, a treaty member, in the testing of a Russian ICBM—a missile whose sole purpose is to deliver nuclear weapons.

Once again, TPNW member states failed to call out Russia by name for its irresponsible nuclear behaviour, this time including de-ratifying the CTBT and moving to deploy tactical nuclear weapons in Belarus. Why? Because the diplomatic corps of the non-nuclear weapon states consider it impolite to call out bad actors by name.

Source: <https://www.project-syndicate.org/commentary/nuclear-proliferation-risk-rising-ahead-of-2026-npt-review-conference-by-joseph-s-nye-2024-03>, March 05, 2024.

OPINION – Gregory F. Giles

The UN Nuclear Ban Treaty Has No Clothes

Fear sells—the more existential the better, as with all the loose talk about the possible use of nuclear weapons by Vladimir Putin. While nuclear dread is good for “driving clicks,” it must not blind us to reality. The U.N. nuclear ban treaty will do nothing to reduce such nuclear dangers. How could it? None of the countries possessing nuclear weapons will have anything to do with it. Not unlike “The Emperor’s New Clothes,”

proponents of the Treaty on Prohibition of Nuclear Weapons (TPNW) want us to believe in its magnificence, to go along with the pretense while it is plain to see that the treaty is stripped of any credibility.

The second gathering of signatories late last year revealed a host of treaty flaws. Any hope that member states and civil society would staunchly self-police the treaty were dashed. They all turned a blind eye to the involvement of Kazakhstan, a treaty member, in the testing of a Russian ICBM—a missile whose sole purpose is to deliver nuclear weapons. When the test occurred in April last year, the ICAN trumpeted that under the TPNW, it was “illegal” for Kazakhstan “to allow

its territory to be used for testing of nuclear-capable missiles.”

Yet, ICAN and TPNW member states, including Kazakhstan, were silent about the ICBM test—at a meeting whose purpose is to assess the implementation of the ban treaty. Evidently, because Kazakhstan is struggling with the legacy of Soviet nuclear tests on its territory and will host next year’s treaty review, it was given a “pass.” So much for the assertions of TPNW advocates that the treaty is non-discriminatory, a contrast they like to draw with the NPT which recognized in 1968 the United States, the United Kingdom, France, Russia, and China as nuclear weapon states—and everyone else as non-nuclear weapon states.

Once again, TPNW member states failed to call out Russia by name for its irresponsible nuclear behaviour, this time including de-ratifying the CTBT and moving to deploy tactical nuclear weapons in Belarus. Why? Because the diplomatic corps of the non-nuclear weapon states consider it impolite to call out bad actors by name. How can a treaty that

won't call out the malign behaviour of even non-member states like Russia—or hold accountable one of its actual signatories like Kazakhstan—be expected to resolve disputes in the event the major powers somehow join its ranks and warily give up their nuclear bombs? The answer is plain, it cannot, which is why those powers boycott it.

They are not alone. NATO member states and U.S. allies in Asia also refuse to join the TPNW. Others have read the writing on the wall. Finland and Sweden, which attended the first meeting of TPNW states parties as observers in 2022, balked last year, preferring to join NATO rather than place their faith in the ban treaty. Other states that observed the first gathering but punted this time include the Netherlands, Burundi, Ghana, Mauritania, Niger, and Senegal. You wouldn't know that, though, by reading any of the self-congratulatory statements issued after the meeting by TPNW member states and civil society. It is a tough time for TPNW supporters. The initial euphoria of circumventing the major powers and rushing the treaty through is over. Now comes the more mundane work of implementing it, structurally weak as it is. That's not helpful for ICAN and others who need to keep members motivated and attract donors. That's become harder now that the MacArthur Foundation has pulled out of the nuclear disarmament field, seeing poor prospects ahead.

Austria has a solution for that, however. In a weak decision document, Austria has convinced TPNW member states that what they really need is better talking points about the so-called evils of nuclear deterrence. This is a hobby horse of a few

individuals in the Austrian foreign ministry, somehow convinced that they can simply debate Western countries into surrendering their nuclear protection, even as their counterparts in the Austrian ministry of defense seek closer ties with NATO. This new initiative will fail—states under the nuclear umbrella are not under any obligation to engage in such theater.

The reality is, since the brutal 2022 Russian invasion of Ukraine and the rapid build-up of nuclear arms by such stalwarts of international law and human rights as China and North Korea, free people everywhere are rediscovering the value of nuclear deterrence over one-sided nuclear disarmament. There is a reason why ICAN has not published any polls since 2022 purporting to show vast public support for the TPNW and opposition to U.S. nuclear weapons forward deployed in Europe. Surely, the TPNW must be good for something? The ban treaty is slowly carving out an important niche in assisting victims and remediating environments impacted by nuclear weapons use or testing. It also is promoting new standards of inclusivity and gender balance. But it has been divisive, too. Its insistence on nuclear disarmament irrespective of the security environment lacks realism and only deepens the chasm between nuclear weapons states and non-nuclear weapons states.

Let's face it, progress on nuclear disarmament won't be coming anytime soon. TPNW supporters can lament this and withhold cooperation from the nuclear weapons states, or they can apply their energy in a more promising area—non-proliferation. Surely, keeping nuclear weapons

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from spreading is just as important as easing the grip of those who already possess them. Making progress on the former should not be held hostage to progress on the latter—that would be a wasted opportunity indeed.

Source: https://www.realcleardefense.com/articles/2024/03/05/the_un_nuclear_ban_treaty_has_no_clothes_1016074.html, March 05, 2024.

OPINION – Mike Edwards

Trident Nuclear Weapons aren't Much of a Deterrent if they don't Work

I write in the wake of a second consecutive failure of a Trident missile test launch, which represents a cringingly embarrassing moment for the Royal Navy and the UK Government. Whether this minute country, out in the ocean on the north-west periphery of Europe and out of the EU, with an ever decreasing military, needs a nuclear defence capability is a debate for those with an axe to grind. My axe hovers over the whetstone of the response and the reputation and how they are perceived by those who pay for them.

It was not a good day at the office for those on board HMS Vanguard, based with her three sister ships at Faslane, when the duff unarmed missile, costing £17 million, plopped into the sea not far from her after the failed launch. To add heat to the riddy, sitting in the control room of the submarine, off the coast of Florida, was Secretary of State for Defence Grant Shapps and the head of the Royal Navy, Admiral Sir Ben Key. I would hope, given the billions we pay for it (how

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many potholes could be filled, NHS waiting lists cleared and schools built for what Trident costs?), that the very least we can expect is that it works. And that was a key message not delivered by the MOD, which said that the failure was “event specific”. Well, what kind of message is that? What else would it be? The MOD and the Royal Navy endlessly describe

Trident as a deterrent. Deterrent is a pejorative word to many people – it is an opinion and not a fact. This trope is tiresome; it's not much of a deterrent if it doesn't work.

Nowadays, Armageddon is Corporeal: We've had nuclear weapons, for better or worse, since they were invented during World War Two. We knew our enemies had them, too. And if we all had them, then there was little chance of them being used, because everyone knew there would be nothing

left for the winner. I suppose there was an element of deterrence, then, but that was during the dark days of the Cold War, and based on the premise that ours worked. Since then, it has been an 80-year, multi-billion-pound stand-off, while we all waited for Godot. During the Cold War, Armageddon was an existential threat. Now, in this troubled world, it's corporeal. And, given that there is a

During the Cold War, Armageddon was an existential threat. Now, in this troubled world, it's corporeal. And, given that there is a Götterdämmerung on the horizon, with two ghastly politicians holding the strings, I'm surprised that a usually rapacious media has not latched on to this with more vigour. What happened on Vanguard seems to have passed with little comment, far less scrutiny, with a general election on the horizon and wars in Europe and the Middle East ongoing.

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Is Our Nuclear Threat Really a Threat at All? Back in the day, when I was a jobbing journalist, I sought, and surprisingly was given, access to HMS Vanguard while she was at sea. The crew were all deeply suspicious of me, but the officers made me feel very welcome, and I have to say I enjoyed the experience immensely. Nothing was off limits and, as we slid silently under the Atlantic, we were permitted to film wherever we wanted. They even stunted a launch drill for us, where an officer walks through the vessel holding a piece of paper aloft containing the coded message from the prime minister to fire.

Nearby stands a burly sailor holding a large truncheon, to dissuade anyone who has a sudden change of mind about ending the world. More chilling than that, even, was the captain's acquiescence to my request to hold the nuclear trigger, bizarrely based on the design of a Colt Peacemaker pistol and alarmingly like a Scalextric handset. That was 25 years ago, and we now live in a much less stable world, with Vladimir Putin's invasion of Ukraine, and a Donald Trump election win in the post. If Trump withdraws the colossal US military from NATO, as he has threatened to do, stops funding Ukraine, as he has threatened to do, and gives his friend Vlad the green light to invade any Nato country, as he has already done, where are we then? Here's where.

Ukraine falls and Russia heads west. Nato retaliates, but without the US it is toothless. The remaining nuclear weapons in the Nato arsenal belong to France and the UK. But, as ours don't seem to work, we might as well leave the job to the French. When I held that nuclear trigger, happily the cable connecting it to the rest of the

system dangled impotently at my feet. I wonder if it would have worked had it been plugged in.

Source: <https://www.pressandjournal.co.uk/fp/opinion/columnists/6394451/trident-missile-nuclear-deterrent-mike-edwards-opinion/>, March 06, 2024.

OPINION – Yoon Young-kwan

Balancing Deterrence and Restraint

That was 25 years ago, and we now live in a much less stable world, with Vladimir Putin's invasion of Ukraine, and a Donald Trump election win in the post. If Trump withdraws the colossal US military from NATO, as he has threatened to do, stops funding Ukraine, as he has threatened to do, and gives his friend Vlad the green light to invade any Nato country, as he has already done, where are we then?.

In the eighth Workers' Party Congress in January two years later, he announced five major tasks — such as the development of strategic attack submarines, hypersonic missiles, and underwater- or ground-launched ICBMs — as a part of the country's five-year defense development to help reinforce its nuclear capabilities.

The Financial Times last month reported the results of its analysis of confidential Russian military documents from 2008 to 2014. Russia had set the strategy of using nuclear weapons if it failed to achieve its military goals with conventional weapons, the report said, adding that Russia still follows the

military guideline. The analysis gave some clues to comprehending why Joe Biden's administration steadfastly refused to provide the long-range ATACMS missiles Ukrainian President Volodymyr Zelenskyy wanted. Coincidentally, in a contribution to Foreign Affairs last year, Professor Keir Lieber from Georgetown University and Professor Daryl Press from Dartmouth College argued that the danger of nuclear war revived, not disappeared, after the Cold War. The two scholars pointed to the high possibility that nuclear-armed U.S. adversaries would use strategic weapons instead of stopping at bluffing.

The problem is that South Korea cannot avoid the risk. North Korean leader Kim Jong-un swiftly turned to a hardline stance after his failed Hanoi summit with Donald Trump in February 2019. In the eighth Workers' Party Congress in January two years later, he announced five major tasks — such as the development of strategic attack

submarines, hypersonic missiles, and underwater- or ground-launched ICBMs — as a part of the country's five-year defense development to help reinforce its nuclear capabilities. For instance, if the North deploys supersonic short-range missiles tipped with small warheads to brace for real battles, it poses a substantial threat to South Korea. In September 2022, North Korea declared it can use nukes on five occasions after enacting the Nuclear Forces Policy Law earlier.

Under such a volatile security situation, what matters most is that we strengthen our deterrence against the North's strategic attack on the South. History shows that naively relying on the enemy's goodwill without building strong deterrence is destined to fail. Just think of the disastrous Munich Agreement struck by British Prime Minister Neville Chamberlain with Adolf Hitler in 1938. In that sense, our military cooperation with the United States and our trilateral security cooperation with America and Japan were the right choices. But given all the challenges ahead, that's not enough. The Rodong Sinmun last year reported that North Korean leader Kim Jong-un ordered the military to "get ready to use nuclear weapons anytime, anywhere" during his trip to a nuclear weapons development facility.

First, the Biden administration needs to strengthen its effort for dialogue with North Korea to lower the risk of an accidental nuclear war in the Korean Peninsula. As the North also would not want a nuclear war to take place here, the U.S. government should open communication channels between the two countries' military authorities and take steps toward building trust and action guidelines for both sides. Second, the U.S. government must block Russia's victory in the Ukraine war by continuously assisting the country by rallying international support from NATO members. If Russia wins the war, it also means the victory of North Korea and China, as they are

closely linked to one another. If Uncle Sam's international leadership weakens, North Korea can misjudge South Korea.

What should the Korean government do? It would be desirable if the government demonstrates a

strong determination to deter the North while restraining itself from overreaction. Western security experts unanimously stress the need for the South to take a balanced approach to dealing with the North. The two American professors pointed out that if nuclear-armed North Korea is pushed into a corner, it

could use the nuclear arsenals it strenuously built to compensate for its relative weakness in conventional weaponry. Therefore, the two allies must stop at destroying the long-range multiple rocket launchers if the North attacks the South with those artilleries, rather than responding over the top.

Dr. Bruce Klingner at The Heritage Foundation also shares the view. In an interview with Yonhap News in February, Klingner, who is helping Trump's campaign, warned of a possible military clash from misjudgments. As both sides are determined to launch a stern counterattack against the other, South Korea needs to strike a balance between maintaining strong military posture enough to deter the North's military offensives and minimizing the risk of an accidental clash escalating to a real war. A security crisis will likely occur in the peninsula this year. We must prevent a limited war from escalating into a full-scale war. The situation can fluctuate depending on who wins the Nov. 5 U.S. presidential election. If the alliance shakes to a dangerous level and our deterrence weakens alarmingly, we must put on the table all possible options, including nuclear armaments and redeployment of U.S. tactical weapons, and draw up our security strategy again. The government should be prepared for all scenarios and start to do what it can do now.

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Source: <https://koreajoongangdaily.joins.com/news/2024-03-06/opinion/columns/Balancing-deterrence-and-restraint/1996321>, March 06, 2024.

NUCLEAR STRATEGY

INDIA

India Joins Select Group of Nations Able to Fire Multiple Warheads on a Single ICBM

India said on 11 March it had joined the world's top nuclear powers by mastering the ability to put multiple warheads atop a single intercontinental ballistic missile. The successful test of MIRV technology on the indigenously developed Agni-V ICBM puts India in a club that includes the United States, Russia, China, France and the United Kingdom. Neighboring Pakistan has also claimed to have MIRV technology, but experts say the claim is unverified.

Indian Prime Minister Narendra Modi praised the country's scientists for the development, one of a series announced by his government months before a national election. ... "Proud of our DRDO [Defence Research and Development Organisation] scientists for Mission Divyastra, the first flight test of indigenously developed Agni-5 missile with MIRV technology," Modi said X on Monday. Indian scientists conducted the test at a facility on Abdul Kalam Island in the Bay of Bengal, off India's northeast coast, the Defense Ministry said in a statement.

"Various Telemetry and radar stations tracked and monitored multiple re-entry vehicles. The Mission accomplished the designed parameters," the

statement said. India did not give an exact number of reentry vehicles released during the Agni-V test, but MIRVed missiles can carry a dozen or possibly more MIRV warheads. ... Each warhead, once released in space from the rocket that missile that carried it aloft, can be programmed to hit separate targets up to 1,500 kilometers (932 miles) apart, according to the Center for Arms Control and Non-proliferation.

Overall, the Agni-V missile has a range of more than 5,000 kilometers (3,100 miles), according to the Center for Strategic and International Studies Missile Defense Project. That puts India rivals like China and Pakistan well within range of the weapon.

Source: <https://edition.cnn.com/2024/03/12/india/india-mirv-icbm-intl-hnk-ml/index.html>, March 12, 2024.

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RUSSIA

Russia Carries Out Successful Test Launch of Yars Intercontinental Ballistic Missile

Russia said on 1 March said it conducted a successful test launch of the Yars intercontinental ballistic missile. The Defense Ministry in a statement said a Yars missile with multiple independently targetable warheads was launched from the Plesetsk Cosmodrome spaceport to Kura Missile Test Range in the eastern region of Kamchatka. The distance between the two regions exceeds 6,700 km (4,181 miles). "The purpose of the launch was to confirm the tactical, technical and flight characteristics of this modern missile system.

tactical, technical and flight characteristics of this modern missile system. All the tasks have been completed in full," the ministry said. Yars is a Russian thermonuclear armed intercontinental ballistic missile with multiple independently targetable warheads, capable of hitting targets at

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a distance of more than 11,000 km.

Source: <https://www.aa.com.tr/en/world/russia-carries-out-successful-test-launch-of-yars-intercontinental-ballistic-missile/3152663>, March 01, 2024.

But mounting evidence suggests the “unstoppable” apocalypse 208-ton intercontinental silo-launched 15,880mph nuclear weapon, the size of a 14-storey tower block, is far from ready for use. An expected test flight by the world’s biggest ballistic missile over the South Pole has not happened.

Putin’s Double Embarrassment as Nuclear Rocket Satan-2 ‘Sanctioned’ and Missile Carrier Falls Over

Putin’s ‘doomsday’ nuclear rocket has been hit by Western sanctions on its key components as footage emerged showing one missile system dramatically overturning in an embarrassing mishap. The Sarmat rocket, known in the West as Satan-2, was already “in service with troops”, the warlord boasted in a direct threat to the West, as he told Russians: “We will soon demonstrate them in the combat duty mode at their deployment bases.”

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“Now all efforts are being made to somehow correct the situation with the supply of sanctioned electronics.” This has hit Russian production of S-400 air defence missiles, used in the war with Ukraine. The report says that Satan-2 - which carries ten nuclear warheads of 750 kilotons each - has only had a limited number of successful tests ahead of deployment. Its deployment on combat

duty late last year was more in hope than expectation. “The missiles can be counted on one hand and it is unknown how they will behave during launches,” said the channel.

Earlier there were reports that it should be tested with a chilling flight over the South Pole - which has not yet

happened. Putin’s own state news agency TASS reported last year that “even a truncated LCI [flight development tests], and assuming all launches are successful, would require several more launches, including via the South Pole”. Only one fully confirmed successful test of the monster super-heavy nuclear

weapon is known - in April 2022. It comes as video emerged showing the moment a Russian Pantsir-S1 air defence missile system overturns as its mobile carrier takes a corner too fast in Sochi. The embarrassing accident was close to Vladimir Putin’s official Black Sea residence Bocharov Ruchey in the resort city. Reports say the mobile complex was on “combat

duty” and rushing to protect the Russian dictator who is due in Sochi on Friday. The accident was also in the same region - Krasnodar - as his secret £1 billion cliff-top palace at Gelendzhik which is hidden from ordinary Russians.

Source: <https://www.mirror.co.uk/news/world-news/putins-double-embarrassment-nuclear-rocket-32246340>, March 01, 2024.

UK

Babcock Awarded Contract to Refit HMS Victorious in Plymouth

Defence giant Babcock has signed a £560m contract to refit one of the Royal Navy’s Trident nuclear submarines at Devonport dockyard in Plymouth. It said more than 1,000 jobs will be secured as a result of the deal, which will extend the life of HMS Victorious into the 2030s. Victorious will be the second submarine to undergo the “life extension package” at

Devonport, after HMS Vanguard. CEO David Lockwood said delivering the programme was a “top priority”. He said: “We are proud to have been awarded this complex defence programme which will use our deep engineering expertise to help keep the UK safe.”

‘Deterrent Patrols’:

Babcock supports all of the UK’s submarine fleet, including HMS Vanguard which left Devonport in May 2023 after a prolonged seven and a half year refit. Work on HMS Victorious is already underway, following a commitment by the Ministry of Defence to authorise early works from July 2023. Second Sea Lord Vice Admiral Martin Connell said: “The Royal Navy performs no more important mission than Operation Relentless, the continuous at sea strategic deterrent patrols which have been performed by our submariners uninterrupted since 1969. “The overhaul of HMS Victorious will allow the boat to carry out deterrent patrols until the next generation of submarines, the Dreadnought-class, enter service.” The vanguard class submarine is armed with Trident 2 D5 missiles which can be fired at targets up to 4,000 miles (6,437km) away.

Source: <https://www.bbc.com/news/uk-england-devon-68444881>, March 01, 2024.

EMERGING TECHNOLOGIES AND DETERRENCE

RUSSIA

Russia Confirmed World’s First Ever Combat Test of Hypersonic Glide Vehicle

Following multiple reports from Russian and Western sources that the Zircon hypersonic cruise missile was used by Russian forces to support ongoing operations in Ukraine, President Vladimir Putin confirmed in an address to the Russian

Federal Assembly on February 29 that the missile had seen its first combat launch, ‘The Military Watch Magazine’ writes. “The Zircon sea-launched hypersonic strike system has already been used in combat. It was not mentioned in the 2018 message. But this system, too, is already in service,” he stated.

The president elaborated that the missile was capable of reaching Mach 9 speeds and had a range of more than 1,000 kilometres. His statement notably came exactly six years after he had in a previous address announced the existence of the system, alongside five other strategic weapons systems. These included the Sarmat silo-based intercontinental range ballistic missile, the Avangard intercontinental range hypersonic glide vehicle, the Kinzhal air launched ballistic missile, the Poseidon unmanned nuclear armed submarine and the 9M730 Burevestnik nuclear-powered cruise missile. The Zircon’s first use thus allowed Russian sources to better emphasize the significant progress made bringing all these assets to an operational status now operational.

The use of the Zircon missile in Ukraine is a notable landmark in the hypersonic weapons revolution as the first ever combat use of a hypersonic glide vehicle. Such glide vehicles not only allow missiles to engage targets far further away and at significantly faster speeds, but can also manoeuvre in their terminal stages as they descend into thicker air, making them both more precise and far more difficult to intercept. The much larger Avangard glide vehicle has been deployed from Russian intercontinental range ballistic missiles since 2022, while Chinese and North Korean tactical ballistic missiles such as

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the DF-17 and Hwasong-8 also deploy such vehicles. The United States Military significantly increased funding for hypersonic weapons development in the late 2010s, with multiple American programs currently underway to bridge the performance gap.

The Zircon was designed primarily as an anti-ship missile class, but has a secondary land attack capability and is currently deployed from a number of Russian warship classes. Its first combat duty began in January 2023. ... A ground-based mobile launch vehicle for missiles is currently being developed. While use of the missile class against targets in Ukraine is not expected to have been cost-effective, or to be common moving further into the conflict, it allows the new missile to be tested under combat conditions while also providing a significant public relations boost to the Russian Navy and the defence sector.

Source: <https://moderndiplomacy.eu/2024/03/06/russia-confirmed-worlds-first-ever-combat-test-of-hypersonic-glide-vehicle/>, March 06, 2024.

USA

USAF Deploys Hypersonic ARRW on Guam for Testing

The US Air Force (USAF) has deployed a hypersonic AGM-183 Air-Launched Rapid Response Weapon (ARRW) on Guam for testing. The presence of this hypersonic glide vehicle (HGV) was disclosed in USAF-published photographs on 28 February. The missile's appearance on Guam comes nearly a year after the ARRW programme was slated for cancellation. USAF spokesperson Ann Stefanek told Janes on 5 March that the ARRW programme is "in the operational test phase". Separately, a safety notice issued by the Maritime Safety Office details a weapons test to be held in the Central

Pacific, at Kwajalein, from 3 to 10 March. It is likely that the missile has already undergone a test or will be test-launched from a Boeing B-52H Stratofortress deployed on Guam during this period.

However, in response to a query about whether the test had been conducted, a USAF spokesperson told Janes on 8 March that no additional information was available on the matter. The maritime warning bulletin suggests that the crew of the B-52H will fly a distance of over 1,900 n miles northeast of Guam to a launch point north of the Ronald Reagan Ballistic Missile Defense Test Site on Kwajalein Atoll. The missile is expected to travel a distance of 1,140 n miles before impacting a target location in the atoll. According to a Lockheed Martin spokesperson, the

ARRW is "currently in the development phase of the contract". This "includes providing a leave-behind capability", the spokesperson said on 7 March.

Source: <https://www.janes.com/defence-news/news-detail/usaf-deploys-hypersonic-arrw-on-guam-for-testing>, March 08, 2024.

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NUCLEAR ENERGY

INDIA

India's First Indigenous Prototype Fast Breeder Reactor at Kalpakkam, Tamil Nadu

Prime Minister Narendra Modi marked the beginning of a new era in India's nuclear energy sector by witnessing the "Core Loading" at the Prototype Fast Breeder Reactor (PFBR) in Kalpakkam, Tamil Nadu. This event signifies the near completion of India's first indigenous PFBR, a landmark project fully designed and constructed within the country by BHAVINI, in collaboration with over 200 Indian industries, including numerous MSMEs.

India Joins an Elite Club: With the commissioning of the 500 MWe PFBR, India is set to become only the second country after Russia to operate a commercial Fast Breeder Reactor (FBR). This achievement not only places India at the forefront of nuclear technology but also underlines its commitment to developing clean and efficient energy sources.

The Future of Clean Energy:

The PFBR is designed with a core consisting of control, blanket, and fuel sub-assemblies, minimizing nuclear waste and enhancing safety features. FBRs are touted as the next step in nuclear energy, capable of providing a safe, efficient, and environmentally friendly source of power. This aligns with the global goal of achieving net zero emissions and underscores India's dedication to sustainable development.

Pioneering the Second Stage of Nuclear Power:

BHAVINI's role in constructing the 500 MWe PFBR marks a pivotal moment in India's three-stage nuclear power programme. Entrusted with the mission to construct, commission, and operate Fast Breeder Reactors, BHAVINI is set to ensure energy security for India in the long term, showcasing the nation's forward-thinking approach to energy solutions.

Emphasizing Safety and Sustainability: The PFBR stands out for its advanced third-generation design, featuring inherent passive safety features that ensure the reactor's immediate and safe shutdown in emergencies. Its ability to utilize spent fuel from the first stage of India's nuclear program significantly reduces nuclear waste, presenting a sustainable approach to nuclear energy that minimizes the need for large-scale

geological disposal facilities.

Commitment to Peaceful Nuclear Applications:

India's expansion of its nuclear power program is essential for meeting the dual objectives of energy security and sustainable development. As a responsible nuclear power, India continues to invest in advanced technologies for peaceful nuclear applications, ensuring the secure use of nuclear and radiological materials in both power and non-power sectors.

This landmark achievement not only showcases India's technological capabilities but also its commitment to pioneering clean and efficient energy solutions for a sustainable future.

Source: Sumit Arora, <https://currentaffairs.adda247.com/indias-first-indigenous-prototype-fast-breeder-reactor-at-kalpakkam-tamil-nadu/>, March 05, 2024.

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The Palisades plant in southwest Michigan could be revived by a \$1.5 billion loan from the US Department of Energy, Bloomberg reported. Federal officials have not yet confirmed the funding, but Dr. Kathryn Huff, assistant secretary in the agency's Office of Nuclear Energy, told Stateline that it would be "exciting" and "historic" to see the plant return to life.

USA

Federal Money Could Supercharge State Efforts to Preserve Nuclear Power

In the coming years, a nuclear power plant on the shores of Lake Michigan could become the first in the country to restart operations after shutting down. The Palisades plant in southwest Michigan could be revived by a \$1.5 billion loan from the US Department of Energy, Bloomberg reported. Federal officials have not yet confirmed the funding, but Dr. Kathryn Huff, assistant secretary in the agency's Office of Nuclear Energy, told Stateline that it would be "exciting" and "historic" to see the plant return to life. The potential federal investment comes as state leaders in Michigan and elsewhere have worked to preserve their

nuclear power capacity. Democratic Gov. Gretchen Whitmer successfully pushed for \$150 million in state funding last year to support the Palisades restart. The plant is owned by Florida-based Holtec International, which bought it in 2022 to decommission it.

As states seek to transition to carbon-free electricity, some leaders acknowledge their climate change goals may be out of reach if they can't keep their nuclear plants online. Nuclear has struggled to compete on cost with other power sources — while also facing concerns about safety risks and radioactive waste — but it provides 18% of the nation's electricity. The closure of nuclear plants, some state officials fear, could lead to an expansion of fossil fuel-powered replacements, worsening the climate problem. ...

California also received a boost of federal money in an award finalized last month to keep open a nuclear plant run by Pacific Gas and Electric, known as PG&E. Other states, including Connecticut, Illinois and New Jersey, have passed legislation in recent years to provide subsidies for existing nuclear plants. Huff, the federal energy official, said U.S. nuclear production may need to reach 200 gigawatts — roughly double the current capacity — to provide clean, “always-on” power as less-constant solar and wind provide a growing share of the nation's electricity. Last year, the Biden administration committed to an international pledge to triple nuclear capacity by 2050. ...

Meanwhile, both red and blue states have taken steps to allow for the development of small modular reactors, an emerging technology that backers say can help to power rural areas or

industrial operations without the demands of a large plant. Six states — Connecticut, Illinois, Kentucky, Montana, West Virginia and Wisconsin — recently repealed bans on adding new nuclear power, in part to enable such reactors. While some environmental groups have embraced the nuclear investments, others have pointed to long-standing concerns about safety issues, citing infamous accidents such as those at Three Mile Island, Chernobyl and Fukushima.

Opponents also note the long-term issue of radioactive waste storage, and in some cases assert that nuclear can stall the growth of renewables such as wind and solar. ... While more states have passed policies to give nuclear a boost, federal funding in Michigan and elsewhere could supercharge efforts to ensure plants stay open. The Department of Energy is distributing \$6 billion from the federal infrastructure law to help save reactors that were slated for closure. The agency awarded funding to the California plant in the first round but has not yet announced awardees from the second round, although applications closed last May.

The agency also is overseeing a loan program — which reportedly will provide the Palisades funding — to repower or repurpose energy infrastructure. The federal climate law passed in 2022 also opened tax credits for new and existing nuclear plants, designed to incentivize clean energy production in the same way existing credits support wind and solar. Since the passage of the tax credits, Huff said, federal regulators have seen an increased interest from plant operators pursuing license renewals to extend the

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operating life of their reactors. Meanwhile, the CHIPS and Science Act passed by Congress also includes funding for federal nuclear research, university programs, new research reactors, isotope production and advanced reactors. The federal support is providing “huge stimulation” to nuclear power while working in tandem with existing state efforts, said Christine Csizmadia, senior director of state governmental affairs and advocacy with the Nuclear Energy Institute, an industry trade association.

Michigan Reboot: When Palisades closed amid financial struggles in 2022, it represented roughly 5% of Michigan’s electricity supply. That has been replaced largely with natural gas generation, Cook said. The expansion of fossil fuel-based power

conflicts with legislation passed last year requiring the state to move to 100% clean energy by 2040. So when the plant’s new owner, Holtec International, announced that it was aiming to bringing the 800-megawatt plant back online, state leaders were on board. The company plans to add a pair of small modular reactors to the existing plant, bringing its capacity to 1,400 megawatts — enough to power more than a million homes. Holtec did not respond to interview requests, but company spokesperson Nick Culp told Reuters the company expects the plant to have full power operation by the end of 2025.

The \$150 million in last year’s Michigan state budget to support the plant’s restart will help pay for fuel purchases and infrastructure upgrades, Cook said. Whitmer has requested an additional \$150 million in this year’s budget to help bring Palisades online. ...

States’ Support: In recent years, many states have provided financial support to struggling nuclear plants, made nuclear eligible for clean energy credits or repealed long-standing bans on the construction of new reactors. ...Huff, the federal official, noted that several of the states that

recently repealed bans on new nuclear power have many coal-dependent communities that could be “left behind” if their coal plants retire. Backers of nuclear, especially the emerging small modular reactor technology, believe old coal plants could be revived to put existing infrastructure to use in service of nuclear power and bring back high-wage jobs. Nuclear electricity production across the country has been relatively stagnant for two decades, with plants struggling to compete with

lower-cost options such as natural gas. Construction of new reactors has almost completely stopped amid regulatory hurdles and spiking project costs.

Opponents of nuclear point to the cancelled projects, delays and cost overruns as proof that nuclear isn’t viable. ... Kamps also cited

previous nuclear disasters and warned of the risks of extending aging plants. But as states look to clean up their energy grids, some leaders say they can’t afford to lose their nuclear power. ...

As with the Michigan plant, state leaders in California, including Democratic Gov. Gavin Newsom, successfully lobbied the feds for money to keep Diablo Canyon open. Last month, the Department of Energy finalized a \$1.1 billion payout to extend the plant’s operations. That followed a vote from state regulators to push the plant’s shutdown date back to 2030. Supporters of nuclear say it’s a necessary complement to wind and solar because of the reliability it provides. ... The California plant is still awaiting the renewal of its license from the Nuclear Regulatory Commission. PG&E did not respond to an interview request.

Source: <https://dailymontanan.com/2024/03/03/federal-money-could-supercharge-state-efforts-to-preserve-nuclear-power/#:~:text=The%20Palisades%20nuclear%20plant%20in,transition%20to%20carbon%20Dfree%20electricity, March 03, 2024.>

SMALL MODULAR REACTORS

GENERAL

Demand for SMRs Surges 65% as Clean Energy Ambitions Grow

A growing desire to include nuclear energy in many nations' clean energy mix has seen a strong push for the development of SMRs because of their potential cost savings and adaptability. According to a new report, this has led to a 65% leap in demand for SMR projects since 2021. The Wood Mackenzie study found that the SMR project pipeline reached 22 GW in the first quarter of 2024, requiring an investment of close to \$266 billion. ...According to the report, five countries – the US, Poland, Canada, the UK and South Korea – are responsible for 58% of the risked SMR project pipeline.

COP28 Powered New Nuclear Interest:

"COP28 also provided a new tailwind for nuclear with a new goal to triple nuclear capacity by 2050," Mr Brown said. "In Wood Mackenzie's net zero scenario, SMRs would account for 30% of the nuclear fleet." "The global focus on net zero means the market for SMRs has widened from utilities to industrial and technology companies." "For these sectors, SMRs provide a range of solutions, including around-the-clock carbon-free power, carbon-free industrial heat and the ability to meet power demand growth long term." "The latter is a particular area of focus in the US with increasing demand for high-capacity data centres."

Government Backing Required: However, Wood Mackenzie also warned that without government backing the nuclear momentum could quickly stall. The international research firm said policy support is crucial to accelerating projects to final

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In Japan pro-nuclear sentiment has strengthened following the election of Prime Minister Kishida and amid record-high commodity prices in 2022. In the UK, government targets and reactor funding has been set as part of the nation's path to net zero. The UK has awarded almost \$120 million to GE-Hitachi and Holtec International for SMR feasibility analysis.

investment decisions. "Some regions have put new policies in place that have spurred the recent activity. Most notably, the US, the United Kingdom and Japan," the report found. In the US, the Inflation Reduction Act provides a 30% investment tax credit (ITC) for a zero-emission advanced nuclear power plant to be implemented after 2025. Additional incentives include 10% ITCs for domestic content and building an SMR on the site of a retired coal plant.

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Uranium Supply an Issue: In what may be positive news for Australia as the holder of the world's largest uranium reserves, Wood Mackenzie says concerns around supply availability and rapidly escalating prices present challenges to

the nuclear sector as a whole. In 2023, uranium was the strongest performing commodity, with prices soaring. ...

Source: <https://smallcaps.com.au/demand-small-modular-reactors-surges-clean-energy/>, March 08, 2024.

SRI LANKA

Foreign Ministry Mum on Russian Proposal to Build Cost-Effective Advanced Nuclear Reactor

Sri Lanka has capable engineers to operate a nuclear power plant and these power plants are very safe, Prof. S.R.D. Rosa, Chairman, Sri Lanka

Atomic Energy Board (SLAEB), said during a recent seminar organised by the Institution of Engineers Sri Lanka (IESL) on 'Potential of nuclear energy and its challenges in Sri Lanka.' Prof. Rosa said that many erroneously believed that Sri Lanka did not have the human resources to operate and maintain a nuclear power plant. "Of course, if we start a nuclear power plant we will have to get help from others initially. We need to work on public perception because many people assume nuclear power plants explode all the time. Nothing can be further from the truth."

Rosa said nuclear power plants were regulated strictly. The SLAEB had started to amend the Lanka Atomic Energy Act as the current Act does not permit nuclear power plants in the country, he said. ... Rosa added they have received a number of proposals to construct nuclear plants in Sri Lanka.

Russia's Rosatom, China's China National Nuclear Corporation (CNNC), France's Électricité de France (EDF), and Denmark's Seaborg have submitted proposals. USA's Ultra Safe Nuclear Corporation (USNC) and Canada's Atomic Energy of Canada Ltd (AECL) have expressed willingness. "The proposal from Russia is a very comprehensive and a complete proposal. ... I think the Russians also want us to join their regional efforts. We had many discussions with Rosatom officials, including many Zoom sessions, and finalized the proposals. To finalize this, we need to sign intergovernmental agreements (IGA). We sent the proposal to the Foreign Ministry six or seven months back, but we still have not got an answer. It's probably because of the Russia-Ukraine war and IMF, etc."

Sri Lanka has also received a complete proposal from China and representatives from CNNC visited Sri Lanka about two months ago. The CNNC officials met SLAEB and even brought a prototype, Rosa said. "EDF, too, has sent a proposal. We then have a unique proposal from Denmark. Seaborg

Technologies is a private Danish startup. They are building barges or floating nuclear power plants. Seaborg Technologies is working on building power plants in Vietnam, and Indonesia and wants to build a third one for Sri Lanka."

Rosa said USNC and AECL have sent proposals of willingness, but they are not complete or comprehensive proposals. Sri Lanka now has received six proposals. Seaborg has offered a power barge, Russia has offered Sri Lanka both onshore and offshore power plants, while the others have proposed conventional nuclear power plants, he mentioned. "We have to also think

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about the prices. There is no point in building a nuclear power plant if the unit cost is about 60 rupees. The problem is that no one gives the exact price unless you sign a Non-Disclosure Agreement (NDA) or a MoU. Russians have offered us several options, depending on our requirements. If we go with the offshore plant, Russians will build and bring

if here and we will have to sign a 10- or 20-year MoU. We have asked the price but they have not given us an exact price. However, we looked at the nuclear power plants Russians have built in Bangladesh, the unit price is between 27 to 30 Sri Lankan rupees." He added that China and Russia are the only countries that have successfully built operational SMRs, advanced nuclear reactors that have a power capacity up to 300 MWs per unit.

Rosa said that they have prepared a Cabinet paper and that they have asked the government to take a "strategic and visionary" decision on generating electricity from nuclear power as a policy. They have also asked the government to invite expressions of interest from government institutions of suitable countries producing nuclear power plants compatible with the technical, economic, social, environmental and legal conditions of Sri Lanka and that can provide an integrated solution, including fuel cycle options and radioactive waste management options. ...

Rosa added Sri Lanka needs nuclear power to have a stable source of energy and that nuclear power plants would complement renewable energy. ...

Source: <https://island.lk/foreign-ministry-mum-on-russian-proposal-to-build-cost-effective-advance-nuclear-reactor/>. March 09, 2024.

NUCLEAR COOPERATION

CHINA-ITER

International Cooperation Boosts China's Competitiveness in Controlled Nuclear Fusion: Political Advisor

China is playing an increasingly important role in the ITER project and it is due to the long-term attention and support of the country's industry and government to controlled nuclear fusion research, Duan Xuru, a senior expert on fusion who is also a member of the National Committee of the Chinese People's Political Consultative Conference, told the *Global Times*. Especially through participation in the ITER project, the world's largest "artificial sun," the level of China's research in controlled nuclear fusion has been greatly improved, and the technological level has caught up and even surpassed those of other countries in some areas, said Duan, chief expert on fusion of the China National Nuclear Corp (CNNC).

The ITER is a tokamak that can generate large-scale nuclear fusion reactions, aiming to simulate the nuclear fusion process that generates light and heat like the sun. The experiment is jointly implemented by China, the European Union, India, Japan, South Korea, Russia and the US. China officially joined the plan in 2006. Since the implementation of the plan, China has always adhered to international commitments and contributed Chinese wisdom

and strength to the smooth progress of the plan. On February 29, the ITER organization signed a contract for assembling the vacuum chamber module with China Nuclear Power Engineering Co, Ltd of CNNC. This is the second time that China has undertaken the installation task of the ITER's core equipment, contributing wisdom and strength to the progress of this project, according to the CNNC.

The assembly of the vacuum chamber module is to integrate and assemble the main large components such as the toroidal field coils, vacuum chamber, and vacuum chamber thermal shield in the assembly hall, and then lift the whole assembly into the tokamak pit. Among them, the toroidal field coils provide a toroidal strong magnetic field for confining the plasma at temperatures of over a hundred million degrees, according to Duan. Located in the central area of the device, the vacuum chamber supports the plasma confined by the magnetic field, providing the required high-purity environment for plasma formation and maintenance. The vacuum chamber thermal shield mainly provides thermal shielding for the superconducting magnets to ensure the stable operation of the low-temperature superconducting magnets.

China has undertaken the manufacturing tasks of 18 procurement packages of the ITER since 2008, involving core key components such as the magnet support system, magnet feeder system, power system, glow discharge cleaning system, gas injection system, and

the first wall of the reactor core that can withstand extremely high temperatures.

..."China's international discourse power in the field of nuclear fusion research is increasing. In the fields of material production and large

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equipment manufacturing, China has gradually formed advantages in foreign countries, and these advantages will provide strong technical support for the high-level development of China's controlled fusion engineering technology," Duan said. While participating in the development of ITER, China's independently constructed and operated new generation artificial sun China Circulation-3 has also continued to improve. In 2023, the device successfully achieved high-constraint operation mode under a plasma current of 1 million amperes and was opened to global scientists.

Asking about different roles of ITER and China Circulation-3, Duan explained that ITER is an experimental reactor, and its goal is to verify the scientific and engineering feasibility of fusion reactors under conditions where the fusion gain Q is greater than 10 within 400 seconds and greater than 5 within 3,000 seconds. Meanwhile, China Circulation III is the largest and most powerful magnetic confinement nuclear fusion large scientific experimental device in China, aiming to provide preliminary verification and solutions for key scientific and technical issues of the experimental reactor, including core plasma operation, nuclear diagnostics, tritium engineering technology, divertor high heat load control, etc, serving as an important support for China's leapfrog development in fusion energy research and development, he said.

In the future, China Circulation III will strive for higher plasma operating parameters, gradually

China Circulation III will strive for higher plasma operating parameters, gradually raise the comprehensive parameters of the fusion plasma core to the level of the core, create an internationally leading combustion plasma large scientific experimental platform, support China's deep participation in ITER experiments, better digest and absorb ITER research results, and lay the foundation for China's independent design, construction, and operation of fusion pilot engineering experimental reactors.

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Duan noted. ...

Source: <https://www.globaltimes.cn/page/202403/1308439.shtml>, March 07, 2024.

NUCLEAR PROLIFERATION

IRAN

Iran Dodges Nuclear Accountability as World Order Wanes

Have the world's attempts to contain Iran's nuclear program failed? The short answer seems to be yes. This answer is indicative of a weakened international system, to say the least. The world's scrutiny and work to limit nuclear proliferation have failed, perhaps sending a signal to other aspiring nuclear weapons powers, with all that a renewed nuclear race would mean for the peace and security of the planet. The above conclusion is based on the fact that Western powers are today avoiding censuring Iran for its lack of cooperation with the UN's nuclear watchdog for fear of aggravating the current geopolitical tensions.

Ahead of its board of governors meeting this week, the IAEA reported that Iran's cooperation with the

Ahead of its board of governors meeting this week, the IAEA reported that Iran's cooperation with the agency remained poor on several outstanding issues related to its nuclear program, which Tehran continues to maintain is for peaceful purposes. The areas the agency's quarterly report pointed to were Tehran's expansion of its nuclear work, the deactivation of the IAEA's surveillance devices that remotely monitor Iran's nuclear program and Tehran's continued barring of field visits by senior agency inspectors.

agency remained poor on several outstanding issues related to its nuclear program, which Tehran continues to maintain is for peaceful purposes. The areas the agency's quarterly report pointed to were Tehran's expansion of its nuclear work, the deactivation of the IAEA's surveillance devices that remotely monitor Iran's nuclear program and Tehran's continued barring of field visits by senior agency inspectors. The so-called E3 group, composed of France, Germany and the UK, had initially planned to censure Iran for its lack of cooperation and had drafted a resolution to that end, only for the group to shelve it, since the international geopolitical picture is very complex due to what is happening in Ukraine and Gaza. The E3 decided it was not the right time to criticize Tehran.

The Western powers' decision not to escalate matters with Iran forms part of what many in the Middle East believe to be a type of appeasement of Tehran. Over the years, this has only emboldened and encouraged its continuous posturing in the Middle East and beyond. IAEA Director-General Rafael Grossi last month decried the "loose talk" by current and former Iranian nuclear program officials, while reiterating his concerns about the potential risks of nuclear proliferation in the Middle East. He said that, while he has no information that Iran is making a nuclear weapon, he is tuning into what is being said by Iranian officials who are boasting about their country's nuclear capabilities.

In a statement on last month's 45th anniversary of the Iranian revolution, the former chief of the Atomic Energy Organization of Iran, Ali Akbar Salehi, claimed that his country had crossed "all the thresholds of nuclear science and technology." He hinted that Tehran had succeeded in manufacturing and building all the necessary components for "the car" (a euphemistic

reference to a nuclear bomb), claiming that all that is left to do is assemble it. In nuclear terms, enriching uranium up to 60 percent is a short step away from enriching to the 90 percent level needed to build a bomb. This is well above the 3.67 percent threshold agreed with Tehran under the 2015 Iran nuclear deal, known as the Joint Comprehensive Plan of Action. Tehran has gradually broken away from its commitments under this agreement after the US unilaterally withdrew from it in 2018, when President Donald Trump was in the White House. In the summer of 2022, the EU tried but failed to get Iran back into

compliance as part of a deal that would have seen Washington return to the agreement.

Over the years, the containment of Iran has proved elusive and, if anything, has laid bare the limitations of international diplomacy and laws and the weakness of international institutions, which have become polarized in an increasingly conflictive world, split between two widening visions of peace,

security and prosperity. The Western nations are in one camp and, in the other, one can see a loose assembly of Russia, China and some nations that represent the growing Global South, including Iran and North Korea. The Iran nuclear deal — despite its numerous critics believing that it failed to address Iran's threat to regional and global peace through its propping up of nonstate actors and groups in Iraq, Lebanon, Syria, Palestine and Yemen — was thought to be part of the long game to trim Tehran's nuclear weapons ambitions. ...

Source: <https://www.arabnews.com/node/2472101>, March 06, 2024.

US Urges Iran to Dilute All its Near-Weapons-Grade Uranium

The United States called on Iran to dilute all of the uranium it has enriched to up to 60% purity,

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close to the weapons-grade level of roughly 90%, in a statement denouncing many of Tehran's recent nuclear moves. The IAEA said in a confidential report to member states that Iran's stock of uranium enriched to up to 60% had fallen slightly in the past quarter as it had diluted, or "down blended", more of its most highly enriched material than it had produced. Iran still has enough of that material, if enriched further, to fuel two nuclear weapons by a theoretical IAEA definition, and enough for more bombs at lower enrichment levels, the report seen by Reuters showed. "Iran should downblend all, not just some, of its 60% stockpile, and stop all production of uranium enriched to 60% entirely," the United States said in a statement on Iran to a quarterly meeting of the 35-nation IAEA Board of Governors. It is not clear why Iran downblended the material. It denies seeking nuclear weapons and says it has the right to enrich to high levels for civil purposes. Western powers say there is no credible civil justification for enriching to such high levels. ...

Source: <https://www.reuters.com/world/us-urges-iran-dilute-all-its-near-weapons-grade-uranium-2024-03-06/>, March 06, 2024.

URANIUM PRODUCTION

USA

Uranium Firms Revive Forgotten Mines as Price of Nuclear Fuel Soars

Across the US and allied countries, owners of left-for-dead uranium mines are restarting operations

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Most of those American mines were idled in the aftermath of Fukushima, when uranium prices crashed and countries like Germany and Japan initiated plans to phase out nuclear reactors. Now, with governments turning to nuclear power to meet emissions targets and top uranium producers struggling to satisfy demand, prices of the silvery-white metal are surging. And that's giving those once-unprofitable uranium operations a chance to fill a supply gap.

to capitalize on rising demand for the nuclear fuel. At least five US producers are reviving mines in states including Wyoming, Texas, Arizona and Utah, where production flourished until governments soured on the radioactive element following the 2011 Fukushima nuclear disaster in Japan. Most of those American mines were idled in the aftermath of Fukushima, when uranium prices crashed and countries like Germany and Japan initiated plans to phase out nuclear reactors. Now, with governments turning to nuclear power to meet emissions targets and top uranium producers struggling to satisfy demand, prices of the silvery-white metal are surging. And that's giving those once-unprofitable uranium operations a chance to fill a supply gap.

Uranium has been used as an energy source for more than six decades, fueling nuclear power plants and

reactors. About two-thirds of global production comes from Kazakhstan, Canada and Australia. Uranium will be a topic of conversation as thousands of mining executives, geologists and bankers descend on Toronto for the Prospectors & Developers Association of Canada gathering this week. The annual event has attracted at least 10 uranium firms, including Denison Mines Corp., Fission Uranium Corp. and IsoEnergy Ltd. As countries increasingly consider nuclear power to address climate change, demand for uranium is expected to skyrocket.

The IAEA estimates the world will need more than 100,000 metric tons of uranium per year by 2040

— an amount that requires nearly doubling mining and processing from current levels. Canada's Cameco Corp. and Kazakhstan's Kazatomprom, which together account for half of global supply, have struggled to ramp up production. They have warned of some operational setbacks that will result in less uranium output than expected in the coming years.

...Production hasn't kept pace due to years of underinvestment in mining and exploration, said Melbye, whose company is reopening mines in Wyoming and Texas that were idled in 2018. Energy Fuels Inc. initiated plans late last year to restart operations in Arizona, Utah and Colorado, while Ur-Energy Inc. said it will dust off an idled mine in Wyoming. Mid-sized companies in Australia and Canada have announced similar plans. To be sure, production from these mines — most of which are small and nearing the end of their lives — would comprise a small fraction of the world's uranium supply. **Top Producers:** Supply constraints should ease with top producers churning out the millions of pounds of uranium they left in the ground when prices were low. Kazatomprom has been increasing output after years of operating well below its capacity. Cameco has been ramping up production at the world's largest high-grade uranium mine and mill — MacArthur River and Key Lake in the western Canadian province of Saskatchewan — after idling operations between 2018 and 2021 due to weak market conditions.

Still, US mine reopenings mark a revival for an American industry that was at risk of disappearing only five years ago. American uranium production

hit an all-time low of 174,000 pounds in 2019 — a drop from its 44-million-pound peak in 1980 — as the US started increasing dependence on imports from countries like Canada, Australia, Kazakhstan and Russia.

The US industry's push is also political, with the government seeking to secure access to supply amid geopolitical uncertainty. Sanctions on Russia following its 2022 invasion of Ukraine have posed challenges for uranium shipments en route from Kazakhstan, since the former Soviet state's exports typically pass through Russian ports. To keep up with demand, the Uranium Producers of America forecasts the US will need eight to 10 new, major mines to start production over the next decade.

Source: <https://www.miningweekly.com/article/uranium-firms-revive-forgotten-mines-as-price-of-nuclear-fuel-soars-2024-03-03#:~:text=At%20least%20five%20US%20producers,Fukushima%20nuclear%20disaster%20in%20Japan, March 03, 2024.>

First Uranium Shipped from enCore's Rosita Plant

The restart of the Rosita plant - which last produced yellowcake in 2008 - is the first step in enCore's South Texas in-situ leach uranium production pipeline strategy. The plant - about 60 miles from Corpus Christi, Texas - has undergone refurbishment since enCore acquired it in 2021. It has a capacity of 800,000 pounds U3O8 (308 tU) per year and is designed to process uranium feed from multiple satellite operations in the South Texas area. EnCore said the initial shipment of

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uranium from the Rosita plant is expected to be delivered to a conversion facility next week. ...

The company has now executed its fifth commercial uranium sales contract, with a fourth US utility with deliveries between 2026 and 2032. enCore said the terms of the contract reflect the spot price at the time of delivery subject to pricing collars that ensure its revenue stream and allow for potential upside. With this latest contract, enCore's existing commitment has increased to 4.25 million pounds U3O8 through to 2032, which it says is well under 50% of its planned production.

... In 2021, enCore announced two term supply agreements, one with UG USA and one with a US utility. In 2022, it announced a third term supply agreement with a US utility. It announced a fourth sales agreement with another US utility in February 2023. enCore noted that three of the contracts provide the optionality to extend with an additional 1.65 million pounds U3O8 to 2032.

... EnCore's utility contracts are all spot related with minimum floor and maximum ceiling prices that are adjusted upward annually for inflation. Minimum floor prices are set at such levels to provide the company with a comfortable margin over its expected costs of operations in Texas, while giving it participation in anticipated escalations of the price of uranium. EnCore said it will "continue to assess opportunities to secure future term agreements that will support its continued project and production growth strategies". "With Rosita under way, we are now moving aggressively to re-start the Alta Mesa Plant which we expect will commence production as planned in Q2/2024," said enCore CEO Paul Goranson. ...

Source: <https://www.world-nuclear-news.org/Articles/First-uranium-shipped-from-enCore-s-Rosita-plant, March 07, 2024>.

NUCLEAR SAFETY

ARGENTINA

IAEA Concludes Long Term Operational Safety Review at the Atucha Nuclear Power Plant in Argentina

An IAEA team of experts today completed a review of long term operational safety at Unit 1 of the Atucha Nuclear Power Plant (NPP) in Argentina. The Safety Aspects of Long Term Operation (SALTO) mission was requested by plant operator Nucleoelectrica Argentina S.A (NA-SA). It continues a comprehensive IAEA evaluation of the unit in recent years. Two IAEA Pre-SALTO missions in 2016 and 2018, followed by a Pre-SALTO follow-up in 2021, were previously conducted to review the long term safety of the unit.

NA-SA is currently preparing to submit a license renewal application to the Argentinian Nuclear Regulatory Authority (ARN) to extend the operating lifetime of the 362 Megawatt electric (MWe) Unit 1 by 20 years. The plant, located 100 km north-west of Buenos Aires, went

into commercial operation in 1974 and its current operating licence expires in 2024. The 745 MWe Unit 2 of Atucha NPP started its commercial operation in May 2016 and was not part of the review. During the ten-day mission from 27 February to 7 March, the team reviewed the plant's preparedness, organization and programmes for safe long term operation (LTO). The mission was conducted by a twelve-person team comprising experts from Belgium, Brazil, Japan, Slovenia, Spain, Sweden, the United States, and two IAEA staff members.

The team had in depth discussions with staff from the Atucha NPP and conducted plant walkdowns during the review. "The team noted the measures taken by the operator to ensure the safe LTO of the plant. Additionally, the professionalism,

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openness and receptiveness exhibited by the plant staff towards suggestions for improvement are commendable," said Gabor Petofi, team leader and IAEA Senior Nuclear Safety Officer. ...

The team identified good practices and good performances that will be shared with the nuclear industry globally, including:

- The qualification of coatings designed to ensure integrity of the containment building.

- Comprehensive condition assessment reports for safety related structures, systems and components.

- Objective score cards used for evaluation of applications for internal vacancies.

- The team also provided recommendations to further enhance the preparations for LTO safety, including:

- The plant should provide a systematic safety assessment to identify reasonable safety improvements for the operation period beyond 2024.

- The plant should complete and implement the qualification programme for electrical components inside the containment.

- The plant should improve the implementation of ageing management of civil structures.

The plant management expressed a determination to address the areas identified for improvement and invite a SALTO Follow-up mission in 2026. "The IAEA and NA-SA teams showed a strong commitment to the successful implementation of the SALTO mission, working in a professional and collaborative environment, sharing information and experience," said Eduardo Arostegui, site manager at Atucha NPP. ... The team provided a draft report to the plant management and ARN at the end of the mission. The plant management

and ARN will have an opportunity to make factual comments on the draft. A final report will be submitted to the plant management, ARN and the Argentinian Government within three months.

Background: A SALTO peer review is a comprehensive safety review addressing strategy and key elements for the safe long term operation of nuclear power plants. They complement OSART

missions, which are designed as a review of programmes and activities essential to operational safety. Neither SALTO nor OSART reviews are regulatory inspections, nor are they design reviews or substitutes for an exhaustive assessment of a plant's overall safety status. LTO of nuclear power plants is defined as

operation beyond an established time frame determined by the license term, the original plant design, relevant standards or national regulations. As stated in IAEA safety standards, to maintain a plant's fitness for service, consideration should be given to life limiting processes and features of systems, structures and components (SSC), as well as to reasonably practicable safety upgrades to enhance the safety of the plant to a level approaching that of modern plants.

Source: <https://www.iaea.org/newscenter/pressreleases/iaea-concludes-long-term-operational-safety-review-at-the-atucha-nuclear-power-plant-in-argentina-0>, March 07, 2024.

JAPAN

Nuclear Power Policy to be Major Focus in Parliament After Ishikawa Quake

As Japan marks 13 years since the devastating earthquake, tsunami and nuclear disaster in March 2011, the government of Prime Minister Fumio Kishida is moving toward restarting idled nuclear power reactors. However, a powerful January 1 earthquake that struck the Noto Peninsula in Ishikawa Prefecture reminded the country of how

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seismic activity can lead to bigger disasters if a nuclear plant is nearby. The New Year's Day quake occurred near Hokuriku Electric Power's Shika nuclear power station in Ishikawa. The controversial restart of nuclear power reactors is set to return to the spotlight in parliament, with opposition parties likely to step up their criticisms of the current evacuation plans in the event of a nuclear disaster.

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The March 2011 disaster led to an unprecedented triple meltdown at Tokyo Electric Power Company Holdings' Fukushima No. 1 nuclear plant. In 2012, the government, then led by the now-defunct Democratic Party of Japan, compiled a policy that called for the end of nuclear power generation in the 2030s. But the Kishida administration has made a clear shift from that policy amid rising energy costs and the need to decarbonize. A basic policy for realizing a green transformation, which was approved by the Cabinet in February 2023, included plans to consider both the rebuilding of aged nuclear power reactors and the construction of new ones. In May 2023, a related law was enacted that allows utilities to effectively operate nuclear reactors for more than 60 years.

Kishida's initiative to increase the use of nuclear power is aimed at reducing Japan's dependence on coal-fired thermal power generation at a time when the United States and European countries are criticizing Japan for being a laggard on climate change. Japan has frequently been given the Fossil of the Day award by Climate Action Network (CAN), a coalition of nongovernmental organizations tackling environmental issues. The pivot in policy is also due to a surge in fuel prices due to the yen's depreciation, dealing an additional blow to Japanese households. Kishida also chose to change course based on advice from people around him, including his secretary, Takashi Shimada, a former vice industry minister, who is

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known to be an advocate of nuclear power. Chugoku Electric Power plans to restart the No. 2 reactor at its nuclear power station in Shimane Prefecture in August, while Tohoku Electric Power aims to bring the No. 2 reactor at its Onagawa nuclear plant in Miyagi Prefecture back online in September. In addition, the government appears to be envisioning an early restart of a reactor at Tepco's Kashiwazaki-Kariwa nuclear plant in Niigata Prefecture.

... After the Noto quake, many roads were

impassable and the transport of relief supplies to affected areas by air and sea did not go smoothly, highlighting issues in the event of a nuclear disaster. "Considering the Noto Peninsula earthquake, it may be impossible to shift the nuclear policy" toward restarting reactors, a member of the main opposition Constitutional Democratic Party of Japan (CDP) said during a recent Upper House Budget Committee meeting. The quake measured an upper 5 — the fourth-highest level on the Japanese seismic intensity scale — at the the Shika nuclear plant. While there were no radiation leaks, facilities at the plant were damaged due to the temblor.

The government's guidelines on measures related to nuclear disasters stipulate that residents within 5 kilometers of a nuclear plant should evacuate in the event of an accident and that those within a radius of between

5 and 30 km should stay indoors at first and then evacuate depending on the situation. Seiji Osaka, executive deputy president of the CDP, told reporters that the evacuation plans do not take the possibility of a complex disaster into consideration. Evacuation would be extremely difficult in the event of a complex disaster involving Shikoku Electric Power's Ikata nuclear plant in Ehime Prefecture or at Japan Atomic Power's Tokai No. 2 nuclear plant in Ibaraki Prefecture, according to Osaka. "The evacuation

plans are made on the premise of residents' exposure to radiation. This is a flaw that must not be ignored," Osaka said. Taku Yamazoe, policy head of the Japanese Communist Party, also cast doubt on current evacuation plans.

... After the earthquake, data from at least 18 monitoring posts to measure radiation levels around the Shika nuclear plant became unavailable.

Asked about evacuation plans at a meeting of the Lower House Budget Committee in February, Kishida said, "We will not promote the restart of reactors unless there are appropriate emergency response plans." But the Nuclear Regulation Authority's work to review the nuclear disaster response guidelines will likely be limited to issues such as the timing of indoor evacuation and won't cover issues related to complex disasters. "An inconvenient truth' for the government has emerged. This will be a focus in the latter part of the ongoing regular parliament session," a senior CDP official said.

Source: <https://www.japantimes.co.jp/news/2024/03/10/japan/politics/japan-reactor-restarts/>, March 10, 2024.

UKRAINE

IAEA Chief Meets Putin Over Nuclear Safety

The United Nations' atomic watchdog chief has met Russian President Vladimir Putin after "tense" talks with energy officials over safety at the Zaporizhzhia nuclear power plant, Europe's largest. It came as a senior Russian military officer warned that the conflict in Ukraine could escalate into a full-scale war in Europe and the probability of Moscow's forces becoming involved in a new conflict is increasing "significantly". Colonel-General Vladimir Zarudnitsky, head of the Russian

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army's Military Academy of the General Staff, made the comments in an article for the defense ministry publication Military Thought, the state RIA news agency reported. "The possibility of an escalation of the conflict in Ukraine — from the expansion of participants in 'proxy forces' used for military confrontation with Russia to a large-scale war in Europe — cannot be ruled out," RIA cited him as saying. ...

The Kremlin published introductory remarks by Putin and Rafael Grossi, chief of the International Atomic Energy Agency, or IAEA, at the meeting in Sochi in southern Russia but gave no details of the closed-door meeting that followed. Grossi announced the trip on Monday, the first day of a regular meeting of the agency's 35-nation board of governors in Vienna, Austria. Putin told Grossi that he was prepared to discuss "particularly sensitive and important issues on the agenda ... and do everything to ensure security anywhere we are in one or another involved in nuclear energy", the Kremlin said.

The Zaporizhzhia nuclear plant's six reactors have been shut down for months, but it still needs power and qualified staff members to operate crucial cooling systems and other safety features. The IAEA has repeatedly expressed alarm about the nuclear plant amid fears of a potential nuclear catastrophe. Grossi told Russia Today that he discussed with Putin the possibility of restarting the plant — and whether it will be necessary to do so.

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several times." ...

Source: <https://global.chinadaily.com.cn/a/202403/08/WS65ea6a5aa31082fc043bb6b2.html>, March 08, 2024.

Ukraine Raises Concerns Over Nuclear Plant Safety

Ukraine's Energy Minister Herman Halushchenko has urged Russia to withdraw its troops from the Zaporizhzhia Nuclear Power Plant in southern Ukraine. During a news conference in Vienna, the minister said the overall situation at the plant is inching closer to a possible nuclear accident, as the number of problems keeps growing by the day. He said the issues include frequent halts to the external power supply, which is needed to maintain the cooling system. The head of Ukraine's nuclear power plants operator Energoatom said that Ukrainian staff are denied access to the plant and he believes Russia is in control of its operation.

Director-General of the IAEA Rafael Grossi met with President Vladimir Putin in Sochi and asked Putin to cooperate to ensure the safety of the plant. Meanwhile, Russian strikes on eastern and southern Ukraine continue. The governor of the southern

Kherson region said that air strikes destroyed an apartment building and medical facilities, killing at least two people and injured two others, including a child. Ukraine's military says that it shot down 12 of 15 Russian drones in eastern parts of the country.

Source: https://www3.nhk.or.jp/nhkworld/en/news/20240310_05/, March 10, 2024.

EU Statement on Nuclear Safety, Security and Safeguards in Ukraine as Delivered at the IAEA Board of Governors

I have the honour to speak on behalf of the EU. The candidate countries North Macedonia, Montenegro, Albania, Ukraine, the Republic of Moldova and Bosnia and Herzegovina and

Georgia, the EFTA countries Iceland, Liechtenstein and Norway, members of the European Economic Area, as well as San Marino, align themselves with this statement. The EU strongly supports Ukraine and the draft Resolution presented to the Board under this item. Two years have passed since Russia started its unprovoked and unjustified war of aggression, threatening the safety and security of Ukraine's nuclear facilities. It is therefore important for the Board to address the issue and support the work of the IAEA to help avoid a nuclear accident in Ukraine, with all its potential regional and global consequences, including for global food security.

We remain seriously concerned about the continued precarious nuclear safety and security situation in particular at Ukraine's Zaporizhzhia Nuclear Power Plant (ZNPP), as reported by the IAEA Director General. None of the serious risks

The plant suffered its eighth total loss of off-site power, the remaining licensed Ukrainian personnel have been excluded, and the regular maintenance of critical safety systems continued to be delayed. As the time passes, the ageing of equipment increases risks to the nuclear safety and security of the plant. Moreover, following the destruction of the Kakhovka dam, the source of cooling water remains precarious.

identified by the Agency existed before Russia's illegal seizure of the plant two years ago. During the reporting period, the situation continued to degrade. The plant suffered its eighth total loss of off-site power, the remaining licensed Ukrainian personnel have been excluded, and the regular maintenance of critical safety systems continued to be delayed. As the time

passes, the ageing of equipment increases risks to the nuclear safety and security of the plant. Moreover, following the destruction of the Kakhovka dam, the source of cooling water remains precarious. Regular detonations in the vicinity of the ZNPP were reported as well as the presence of anti-personnel mines at and around the ZNPP.

The communication lines, including the online transmission of data from the radiation monitoring system from the ZNPP to the competent State authority remain interrupted, in disregard with IAEA safety standards. According to the IAEA Director General, six out of the Seven Pillars for ensuring nuclear safety and security in armed conflict are being compromised fully or partially

at the ZNPP. In this context, we stress the importance of respecting the Seven Pillars. Despite repeated requests, the IAEA is not given access to all areas of the ZNPP, or to the information relevant for nuclear safety. Such access is essential for the IAEA to fully confirm the observance of the five concrete principles for protecting the ZNPP, notably the absence of heavy weapons. Russia must provide timely and appropriate access to all parts of the ZNPP and all information, as requested by the IAEA. The five principles must be respected.

The EU welcomes that despite the very challenging circumstances the IAEA has been able to continue to implement safeguards and undertake in-field verification activities, in accordance with Ukraine's Comprehensive Safeguards Agreement and the Additional Protocol. The EU greatly appreciates the IAEA's continued presence at all Ukrainian nuclear sites as well as its technical support and assistance to help maintain nuclear safety and security.

Given the vulnerable power status of the ZNPP, as reported by the Director General, all ZNPP reactors must remain in a shutdown state, in accordance with the order of the Ukrainian regulator, and as recommended by the IAEA. The physical integrity of Ukraine's other nuclear power plants also remains under threat as long as Russia continues its warfare. The EU welcomes that despite the very challenging circumstances the IAEA has been able to continue to implement safeguards and undertake in-field verification activities, in accordance with Ukraine's Comprehensive Safeguards Agreement and the Additional Protocol. The EU greatly appreciates the IAEA's continued presence at all Ukrainian nuclear sites as well as its technical support and assistance to help maintain nuclear safety and security. We commend the courage and determination of all IAEA staff involved.

The EU will continue to provide financial support for the IAEA's activities in Ukraine in 2024. Returning the ZNPP to the full control of the competent Ukrainian authorities is the only lasting solution to minimise the risk of a nuclear accident. The EU therefore reiterates its strong call on Russia to immediately and completely withdraw from the ZNPP. It belongs to Ukraine. Russia's attempts to illegally take ownership of Ukraine's

ZNPP have no validity under international law. The EU continues to stand with Ukraine for as long as necessary. We support all efforts towards achieving a just, lasting and sustainable peace based on Ukraine's sovereignty, independence and territorial integrity within its internationally recognised borders. It is high time to collectively address nuclear safety, security and safeguards in Ukraine, two years after the Board adopted its first Resolution followed by Russia's illegal seizure of the ZNPP. We call upon all Board Members to support the draft Resolution in front of us.

Source: https://www.eeas.europa.eu/delegations/vienna-international-organisations/eu-statement-nuclear-safety-security-and-safeguards-ukraine-delivered-iaea-board-governors-4-8-march_en, March 07, 2024.

NUCLEAR WASTE MANAGEMENT

CANADA

New Report Details Safety of Geological Repositories for Nuclear Waste

The Nuclear Waste Management Organization has released new research into the safety of burying nuclear waste underground, including at one site in Northwestern Ontario. The 2023 Confidence in Safety Report looks at two sites under consideration for a deep geological repository to store used nuclear fuel. The two sites include one in the Wabigoon Lake Ojibway Nation-Ignace area in northwestern Ontario and the other in the Saugeen Ojibway Nation-South Bruce area in southern Ontario.

The NWMO said it has confidence that either site can safely host a deep geological repository for used nuclear fuel. ... A deep geological repository is constructed approximately 650 to 800 metres below ground level and encased in a natural shield of solid rock. The repository design incorporates

a series of engineered barriers to ensure the fuel can be isolated safely for many thousands of years.

The selection process for a new site began in 2010 with 22 communities expressing interest in hosting a repository site. This latest report states that the two proposed sites have features to help ensure they can safely contain and isolate used nuclear fuel, including being situated in stable, seismically quiet settings with rock formations of the necessary depth, breadth and volume to host the repository, as well as no economically viable resources within the

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...The proposed site near Ignace has drawn criticism from community members, who argue the dangers of storing nuclear waste outweigh any benefits of hosting a repository site. Once a site is chosen, additional technical studies will be conducted.

Source: [https://www.nwonevnews.com/local-news/new-report-details-](https://www.nwonevnews.com/local-news/new-report-details-safety-of-geological-repositories-for-nuclear-waste-8418795)

[safety-of-geological-repositories-for-nuclear-waste-8418795](https://www.nwonevnews.com/local-news/new-report-details-safety-of-geological-repositories-for-nuclear-waste-8418795), March 10, 2024.



Centre for Air Power Studies

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

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P-284

Arjan Path, Subroto Park,
New Delhi - 110010

Tel.: +91 - 11 - 25699131/32

Fax: +91 - 11 - 25682533

Email: capsnetdroff@gmail.com

Website: www.capsindia.org

Edited by: Director General, CAPS

Editorial Team: Dr. Sitakanta Mishra, Javed Alam, Dr. Ngangom Dhruva Tara Singh, Rishika Singh, Abhinav Shankar Goswami, Ritika Mourya

Composed by: CAPS

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