

NUCLEAR INTELLIGENCE WEEKLY[®]

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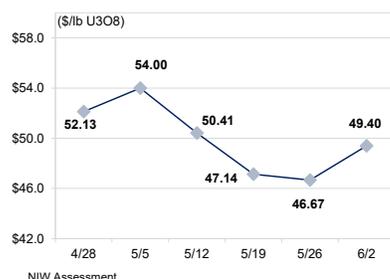
Market Points

Australian junior Boss Energy announced this week that its board made a final investment decision to develop its Honeymoon in situ recovery project in South Australia with production beginning next year.

The uranium spot market recovered prior losses this week as Energy Intelligence's Uranium Price Panel delivered an assessment of \$49.40 per pound U3O8 on Jun. 2, up from \$46.67/lb. on May 26.

Energoatom has received a UAH1.5 billion (\$51 million) loan from Ukrgasbank to support a new agreement with Westinghouse for supply of "nuclear fuel for all nuclear power plants of Ukraine."

UPP: \$49.40/LB U3O8



WEEKLY ROUNDUP

Ukraine Signs Major Nuclear Deal With Westinghouse

- Amid the ongoing war in Ukraine, Energoatom and Westinghouse on Jun. 2 signed an agreement to significantly expand the US vendor's presence in the struggling nation — a further indication of Ukraine's determination to break its dependence on Russian energy. The pact calls for Westinghouse to supply all nuclear fuel for Energoatom's operating fleet and to increase the number of planned AP1000s from five to nine, according to a Westinghouse announcement and an Energoatom posting. A signing ceremony at the Khmelnytski nuclear plant, where the first two AP1000s are planned, included Energoatom President Petro Kotin and Westinghouse President and CEO Patrick Fragman, with Ukrainian Energy Minister Herman Halushchenko and Swedish Ambassador to Ukraine Tobias Thyberg also in attendance. "The fuel will be supplied out of Westinghouse's fabrication site in Vasteras, Sweden," said Westinghouse, "with continued localization of fuel assembly component production in Ukraine." Also planned is the creation of a Westinghouse Engineering Center in Ukraine to support the planned AP1000 build-out, as well as the current Russian operating fleet and future decommissioning.

- A years-long investigation into four undeclared Iranian sites suspected of nuclear activity dating back decades will once again be the focus of a resolution at the upcoming International Atomic Energy Agency (IAEA) board meeting that starts Jun. 13. The US is backing a resolution alongside France, Britain and Germany that calls on Iran to "act on an urgent basis" to "clarify and resolve" outstanding safeguards issues related to the discovery of uranium particles of anthropogenic origin at three sites, with the fourth, at Lavisian-Shiane, now dropped from the probe. But with ongoing diplomatic efforts aimed at restoring what's left of the Joint Comprehensive Plan of Action, the resolution stops short of censuring Iran, a move that would risk referral to the UN Security Council. Iran rejected the IAEA's report, with a foreign ministry spokesperson saying it doesn't "reflect the reality of talks between Iran and the agency." Notably, the IAEA's latest Iran safeguards report for the first time identified all four locations — Turqzabad, Varamin, Marivan and Lavisian-Shiane.

- The prestigious peer-reviewed journal of the National Academy of Sciences published a paper this week finding that small modular and advanced reactors (SMRs) will generate "more voluminous and chemically/physically reactive waste" than conventional light water reactors (LWRs). The study's authors include Lindsay Krall, who works in the research and safety analysis division of the Swedish Nuclear Fuel and Waste Management Co. and former US Nuclear Regulatory Commission chair Allison Macfarlane. Based on reactor designs by NuScale, Terrestrial Energy and Toshiba, covering water, molten salt and sodium-cooled SMR designs, the report was immediately slammed by NuScale's co-founder and Chief Technology Officer Jose Reyes, and in a Neutron Bytes blog post. In a letter to the academy's journal, Reyes said the study used an earlier version NuScale design and not the current VOYGR model, which he said has fuel burn-up characteristics similar to those of existing LWRs. The authors have yet to respond to the criticism, but in her latest tweet, lead author Krall repeated the report's conclusion that "most" SMRS will increase nuclear waste volumes "by factors of two to 30."

NUCLEAR FUEL MARKET

Honeymoon Mine to Return to Operation

Australian junior Boss Energy announced this week that its board has made a final investment decision to develop its Honeymoon in situ recovery project in South Australia. This marks the first brown-field development decision since spot market prices rebounded from a decade-long lull.

“The decision means that Boss will now accelerate construction, ensuring Honeymoon remains on track for first production in the December quarter of 2023” to produce 2.45 million pounds U3O8 per year within three years, the company said in a Jun. 1 statement.

At an estimated \$82 million (A\$113 million) capital cost to develop the legacy operation, the announcement follows a \$90 million equity raise and a front-end engineering study. Boss said it also holds a strategic 1.25 million lb. uranium stockpile valued at \$59 million, and no debt, “ensuring it has maximum flexibility and pricing leverage in its offtake negotiations.”

Boss CEO Duncan Craib said in a March presentation that the company would not rely on offtake agreements to fund Honeymoon’s development, noting that Boss would rather wait until there is a “further increase in contract pricing.” Craib reiterated this week the miner’s financial health puts it in an “extremely strong negotiating position with utilities and ensures we can capitalize on the looming uranium supply deficit.” With all-in sustaining costs forecast at \$25.60 per pound over the life of the mine, Boss estimates that at prices close to \$60/lb. it would have a 47% rate of return.

While the uranium spot price has slumped since Boss announced in March it was awaiting a final investment decision from the board, the price recovered some of those losses this week. Market sources suggest the spot uranium market may have been pressured down through the end of May to achieve lower prices on certain offtake contracts. The uranium price delivered by Energy Intelligence’s Uranium Price Panel rose to \$49.40/lb. U3O8 on Jun. 2, up from \$46.67/lb. on May 26.

For Boss, the fully permitted Honeymoon mine benefits from “extensive infrastructure in place,” although it had to overcome significant challenges to reach the decision to proceed with develop-

ment. Prior owners Uranium One and Mitsui poured about \$170 million into the project before Uranium One sold the project to Boss in 2015. But the prior owners were unable to overcome high concentrations of chloride and calcium (gypsum) precipitation within the ore body, resulting in lower recoveries and much higher all-in costs, closer to \$40/lb. U3O8.

Boss said earlier it was able to reduce estimated costs because it was able to “identify a unique resin that is effective in leaching the uranium enabling an ion exchange processing plant to be utilized,” which in the company’s field leach trials in 2017 showed higher recovery rates than Honeymoon’s prior owners were able to achieve.

Boss also had to disentangle itself from two of the three legacy contracts — two of which were with EDF in France and one with the Tennessee Valley Authority in the US — under prior owner Uranium One. Boss told Energy Intelligence last summer that it has managed to whittle the portfolio down to one contract without fees or payments and that it could be fulfilled using the 1.25 million lbs. U3O8 that Boss now holds.

Meanwhile in Ukraine, Energoatom has received a 1.5 billion hryvnia (\$51 million) loan from Ukrgasbank to support a new fuel supply agreement with Westinghouse under which the US company is committed to supply fuel for the entire fleet, although the timing on that wasn’t made clear. Six of Ukraine’s Russian VVER-1000 reactors are currently using Westinghouse fuel, with two VVER-440 reactors scheduled to take Westinghouse fuel by 2024. Energoatom operates four nuclear plants comprising a total of 15 reactors, but six of those reactors are located at Zaporozhye, which is currently under Russian military control and as such faces an uncertain future.

Westinghouse clarified in a Jun. 3 statement that all fuel for Ukraine would continue to be supplied out of its fabrication plant in Vasteras, Sweden, “with continued localization of fuel assembly component production in Ukraine. Atomenergomash, a subdivision of Energoatom, is currently completing qualification to manufacture top and bottom nozzles for Westinghouse fuel.”

Jessica Sondgeroth, Washington

URANIUM PRICE PANEL

For the week ended June 2, 2022

	Weekly Spot Market Prices													
	Chg.	June		May			Apr				Mar			
		3	26	19	12	5	28	21	14	7	31	24	17	10
Price (\$/lb U3O8)	2.73	49.40	46.67	47.14	50.41	54.00	52.13	61.28	63.88	63.07	57.94	58.34	56.00	59.63
Total Assessments	-2.00	10.00	12.00	10.00	9.00	11.00	9.00	10.00	10.00	9.00	10.00	9.00	9.00	10.00
% within 1 StDev	-35.00	40.00	75.00	80.00	77.78	72.73	55.56	60.00	90.00	77.78	80.00	66.67	66.67	80.00
Low (\$/lb U3O8)	3.00	49.00	46.00	47.00	49.00	53.50	51.25	59.00	63.75	63.00	57.50	58.00	55.00	59.00
High (\$/lb U3O8)	2.65	50.15	47.50	47.50	52.00	55.00	53.00	63.25	64.00	63.50	58.75	58.50	57.00	60.25
Variability*	0.27	0.32	0.05	0.00	0.28	0.50	0.50	0.75	0.08	0.00	0.28	0.13	0.50	0.25

*This represents the value of the potential range of conceivable final averages that might result when random elimination is used to balance market positions within the panel.

IAEA

Ukraine Puts Grossi in the Firing Line Over Davos Statements

Ukraine's frustrations, including over Russian cruise missiles allegedly overflying three of its four nuclear power plants, boiled over last week into a verbal attack on the International Atomic Energy Agency (IAEA) and its Director General Rafael Grossi for failing to effectively respond to Kyiv's "numerous appeals" for a "clear position" on "acts of Russia's nuclear terrorism." The IAEA has so far made no response to the criticism by Ukraine's nuclear regulator, but the accusations have put the nominally neutral international agency in the hot seat as it struggles to gain access to the Russian-occupied Zaporozhye nuclear plant in Ukraine's war-torn southeast.

Since Russian troops marched into the Chernobyl nuclear plant site at the war's outset on Feb. 24, the risk to Ukraine's nuclear infrastructure has only grown, particularly at Zaporozhye, where fighting and a fire broke out the night of Mar. 4, and, according to the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU), "three Ukrainian defenders" died. Grossi has wasted no opportunity for reaching out to both sides in the conflict, effectively positioning the agency as a broker on thorny and unprecedented nuclear-related issues and significantly raising the IAEA's profile. While this proactive approach has been widely applauded, Grossi appeared to slip up at a May 25 World Economic Forum panel discussion, where his remarks on the Zaporozhye situation prompted a furious response from Ukraine and accusations that he was parrotting Russian "propaganda."

Grossi described the plant as Europe's largest with six reactors, and said it has "30,000 kilograms of plutonium, 40,000 kg of enriched uranium and my inspectors do not have access to that." He also said that the current situation at the plant, which though controlled by Russian forces is still operated by Energoatom, is both "unprecedented" and "unsustainable" and that inspectors needed to visit the site "to prevent that either there is a problem or we end up finding out that a few hundred kilograms of nuclear weapon-grade material has gone missing."

The SNRIU hit back two days later, criticizing the remarks for implying that sensitive material was stockpiled at the plant rather than contained in nuclear fuel, a large portion of which sits in spent fuel pools or dry casks. The Ukrainian agency said it "categorically refutes the information about the alleged presence of plutonium and enriched uranium stocks ... suitable for the manufacture of nuclear weapons," saying Ukraine did not have the facilities necessary to convert the material into weapons-usable material "due to the lack of technology and a political ban on its production." It added that "it is well known" to the IAEA that Ukraine annually fulfills its safeguards obligations, and called it "very sad that the odious lies of Russian propaganda are being broadcast at a high level by a top IAEA official."

Whether the Ukrainians misinterpreted the director general's remarks is debatable. One source said Grossi's remarks could be viewed as having been said in "an unguarded moment ... and he probably didn't mean to say it in that way." Even so, the source said he was "flabbergasted" that Grossi didn't clarify that the material was contained in nuclear fuel, and he added that "it's now becoming a sort of open secret that he wants to run for secretary general after [current UN Secretary General Antonio] Guterres," whose term expires in 2026. Grossi could "have said, 'you know there's so much plutonium in the spent fuel' ... but then that takes away the oomph of the statement."

Grossi's public profile is leagues ahead of his IAEA predecessors, but while increasing his own visibility on the world stage, he has also expanded the agency's — something he promised to do while he was campaigning for his current position. "He is making the agency more visible and deservedly so," said Laura Rockwood, director of Open Nuclear Network and a former senior IAEA lawyer.

Diplomatic Battleground

The IAEA has become a diplomatic battleground for nuclear-related allegations from both sides. For example, a 'note verbale' from the Ukrainians circulated by the agency Apr. 29 reported three alleged instances of cruise missile overflights over the South Ukraine, Khmelnytski and Zaporozhye nuclear power plants, respectively on Apr. 16, 25 and 26. Russia accused Ukraine of launching two unmanned armed drones over Zaporozhye on Apr. 27, according to a May 13 diplomatic note circulated by the agency.

It's worth noting that earlier in the conflict, when both Chernobyl and Zaporozhye were under siege, Grossi promoted his "seven pillars" of safety, including that nuclear plant "operating staff must be able to fulfill their safety and security duties, and have the capacity to make decisions free of undue pressure."

However, recent IAEA updates, which are now far less frequent than in the past, contain a blanket statement attributed to Ukraine, of "no significant developments related to nuclear safety and security in the country over the past 24 hours." Ukraine says these assurances are emboldening the Russians and coming from Russian-appointed officials in Ukraine.

Although Russian forces finally left Chernobyl and a second IAEA mission at the site began this week, it's not at all clear the same will occur at Zaporozhye. Increasingly there are questions about which side will ultimately retain control of the plant, with Ukraine's state-owned grid operator Ukrenergo on May 18 dismissing an alleged Russian claim that the plant would supply Russia with electricity. "Ukraine's power system currently has no physical connections with Russia's power system. Therefore, the supply of electricity from Ukrainian power plants to Russia is currently physically impossible," Ukrenergo said in a statement tweeted out the same day.

In fact, the battle for control over Ukraine's large nuclear infrastructure appears to have almost inadvertently started just hours before the invasion began when Ukrenergo conducted what was intended to be a short-lived experimental break with the larger Russian-operated network in preparation for a plan to connect Ukraine and Moldova to the continental European grid in 2023. However, just hours after the exercise started Russia invaded and priority was put on synchronizing the Ukrenergo-operated grid with the grid operated by the European Network of Transmission System Operators for Electricity. On Mar. 16 EC Energy Commissioner Kadri Simson issued a statement announcing the linkage, calling it a "historic milestone for the EU-Ukraine relationship" that involved "doing a year's work in two weeks."

Stephanie Cooke, Washington

NEWBUILD

KHNP Jolts Competitors With Equity Stake Appetite

Korea Hydro & Nuclear Power's (KHNP) statement late last month that it was willing to take up to a 30% stake in Poland's first nuclear power plant was a shot across the bow to its French and US reactor vendor competitors, which either can't or won't take any comparable stake to guarantee winning a potentially massive Polish contract. Both EDF and a Westinghouse-led US consortium are likely to tout other attractions to planners in Warsaw, but the South Korean move puts them both on a back foot.

A 20%-30% KHNP equity stake in the Polish newbuild project "would be the KHNP's direct contribution to the investment," KHNP Deputy CEO Lim Seung-yeol told the Polish Press Agency in a May 21 article. "The rest would be covered by financial institutions. On the Korean side, it would be export credit agencies."

KHNP's promise of billions for a Polish newbuild signals not only a willingness to take risk on such a project, but a newly aggressive domestic industry evidently reinvigorated by the election of pro-nuclear President Yoon Suk-yeol, even at the risk of incurring Washington's wrath. Yoon promised 10 reactor export deals by 2030. But Washington is unlikely to sit still given the intergovernmental agreement (IGA) it signed with Warsaw in October 2020 that it sees as a claim for any Polish newbuild work.

Offers Solicited and Unsolicited

The US-Poland IGA elbowed out some competition on the early part of the Polish program, with Westinghouse and Bechtel assigned a front-end engineering and design (Feed) study. But Poland has been clear since signing the IGA that it believes it is bound by no exclusivity. "We are not in a lock-in situation,"

Poland's Plenipotentiary for Strategic Energy Infrastructure Piotr Naimski told Energy Intelligence in an October 2020 interview. And Warsaw has since received commercial offers from EDF, in October 2021, and from KHNP, on Apr. 25.

To make an "unsolicited offer" to nuclear planners in a country with a US IGA "ruffles some feathers," a US nuclear industry source told Energy Intelligence. But the fundamental problem is that "the Poles have said they want equity, and US equity hasn't showed up."

Indeed, since its acquisition by Brookfield Business Partners in 2019, Westinghouse has made clear it would take no construction risk to win newbuild contracts, and it has offered to take no equity in projects. Bechtel has long been similarly conservative in winning nuclear newbuild business. So the South Korean stance poses a tall challenge for the Westinghouse-Bechtel Feed study, due later this year, to make a case for a US-supplied project unless those companies come up with equity injections.

To be fair, the precise extent of the South Korean equity offer is not clear. Warsaw is talking about building 6-9 gigawatts of nuclear capacity via the construction of six reactors, the first of which would be commissioned in 2033. But this reactor fleet would likely start with an initial twin-unit plant at Warsaw's preferred site adjacent to the Baltic seaside villages of Lubiato and Kopalino, in Pomerania province, and it's not clear if the KHNP offer is for a 20%-30% stake in that first plant or in the entire Polish nuclear fleet. Warsaw has projected a \$40 billion price tag for the six-reactor program, but how much of this would come from equity versus debt financing? A KHNP offer of 30% equity financing would translate to only \$3.6 billion if the debt-equity ratio were 70% to 30%.

Attractions Beyond Equity

A \$3.6 billion stake is still far more than EDF could offer, given its financial travails. The French state-owned company has made clear to its UK subsidiary that it can't take more than 20% in a proposed twin-EPR newbuild at Sizewell C in the UK, and even 20% might be a tall order for the less mature Polish market.

In the meantime EDF's offer to Poland appears to be centered around presenting itself as an experienced one-stop shop for newbuilds: "We have explained how we will be able to integrate engineering, procurement and construction [EPC]," Vakisasai Ramany, EDF's senior vice president in charge of development, new nuclear projects and engineering, told Energy Intelligence in a December interview. "I think from that standpoint it is unique."

It's certainly a departure from Westinghouse's AP1000 pitch, which is increasingly centered around a broad consortium approach. Only last week the Pittsburgh-based company signed a strategic cooperation agreement on global AP1000 projects with Hyundai Engineering & Construction that would see the South Korean firm apply its EPC skills to the AP1000 offering.

Industry sources were split on what this might mean, and how it might integrate with Bechtel's EPC offerings. One likely scenario would be Hyundai E&C focusing on the AP1000 balance of plant, with Bechtel still responsible for the overall EPC. But Hyundai E&C could theoretically play a broader EPC role—particularly if it's willing to accept more construction risk than Bechtel or Westinghouse. In that situation Bechtel would have a less prominent, and less risky, project management role. Either way, if Hyundai E&C does join forces with Westinghouse and Bechtel in a Polish bid, it will certainly open another avenue of debt financing and complicate Seoul's support for a KHNP bid.

There remain three major issues with any Westinghouse-led approach, which will likely be clarified later this summer. Naimski said in a May 31 interview with Poland's *Dziennik Gazeta Prawna* that the government expects to select a vendor "in the fall" after receiving a Westinghouse-led bid by "late summer."

The first issue for Westinghouse is that it likely won't match the KHNP equity offering. The second is Westinghouse's recent history: the disaster of its four AP1000 newbuilds in the US, two of which were abandoned in 2017, can in many ways be traced back to disputes over construction risk allocations in the initial supplier consortia for those newbuilds. Finally, and perhaps most importantly, is the fact that Westinghouse itself is on the market. It's not clear why any prospective newbuild planners — be they in Warsaw, Prague or even Riyadh — would select Westinghouse as a supplier when it's entirely unclear who might own the storied company next year.

Phil Chaffee, London

UNITED STATES

West Virginia Poised to Host New Nuclear Technologies

West Virginia appears to be in the throes of a transition from dependence on coal mining to potential dependence on new nuclear infrastructure, encouraged by interest from private nuclear vendors, the US Department of Energy (DOE) and powerful centrist Democrat Sen. Joe Manchin, who was key to coaxing state lawmakers into lifting a ban on nuclear energy earlier this year.

West Virginia is surrounded by both government and commercial nuclear facilities in Ohio, Kentucky, Virginia and Pennsylvania, and is now evidently open to the possibility of hosting new ones, including a research reactor at West Virginia University and a nuclear fuel recycling facility in the more sparsely populated southern part of the state. While West Virginia lawmakers shop around for projects, Manchin is well-positioned to direct expanded federal spending on nuclear energy to his home state. Manchin

played a big role in convincing the West Virginia legislature to repeal a 1996 ban on nuclear power plants in February. For a state struggling to wean itself off coal, which has been declining in popularity and demand, nuclear vendors are promising industrial revitalization.

Capitol Hill Talks

Manchin, who chairs the Senate Energy and Natural Resources Committee, last week began talks with Senate Majority Leader Chuck Schumer, a New York Democrat, over a slimmed-down energy and climate package — at least compared with the Biden administration's \$1.75 trillion infrastructure bill that cleared the House last year. That's a positive development for the domestic nuclear energy industry, which enjoys bipartisan support, since Manchin has been a consistent supporter of nuclear production tax credits and the development of domestic nuclear infrastructure, particularly in light of the growing geopolitical conflict with Russia over its invasion of Ukraine.

However the deliberations shake out, the DOE is already raising its ask. Energy Secretary Jennifer Granholm on May 27 sent a letter to Manchin requesting "additional, catalytic investment to boost domestic manufacturing" of low-enriched uranium (LEU) for existing reactors and high-assay, low-enriched uranium (Haleu) needed to fuel the agency's first round of advanced reactor demonstration projects. "I am writing to bring to your attention a critical need relating to the domestic uranium supply chain as you contemplate further energy and climate legislation," Granholm stated. "The Russian invasion of Ukraine and the corresponding impacts on global fuel supplies have cast into sharp relief the threat to global energy security from dependence on Russian-supplied fuels."

That language happens to coalesce rather neatly with the International Nuclear Energy Act of 2022, which Manchin and Sen. James Risch, an Idaho Republican, introduced on Apr. 8. The new bill would require the DOE to establish a "Nuclear Fuel Security Program" under which the agency would have one year from enactment to select one or more US nuclear energy companies to produce both LEU and Haleu in amounts and timeframes specified by the DOE secretary. Less clear, however, is how Congress or DOE would define "US nuclear energy companies" or whether the technology would have to be US-origin.

West Virginia Shops Around

Last month, Westinghouse posited to the West Virginia legislature's joint committee for government operations the prospect of hosting its eVinci microreactor as a research reactor at West Virginia University. And in January, a new nuclear company helmed by a former high-level DOE official touted to the same committee the possibility of siting a nuclear fuel recycling facility in the southern part of the state. That's a far cry from the coal-dependent state's prior position against any nuclear power

and waste as part of the 1996 moratorium. But since that ban has been repealed, state lawmakers appear more amenable to the promises of advanced reactor technologies, along with fuel recycling and reprocessing.

Despite the state's previous position that it would not support nuclear power until a nuclear waste repository is available, state Rep. Doug Smith, a Republican from Mercer, told Energy Intelligence: "There's a number of us that would think that West Virginia would be a prime place — especially down in the southern part of West Virginia where it's not as populated — to put a recycling center."

Former acting assistant secretary and principal deputy assistant secretary for DOE's Office of Nuclear, Energy Ed McGinnis, now CEO at a new Washington, DC-based nuclear technology company called Curio, visited the state in January to push the idea. With the DOE awarding tens of millions to commercial vendors to develop recycling technologies to meet nuclear fuel enrichment needs, Curio is looking for a home for its NuCycle facility that it says will "produce a new uranium supply stream that can complement already existing and future uranium mining operations." It will have an annual capacity of 800 metric tons of uranium, with an output of 40 MT of waste-derived "TRUfuel" for "the next-generation advanced reactors coming to market."

Curio would also sell plutonium-238 "to the space and other industries," McGinnis said in a Jan. 11 presentation to the joint committee. The facility would "generate substantial revenues annually and employ approximately 3,500 skilled, well-paying, generational jobs." Additionally, "the plan calls for the allocation of approximately \$1 billion to the consenting state each year for the 50-year life of the plant, along with tax revenue from the business products developed and sold, which reflects a true and committed partnership with significant revenue sharing with the state and local communities," McGinnis said.

On May 22, Mike Valore, Westinghouse Nuclear senior director for advanced reactor commercialization, told the same joint committee the state could use its eVinci technology as a research reactor for testing "different applications such as hydrogen generation" with a "technology that can put out both electricity and a high amount of heat." Valore estimated the first-unit cost at \$90 million-\$120 million with operations by 2028, while noting that for "early adopters of the technology," it's not unusual for supporting infrastructure and supply chains to follow. While such considerations are in the early days, the interest of state lawmakers is piqued. "I talked to our chairman of the government organization [joint committee]," Smith said. "And he has a strong feeling that this [microreactor] is something that we are gonna move forward on here in West Virginia."

West Virginia could also take advantage of a funding shift at the DOE for universities. The agency's Office of Nuclear Energy is consolidating its small business innovation and university research programs to support its advanced reactor projects, potentially

including the nation's first university research reactor since the 1970s. Congress awarded a total of \$121 million to the separate programs in 2022, while the DOE is requesting \$161 million for the consolidated program in fiscal 2023.

If Westinghouse — which is up for sale by its current owner Brookfield Business Partners — expands its role in nuclear plant construction, particularly of advanced reactors, Valore noted that the company will need new manufacturing capacity. "Major portions of manufacturing could happen in West Virginia," Valore said.

Jessica Sondgeroth, Washington

JAPAN

LDP Win in Niigata Eases Path to Kashiwazaki Restart

Japan's ruling conservative Liberal Democratic Party (LDP) gained a vote of confidence on May 29 for its nuclear expansion plans when LDP-backed Niigata Prefecture Gov. Hideyo Hanazumi overwhelmingly defeated an antinuclear advocate to win a second four-year term.

The former deputy coast guard commander defeated Naomi Katagiri, a real estate businesswoman and deputy chair of the Niigata branch of the Japan Association of Corporate Executives. He received 77.5% of the total vote, with only 49.6% of more than 1.8 million eligible voters casting a ballot.

Hanazumi's victory will ease political uncertainty surrounding the long-delayed restart of two 1,315 megawatt advanced boiling water reactors (ABWRs) at the giant Kashiwazaki-Kariwa nuclear power plant operated by Tokyo Electric Power (Holding) Co. (Tepco) in the prefecture, and may also buoy the LDP's push to accelerate restarts. But recent remarks from the regulator suggest that any restart is at least a year away from receiving technical approval, and the local approval process could be tied up depending on the progress of public-civic commissions investigating the Fukushima accident.

Public sentiment remains unfavorable for the restart of the two ABWRs, with a poll published by the *Niigata Nippo* daily newspaper May 23 showing only 30% in favor and 48% opposed. Even so, Katagiri failed to gain traction on the restart issue, with economic and employment policy a top priority for those polled, followed by medical and welfare policy, education and child care, and new Covid-19 countermeasures all ahead of nuclear, which tallied only 8%. "Nuclear power was not the main issue for voters in Niigata, who are more concerned with economic policy and consistency of administration," said Tohoku University environmental science professor Asuka Jusen.

The campaign's biggest success was in turning differences in the center-left opposition coalition that won three of Niigata's five House of Representative seats last October into full-blown divisions. Hanazumi secured support from the center-right Democratic Party for the People and the Japan Confederation of Trade Unions (Rengo), one of whose leading members, the Federation of Electric Power Related Industry Workers of Japan, balked over then CDP leader Yukio Edano's promotion of an antinuclear plank.

Given Rengo's electoral clout, its decision in turn led the Niigata CDP branch to refrain from endorsing either candidate, leaving Kitagiri with formal endorsements from only the Social Democratic Party, the Japan Communist Party, the left-populist Reiwa and the Civic Union for Peace and Constitutionalism. Although Hanazumi did not take an overt stance on the Kashiwazaki-Kariwa restarts, other LDP politicians stumping for the incumbent were less reserved. A senior activist in Katagiri's campaign told Energy Intelligence in mid-May that the LDP's push to "step on the accelerator for further restarts" in the wake of rising oil and natural gas prices "has affected general voters" in the prefectural governor's race and in the campaign for the upcoming Jul. 25 elections for the House of Councilors, the Diet's upper house.

By sidelining the CDP's credibility as the leading opposition party, this achievement may open the door to a structural strategic gain for the LDP in the July elections that could help Prime Minister Fumio Kishida consolidate his administration and gain a freer hand in energy policymaking. "The main role of the leading opposition party is to present alternatives, and the CDP has now abdicated this responsibility," commented a Japanese political analyst.

LDP Secretary-General Toshimitsu Motegi told reporters May 30 that he hoped "to connect this momentum of victory to the upper house election" and consolidate the realignment. "At the national level, there is widespread recognition among Rengo members that political stability and energy security are extremely important considering the current Ukraine situation," Motegi said.

Nuclear Ball in Tepco's Court

With little to lose on the nuclear issue, Hanazumi stuck to his formal neutral stance on restarts and renewed his commitment to respect the results of three commissions investigating Fukushima; these were set up by the governor's antinuclear predecessor, Ryuichi Yoneyama, after the Nuclear Regulation Authority (NRA) confirmed in December 2017 that Tepco's planned changes to reactor basic design for the two units conformed to stricter post-Fukushima safety requirements.

The commissions are tasked with probing the accident's technical implications for the safety of the Kashiwazaki-Kariwa restarts, impacts on public health and livelihood, and emergency evacuation plans. So far, only the technical committee has completed its report.

In his platform, Hanazumi said that there was no deadline for completing the investigations and that "we will not discuss restarting until the verification results are available." His administration will "give top priority to the safety of the citizens of the prefecture and require rigorous and appropriate measures from the national government and Tepco," he promised.

In contrast to Yoneyama, who floated the option of a prefectural referendum to decide on the restarts, Hanazumi has yet to commit to a method for integrating the commission results into a restart decision-making process, including whether to solicit citizen participation. However, whether the two Tepco ABWRs will be restarted during Hanazumi's second term, which ends in June 2026, may be decided less by what the governor does than by whether Tepco can satisfy the NRA on safety and security concerns.

Specifically, Tepco needs the NRA to lift its indefinite ban, imposed in April 2021, on any movement of nuclear materials at the site. Tepco had hoped to restart Unit 7 in mid-2021 but those hopes were shattered by revelations that a plant employee had illegally entered the plant's central control room. The incident escalated into a scandal over Tepco's nuclear safety management that is still not resolved.

In an interim report on Tepco's improvement measures released on Apr. 27, the NRA stressed the need for Tepco to reverify both countermeasures and a root cause analysis of the plant's malfunctioning intrusion detectors, saying this is "essential to be able to guarantee nuclear security."

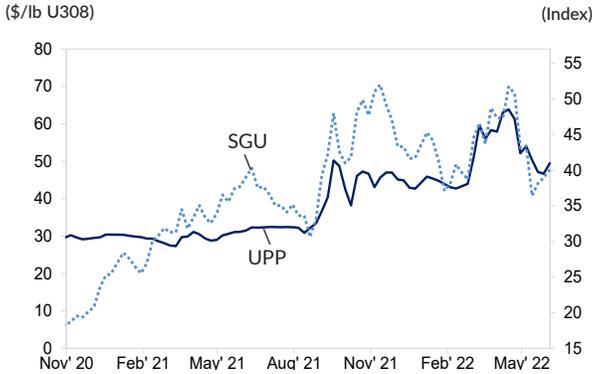
The same day NRA Chairman Toyoshi Fuketa told reporters that the next decision point on the incident "would be in about a year." Meanwhile, Tepco's case was further undermined on May 25 with the exposure of another ID misuse flap, which occurred May 11. Subsequently, the NRA reportedly launched an unannounced "behavior observation" project at Kashiwazaki-Kariwa to check whether the effort to raise safety awareness among staff, including subcontract employees, has made any progress.

Dennis Engbarth, Taipei City

URANIUM MARKET UPDATE

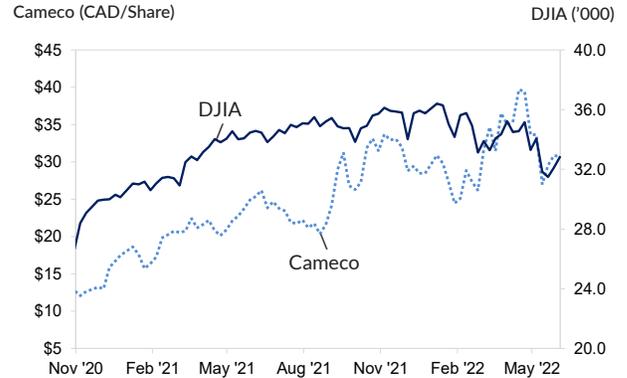
All prices as of Thursday, June 2, 2022

UPP VS. SOLACTIVE GLOBAL URANIUM INDEX
(previous 52 weeks)



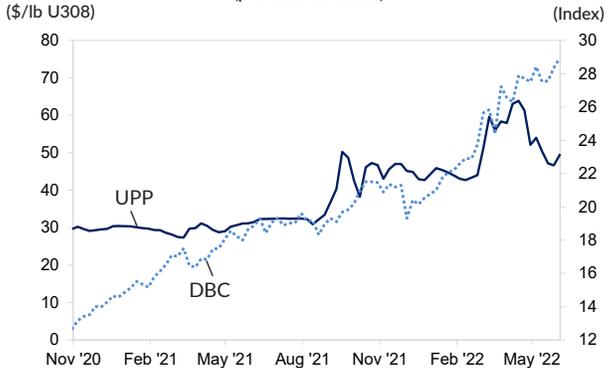
The Solactive Global Uranium Total Return Index, created by Structured Solutions AG, tracks the price movements in shares of companies active in the uranium mining industry. Calculated as a total return index and published in US\$, its composition is ordinarily adjusted twice a year.

CAMECO VS. DOW JONES INDUSTRIAL AVERAGE
(previous 52 weeks)



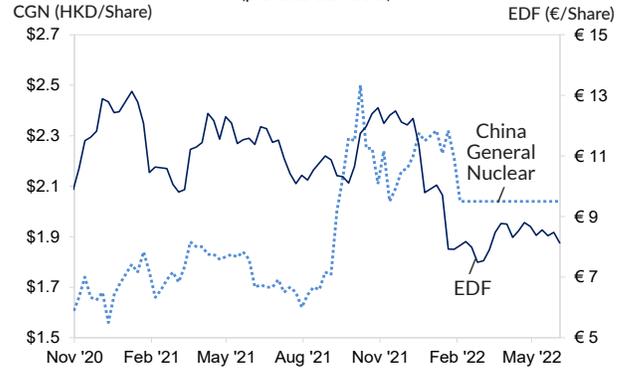
Canadian uranium miner Cameco's stock is valued in Canadian dollars compared with the US dollar on the Dow Jones Industrial Average (DJIA). Roughly two-thirds of DJIA's 30 component companies are manufacturers of industrial and consumer goods. The others represent industries ranging from financial services to entertainment.

UPP VS. POWERSHARES DB COMMODITY INDEX
(previous 52 weeks)



The PowerShares DB Commodity Index Tracking Fund is designed to provide investors with a broadly diversified exposure to the returns on the commodities markets. It is based on the Deutsche Bank Liquid Commodity Index, which is composed of futures contracts on 14 of the most heavily traded and important physical commodities.

EDF VS. CHINA GENERAL NUCLEAR
(previous 52 weeks)



The stock valuation of France's Electricite de France (EDF), largely owned by the French state, is in euros compared to state-owned China General Nuclear (CGN) Power Co., valued in Chinese yuan renminbi. Both companies build nuclear power facilities, design and service reactors, operate nuclear reactors and supply nuclear components and technology.

MONTHLY SPOT MARKET PRICES

	Chg.	2022					2021						
		May	Apr	Mar	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun
Uranium (\$/lb U308)													
Low	-6.50	46.00	52.50	51.00	42.50	43.00	42.00	43.00	36.00	36.00	32.20	32.20	31.00
High	-10.00	54.00	64.00	60.00	44.50	46.50	47.00	47.50	48.00	51.00	36.00	32.50	32.50
Conversion (\$/kgU)													
Low	+2.00	30.00	28.00	26.00	16.00	16.00	16.00	15.00	16.00	19.00	19.00	19.50	19.50
High	+3.00	33.00	30.00	28.00	17.00	17.00	17.00	18.00	19.00	21.00	21.00	21.50	21.50
Enrichment (\$/SWU)													
Low	+2.00	84.00	82.00	100.00	59.00	57.00	56.00	56.00	55.50	55.50	54.00	54.00	54.00
High	-	150.00	150.00	150.00	61.00	59.00	57.00	57.00	57.50	57.50	56.00	56.00	56.00

NIW monthly UF6, SWU and U308 prices rely on the general consensus of direct market participants and is informed by actual market transactions. This section was previously known as the Nukem Weekly Report and the Nukem Price Bulletin. The methodology for NIW's weekly UPP price is different - more information about the methodology behind that price is available on page two.

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