

NUCLEAR INTELLIGENCE WEEKLY[®]

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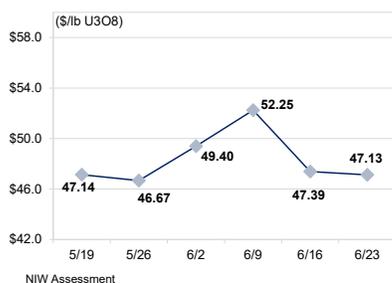
Market Points

Orano is weighing an expansion at its Georges Besse II enrichment plant near Pierrelatte, which could trigger further conversion expansion and higher uranium demand.

Recovering from losses earlier this week, Energy Intelligence's Uranium Price Panel delivered a price of \$47.13 per pound U3O8 on Jun. 23, down from \$47.39/lb. on Jun. 16.

Canadian mining junior Global Atomic has received letters intent from a North American banking syndicate to finance its Dasa uranium project in Niger at an estimated \$208 million capital cost.

UPP: \$47.13/LB U3O8



WEEKLY ROUNDUP

South Korea Touts Major Nuclear Export Push; Newbuild Resumption

- South Korean President Yoon Suk-yeol promised an enormous nuclear exports push this week as his government touted plans for resuming development on the twin APR1400s at Shin Hanul-3 and -4 halted by the previous government. This week's support package allocates some 92.5 billion won (\$71 million) to immediately restart work on the Shin Hanul project, with 380 billion won injected as liquidity into the domestic nuclear industry, and 670 billion won for R&D, all this year. Another 3 trillion won (\$2.3 billion) will go to nuclear R&D from 2023-25. The plans were announced during Yoon's Jun. 22 tour of the forge owned by Doosan Enerbility — formerly Doosan Heavy Industries — where abandoned Shin Hanul-3 and -4 components were stored. Doosan's 17,000-ton forging press, installed in 2017, was in danger of gathering dust under Yoon's predecessor, but Doosan is now lining up orders to keep the press busy, including for the fabrication of small modular reactor components "in the domestic and global markets," the company said.
- Czech Prime Minister Petr Fiala laid out an ambitious strategy this week to increase energy independence, including a recent tender for new reactors at Dukovany and last week's takeover by state-controlled Cez of Czech-based Skoda JS. The newbuild tender involved "neither China nor Russia," Fiala said in a Jun. 22 speech to the nation, noting that the acquisition of Skoda "is key to our nuclear sector." Skoda has supplied major components and services to reactors across the EU. Former Skoda owner OMZ, a Gazprombank subsidiary, first put the Czech firm on the market four years ago as "sanctions restrictions and other legal risks" threatened "stopping the enterprise with its subsequent bankruptcy," Gazprombank Deputy Chairman Tigran Khachaturov said in a Jun. 17 statement. The sale proceeds will be invested in "strategically important Russian assets and projects." Cez noted that the purchase ended the risk of sanctions against Skoda interfering with that company's "ability to maintain key services and supplies" for Cez reactors.
- The US Department of Energy (DOE) appears willing to accommodate a request by California Gov. Gavin Newsom to modify the rules of its \$6 billion Civil Nuclear Credit Program to allow Pacific Gas & Electric's Diablo Canyon plant to qualify. The DOE on Jun. 17 issued a proposed guidance amendment seeking public comment by Jun. 27 on whether the agency should "eliminate the requirement" that a reactor applicant must recover more than 50% of its costs from competitive electricity markets. Diablo Canyon, being in a regulated market beholden to ratepayers, apparently did not meet that requirement. The 2021 Infrastructure Investment and Jobs Act that created the nuclear credit program requires that a nuclear reactor applicant operates "in a competitive electricity market." The DOE now wants to expand its previous interpretation of that language to require only that a reactor applicant "will receive a material amount of its total revenue from sources that are exposed to electricity market competition." Diablo Canyon does receive some revenue from the California Independent System Operator's competitive electricity market as a must-take resource.

NUCLEAR FUEL MARKET

Orano Weighs Capacity Expansion

An Orano executive told a French news agency this week that the company is considering expanding enrichment capacity in response to customer concerns over a potential embargo on Russian nuclear fuel imports. Such an expansion would likely also require an expansion of Western conversion capacity, and that in turn would almost certainly push uranium demand higher. But the million-dollar question is: How long would it take?

Across North America and Europe, enrichers Urenco and Orano and their customers are awaiting clarity from lawmakers to inform future demand requirements. A number of nuclear fuel industry participants have speculated that a ban on Russian imports beginning in 2026 would likely justify capacity increases at Western enrichment and conversion plants to accommodate demand. But this doesn't come without risk given exacerbated supply chain issues and rising inflation.

And for now, a lack of clarity over future trends is keeping a damper on uranium prices, which have considerably weakened after reaching 10-year highs following Russia's invasion of Ukraine on Feb. 24. The price slipped earlier this week to \$45.50 per pound U3O8 before recovering to prior week levels closer to \$47.50/lb. The spot price delivered by Energy Intelligence's Uranium Price Panel was \$47.13/lb. on Jun. 23, down by just a few cents from the previous week's price of \$47.39/lb., delivered Jun. 16.

Orano's Tricastin Director Francois Lurin told *Le Dauphine* that the company is considering expanding capacity at its 7.5 million separative work unit (SWU) Georges Besse II plant near Pierrelatte. When Energy Intelligence in March asked the company about just such a move, the French nuclear fuel supplier explained that "we need their [customers'] long-term support before contemplating to increase our enrichment capacity." But that support is in part dependent on legal clarity over Russian nuclear fuel imports.

Lurin suggested utilities are anxious about the geopolitical conflict between Russia and the West and concerned that a ban on Russian nuclear fuel imports, either from Western governments or Russia itself, will find them short of supply. While many outliers will determine how bifurcated the market becomes — including the

possibility of outright bans on Russian nuclear fuel imports — one of the first signifiers has been the solicitation of non-Russian enriched uranium product from utilities in the Czech Republic, Slovakia and Bulgaria seeking to diversify away from Russia.

Energy Intelligence understands Orano has already shifted away from underfeeding, likely operating at a higher tails assay than Urenco. This shift to higher tails assays, or overfeeding, is economically unattractive to Urenco or Orano at the low separative work unit (SWU) prices contracted for over the past decade. But because both enrichers are likely to require at least three to four years to increase capacity, demand for non-Russian nuclear fuel is pushing term prices well above \$100/SWU, more than double recent transactions. While that might give Urenco more room to make the full swing to overfeeding, supply of UF6 remains tight and questions on the expansion of conversion capacity remain unanswered.

In the US, a bipartisan group of lawmakers is working with the US Department of Energy to secure low-enriched uranium (LEU) capacity for the US reactor fleet, likely to include some form of funding to ease a potential bottleneck at the Metropolis conversion plant in Illinois, scheduled to restart at 7,000 tU capacity early next year.

Meanwhile, Canadian mining junior Global Atomic Corp. announced this week it has "received letters of intent from a banking syndicate" comprised of North American financial institutions to finance its Dasa uranium project in Niger. Further details are pending due diligence and board approvals, expected by the end of 2022.

Global Atomic said last week it received a letter of intent from a major North American utility to procure 2.1 million lbs. U3O8 from 2025-30 from Dasa, following "a production decision" in November last year to proceed with its 90% owned Dasa at an estimated \$208 million capital cost. The mine estimates all-in sustaining costs at \$21.95/lb. for 3.8 million lbs. annually over 12 years.

Jessica Sondgeroth, Washington

URANIUM PRICE PANEL

For the week ended June 23, 2022

	Chg.	Weekly Spot Market Prices													
		June				May				Apr				Mar	
		23	16	9	3	26	19	12	5	28	21	14	7	31	
Price (\$/lb U3O8)	-0.26	47.13	47.39	52.25	49.40	46.67	47.14	50.41	54.00	52.13	61.28	63.88	63.07	57.94	
Total Assessments	-1.00	10.00	11.00	10.00	10.00	12.00	10.00	9.00	11.00	9.00	10.00	10.00	9.00	10.00	
% within 1 StDev	17.27	90.00	72.73	70.00	40.00	75.00	80.00	77.78	72.73	55.56	60.00	90.00	77.78	80.00	
Low (\$/lb U3O8)	0.40	47.00	46.60	51.70	49.00	46.00	47.00	49.00	53.50	51.25	59.00	63.75	63.00	57.50	
High (\$/lb U3O8)	-1.00	47.50	48.50	52.50	50.15	47.50	47.50	52.00	55.00	53.00	63.25	64.00	63.50	58.75	
Variability*	-0.03	0.06	0.09	0.40	0.32	0.05	0.00	0.28	0.50	0.50	0.75	0.08	0.00	0.28	

*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.

UKRAINE

Regulator Describes ‘Terrorism’ at Zaporozhye

Ukraine’s nuclear regulatory agency faces an unprecedented struggle to maintain nuclear safety, most notably including “terrorism against firefighters and nuclear power plant personnel” at the Russian-occupied Zaporozhye nuclear power plant, according to Oleg Korikov, the organization’s beleaguered interim head.

Korikov warned fellow European regulators in Europe that Ukraine’s Nuclear Regulatory Inspectorate (SNRIU) is unprepared for further deterioration at Zaporozhye, a six-reactor facility that is Europe’s largest nuclear plant, and is essentially in uncharted waters. “We do not have rules, regulations [for] how we can regulate, how we can operate, in these conditions,” said Korikov.

Staff at Zaporozhye “is under heavy psychological pressure of Russian soldiers,” the SNRIU’s acting chairman and chief state inspector told a Jun. 20 meeting of the European Nuclear Safety Regulators Group. There is “kidnapping and attacks on nuclear power plant staff” in Enerhodar, the Russian-occupied city closest to the plant. “We have evidence of this.” This appeared to confirm what has emerged as one of the most troubling aspects of the situation at Zaporozhye and Enerhodar since both were occupied by Russian troops on Mar. 4: the kidnapping, intimidation, interrogation and torture of Zaporozhye workers.

In a Jun. 17 article, the *Wall Street Journal* documented a campaign of intimidation against Zaporozhye employees by Russian troops worried that workers were passing on information to Ukrainian forces. This includes workers going missing, being shot or being kidnapped and imprisoned for weeks at a time, sometimes with no food or water.

“There are incidents of military pressure” against plant workers, including troops firing at staff and “kidnapping of the chief” of the plant, said Korikov, who began his career at Zaporozhye as a field operator and then a control room operator.

The situation at Korikov’s former workplace, meanwhile, is only deteriorating: two days after Korikov’s speech Enerhodar Mayor Dmitry Orlov described a growing wave of kidnappings as “catastrophic” during a meeting with Petro Kotin, the head of Ukraine’s nuclear operator Energoatom. “People are being abducted en masse, the whereabouts of some of them are unknown,” said Orlov describing the conversation in a Jun. 22 Telegram post. “The rest are in very difficult conditions: they are being tortured and bullied both physically and morally.”

Regulating From a Distance

The SNRIU faces enormous pressures of its own. Many SNRIU staff are “working in a stressful situation” unrelated to

Zaporozhye, said Korikov, who explained that some were conscripted to fight in the Ukrainian military, some were in Russian-occupied areas of Ukraine where it is “impossible for them to perform” their functions, and some “may be abroad” working remotely. “Existing communications channels are unstable,” warned Korikov.

The SNRIU is not only unable to send inspectors to the besieged plant, it struggles just to know what’s going on there. “Ordinary communication” is “very under pressure,” noted Korikov, and “whenever possible any other available means of communication are used.”

For the moment the SNRIU’s oversight of Zaporozhye is therefore limited to the collection, analysis and review of whatever information the regulator’s staff is able to glean via furtive — and risky — communication with Energoatom’s Zaporozhye staff on the ground. From the legal point of view, Korikov explained that under conditions of martial law Ukraine allows the validity of nuclear facility licenses to be automatically renewed until martial law is ended. But that does not address actual safety on the ground at Zaporozhye.

None of the usual reporting methods relied up by a nuclear regulator to address safety questions, such as a safety analysis report, “take into account military action in the region and in the country as a whole,” said Korikov. “So if we get some damage related to military aggression — for example transformer damage or oil tanks [damage], or something like this — we face the problems which we are not ready yet to manage.”

Debating Next Steps

Not for the first time, Korikov found himself at odds with the International Atomic Energy Agency (IAEA) over possible solutions. While Korikov argued that Zaporozhye’s safety and security could only be secured with the end of Russian occupation, IAEA head Rafael Grossi continued his push to send a mission of inspectors and experts to the plant over vehement Ukrainian objections.

In a pre-recorded address to the Brussels conference played on Jun. 20, Grossi doubled down on that IAEA initiative. “It’s critically important that our team’s safeguards inspectors and safety and security experts travel to Zaporozhye,” said Grossi, who claimed that “Ukraine’s government has requested it at the highest levels. It’s the mandate of the IAEA to answer that call, and it is my responsibility as director general to see it through.”

Korikov did not address — nor was he asked about — the considerable distance between Grossi’s claim that Kyiv had requested an IAEA mission to Zaporozhye, and the very public refusals of such a request from the SNRIU and Energoatom, both of which believe such a mission might legitimize the Russian occupation. But Korikov sat on stage next to Lydie Evrard, the IAEA’s deputy director general for nuclear safety and security, and he conferred with her privately long after the public session had ended.

“There are different and big issues for nuclear safety and security given the current circumstances, with the plant operated by Ukraine and with military forces in the vicinity and on site,” Evrard told the conference. She further argued that “the main issue” with “direct implications” for nuclear safety and security at Zaporozhye was “the pressure on the staff.” And this is what the IAEA would like to “examine further” in an agency mission to the plant.

Phil Chaffee, London

NEWBUILD

Vogtle Owners Enter Legal Dispute Over Rising Costs

Two Vogtle newbuild project owners — that together hold a 52.7% project share — are suing Southern Co. subsidiary Georgia Power to shield themselves from rising costs as construction of the twin-unit AP1000 faces continued delays. The legal challenges could force Georgia Power to take on all future capital costs, while the company’s ratepayers stand to take on a larger share of operational costs. Still, the dispute is unlikely to halt the project given how close Vogtle-3 is to completion.

Oglethorpe Power Corp., with 30% project share, and the Municipal Electrical Authority of Georgia (Meag), with 22.7%, each filed lawsuits over the past week at the Fulton County Superior Court in Atlanta, Georgia, seeking a declaratory judgment on a 2018 owners’ agreement that the total project cost has reached a threshold allowing them to freeze payments to Georgia Power in exchange for a smaller project share. Georgia Power says the project has not reached that threshold, but the owners disagree and efforts to come to a resolution since October last year have clearly failed.

So far, the City of Dalton with 1.6% of the project, has been quiet on the matter. But if Meag and Oglethorpe succeed, that might prompt the city to exercise the same option. And because Georgia Power has told the state regulator that it will not pass on any additional capital costs to ratepayers, the utility and its shareholders may have to absorb all future capital costs. But that would come with a larger megawatt share, potentially putting ratepayers on the hook for a larger share of operational costs once Vogtle-3 and -4 enter service. And with the project nearly complete, it’s unlikely to be scrapped, even if further delays and cost overruns are a distinct possibility.

Rising Costs

Indeed, the project’s commercial operating dates have once again been pushed back after at least five such delays last year. In October, the Unit 3 start date was put at the third quarter of 2022, with Unit 4 pinned for the second quarter of 2023. The latest

“risk-adjusted” ranges see Unit 3’s start-up between December and March 2023 and Unit 4 between September and December 2023.

Based on those dates, Georgia Power and its co-owners in February put total capital costs, net of parental guarantee and test fuel, at \$20.5 billion, representing a 15% increase over the prior 10 months, according to the 26th Vogtle Construction Monitoring (VCM) report filed with the Georgia Public Service Commission (GPSC) ahead of hearings that begin Jul. 12. That increase is blamed in part on incomplete inspection records filed with the Nuclear Regulatory Commission. GPSC staff in separate filings note that the site spent on average over \$200 million per month in the final six months of 2021.

Against previously approved in-service deadlines of November 2021 and November 2022, respectively, Unit 3 is roughly 13–16 months behind schedule, and Unit 4 roughly 10–13 months. A major bone of contention with its partners revolves around the reasons for those delays, with Georgia Power blaming the Covid-19 pandemic for about three to four months of delays and \$160 million–\$200 million in cost overruns.

But filings with the GPSC indicate the reasons aren’t so clear cut, considering that pandemic-related staffing decreases during the first half of 2021 coincided with improved “schedule performance and productivity.” And Georgia Power is at odds with its co-owners and GPSC staff about the extent of pandemic-related costs.

Owners’ Dispute

Among the Vogtle newbuild owners, Oglethorpe has led the charge against rising project costs, and that may be in part because Oglethorpe expects to have access to 1,900 megawatts of renewable generation this year and may not need as much power from the 2 GW plant once it’s completed. The dispute with Georgia Power centers on a February 2019 amendment to a cost-sharing agreement, called the Global Amendments, that was struck after the 2017 Westinghouse bankruptcy. The amended version states that if project costs rise above a certain threshold the owners can exercise a freeze option that incrementally increases Georgia Power’s share of project construction costs beyond its original 45.7% equity holding.

Over the past year, the owners have been at odds over the baseline amount in total project costs for reaching that threshold, with both agreeing to use the 19th VCM, filed in September 2018, to determine a figure. Georgia Power puts the figure at \$18.38 billion, and Meag and Oglethorpe at \$17.1 billion. The freeze option is exercisable once the baseline amount, whatever it is finally determined to be, is exceeded by more than \$2.1 billion.

Oglethorpe in its lawsuit accuses Georgia Power of using a “hidden math formula” that it calls “creative” but “entirely inconsistent with Georgia Power’s own presentation of the relevant numbers at the time the co-owners entered into the Co-Owner Term Sheet and Global Amendments.”

Oglethorpe claims Georgia Power reaches its higher figure by breaking out its share of the \$17.1 billion in total project costs at \$7.8 billion, but then adding in “unique non-shareable Georgia Power costs” to reach \$8.4 billion. That higher figure is then divided by its 45.7% share to reach \$18.38 billion.

“Georgia Power’s position ignores the fact that its share of the estimate at completion, as reflected in the VCM 19, includes certain non-shareable costs that are not allocated to the other co-owners,” Meag’s complaint adds. “So it cannot reverse engineer the VCM 19 Forecast amount by dividing its share of the costs identified in VCM 19 by its ownership interest.”

While their lawsuits make very little mention of Covid-19-related costs, Georgia Power’s parent company has leaned on the pandemic as a force majeure event. The owners, however, contend that is irrelevant to the terms of the freeze option.

Georgia Power spokesperson Jacob Hawkins told Energy Intelligence that the parties “continue to have a difference of opinion” and while the company understands “that certain Vogtle co-owners have filed a lawsuit seeking to clarify the terms of the co-owner agreement,” it has “not yet seen the lawsuit.”

Jessica Sondgeroth, Washington

JAPAN

Will Utilities Face Higher Risks After Supreme Court Decision?

The Japanese Supreme Court decision absolving the national government of liability to compensate thousands of Fukushima victims represents a big win for the pro-nuclear government. But it contains decidedly mixed messages for Japan’s nuclear power industry and potentially for underfunded nuclear liability regimes across the globe.

The verdict by the Second Petty Court of the nation’s highest court overturned lower court judgments in three class action suits that had required the national government to grant reparations, in addition to compensation from Tokyo Electric Power Co. (Tepco), which has so far awarded a total of 10.43 trillion yen (\$77.1 billion) in reparations. The Jun. 17 verdict likely dampens the chances of securing state reparations for plaintiffs in some 30 other outstanding class action suits by residents forced to evacuate or otherwise relocate.

Japan’s Supreme Court is composed of a chief justice and 14 other justices, comprising a Grand Bench, with five justices each in three Petty Benches, although the court currently lists only 14 justices. Cases are initially assigned to one of the three benches, and those involving constitutional questions are transferred to the Grand Bench for inquiry and adjudication, according to an official document.

The Jun. 17 ruling dealt with the question of reparations from the government under the State Redress Act, which is separate from the Act on Compensation for Nuclear Damage under which Tepco’s payments are made. The verdict covers four class action lawsuits originating in Fukushima, Gunma, Chiba and Ehime prefectures and overturns judgments by three of the appellate courts that further compensation was necessary under the State Redress Act. Of the four high courts, only the Tokyo High Court ruled against state reparations with regard to the Gunma suit.

On Mar. 4 the Supreme Court’s Third Petty Bench confirmed and finalized lower court judgments hiking Tepco’s total damages in the four lawsuits to 1.45 billion yen (\$10 million). Tepco receives assistance for its payments from the Nuclear Damage Compensation and Decommissioning Corp., whose equity is split 50-50 between the national government and nuclear operators.

Potentially the court’s latest decision sends a chilling message to Japanese nuclear utilities in the event of another serious accident, and because much of the Supreme Court case revolved around regulatory responsibility, the decision may cast a shadow over government efforts to accelerate regulatory reviews in order to facilitate reactor restarts.

A Preventable Tragedy?

Article One of the State Redress Act stipulates that when a public officer or a public entity unlawfully inflicts damage on another person during the course his or her duties, whether by intention or neglect, the state or public entity shall assume the responsibility of redress. Three of the four high court judgments overturned by the Second Petty Bench found a causal relationship between the Ministry of Economy, Trade and Industry and its now defunct Nuclear and Industrial Safety Agency for lack of regulatory action, making the government liable for a preventable tragedy.

The 3-1 majority opinion delivered by Presiding Justice Hiroyuki Kanno observed that the 9.1 magnitude Great Tohoku Earthquake on Mar. 11, 2011 and the massive tsunami it spawned had been far greater than forecast by the Cabinet-level National Headquarters for Earthquake Research Promotion in July 2002. In its long-term evaluation of seismic risk, the headquarters had warned that there was a high probability — 20% over the following 30 years and 30% over 50 years — of an 8.2 magnitude earthquake in northeastern Japan that could generate tsunami as high as 15.7 meters.

Acknowledging losses suffered by victims, Kanno said that the state needs to take “the utmost responsibility” in their relief. But he made a distinction between the legal judgment the court had been asked to make and damages relief, and concluded the majority decision was justified on the basis that the earthquake and tsunami were so large that the accident could not have been avoided even if government overseers had acted on the basis of the 2002 long-term predictions.

In a detailed 54-page dissent, Justice Mamoru Miura argued that “multiple protective measures” beyond a higher seawall — had they been required — might have prevented the tragedy. Such measures would have included waterproofing vital equipment and relocating emergency power equipment from basements to higher floors and could have been taken “without waiting for the occurrence of the accident.”

Pointing to possible constitutional issues, Miura declared that “personal rights based on survival are the most important value guaranteed by the Constitution,” and that “refraining from necessary measures because of economic interests cannot be justified.”

The Fallout

The Supreme Court’s judgment was welcomed by the pro-nuclear conservative Liberal Democratic Party (LDP) Cabinet of Prime Minister Fumio Kishida. Chief Cabinet Secretary Hirokazu Matsuno observed in a Jun. 17 news conference that the court had agreed with the Ministry of Justice that “the non-exercise of national regulatory authority did not violate the law.”

There was no shortage of criticism of the decision, with many commentators expressing concern over its possible impact on the remaining class action suits. “It is likely that national government responsibility will be denied in subsequent proceedings of the same kind,” warned the *Hokkaido Shimbun* in a Jun. 18 editorial.

A lawyer with the Tokyo-based National Network of Counsels in Cases against Nuclear Power Plants slammed the judgment as “escapist,” while “Fukushima Livelihood” class-action suit lawyer Izutaro Managi, who spearheaded the favorable October 2020 Sendai High Court judgment, declared Jun. 17 that the Supreme Court “had dumped the question of how to cope with the risks of nuclear power back to society.”

Lawyers for the “Fukushima Livelihood” class action—the largest of all the suits with 3,850 plaintiffs — reportedly announced Jun. 21 that they will file an “additional proceeding” with the Fukushima District Court by the end of September and are aiming to more than double the number of plaintiffs to 10,000. “I want to see the Supreme Court decision overturned by the second team,” said the legal team’s leader Takashi Nakajima, evidently referring to a new class action suit working its way up through the courts.

The Kishida government, meanwhile, is accelerating efforts to push for reactor restarts with approval Jun. 7 of a “basic policy” that also includes “the highest priority on safety” — and development of a “nuclear disaster prevention system that includes efficient and strict nuclear regulation.” Moreover, the LDP’s campaign platform for the Jul. 10 election of half the House of Councillors promises to “maximize the introduction of renewable energy and maximize the utilization of nuclear power that has been confirmed to be safe.”

Tatsujiro Suzuki, vice director of the Nagasaki-based Research Center for Nuclear Weapons Abolition and a former deputy chair of Japan’s Atomic Energy Council, told Energy Intelligence Jun. 22 that “the Supreme Court decision might help the government promote nuclear power, but nuclear power is unlikely to return as a reliable baseload power source because of economic factors and legal and political uncertainties.”

Moreover, Suzuki warned “the fact that the national government is not being held responsible for the nuclear accidents means that the legal and moral responsibility and liability of electric power companies has increased.” Suzuki added that recent moves by LDP politicians to push regulators to accelerate the safety review process “are not wise as such measures could result in regulatory capture and may lead to another serious accident.”

Dennis Engbarth, Taipei City

OUTLOOK

IEA Warns About Shrinking Nuclear Newbuild Pipeline

The International Energy Agency (IEA) this week warned in its annual report on world energy investments that the pipeline of dispatchable nuclear newbuild projects is shrinking, despite a steady rise in spending on nuclear energy over the past three years.

The Paris-based agency, which advises OECD member states on energy policies, reported this week that global investments in nuclear have ticked up since 2019, and are set to reach circa \$50 billion this year, possibly surpassing falling investments in coal power. But both amounts are drops in the bucket compared to the nearly \$1.4 trillion in “clean” energy investments this year, let alone the \$2.4 trillion in total energy investments, and the IEA warned that nuclear newbuilds may still be falling behind.

“Even if [global energy investment] ... keeps growing at the pace seen since 2019,” read the 2022 edition of the IEA’s *World Energy Investment*, “much more rapid acceleration is needed in a range of renewable technologies, nuclear power and electricity grids to get on track for a 1.5°C stabilization of the rise in global average temperatures — alongside a faster move away from high dependence on unabated fossil fuels.”

Current market signals are “worrying for hydropower and nuclear,” said the agency, which has increasingly advocated for nuclear energy providing an “essential foundation” to the energy transition. Instead, “the pipeline of projects has reduced while it should be increasing,” given the “important roles” hydro and nuclear power play “in managing overall power sector emissions and electricity security.”

Over the past six years that pipeline — which the agency describes as the gigawatts capacity of final investment decisions (FIDs) minus the GW capacity of projects entering operation — has expanded for natural gas, while shrinking for coal, nuclear and hydro power. “Nevertheless, FIDs in these sectors are not a complete indicator of investment spending, as increasing capital is being spent on refurbishing, modernizing and extending the lifetimes of existing hydro and nuclear power generation plants.”

In slightly more granularity, the IEA explained that while nuclear newbuild spending was accelerating in China, Europe and Pakistan, nuclear investments in France, the US and Russia were more focused on “the refurbishment, modernization and life extension” of existing reactors.

The report also warned of inflation-driven rising costs for new clean energy generation. While it focused on what this meant for renewables, many of the drivers it highlighted will have an enormous impact on the commodities needed for new nuclear newbuilds: “At the end of 2021, polysilicon prices had risen by 200%, steel by 70% and aluminum by 40% with respect to the end of 2020 figures, reflecting supply-chain disruption induced by responses to Covid-19, and energy and commodity price hikes affecting the mining, refining and freight sectors.”

A Warning to Europe

The report’s release was accompanied by a blunt warning from IEA Executive Director Fatih Birol to Europe that it must prepare for a complete cutoff of Russian gas exports this winter, and should not switch off nuclear plants while restarting coal plants. Countries “should consider postponing closures [of nuclear power plants] as long as the safety conditions are there,” he told the FT in an interview timed to the Jun. 22 release of the investment report.

While both Switzerland and Spain have longer-term nuclear phaseouts in progress, this was likely a veiled comment to Germany, which in March doubled down on its end-of-year nuclear phaseout and then this past weekend announced plans to update its laws to allow for coal and lignite power stations to be upgraded or brought back on line temporarily.

Birol argued that countries should instead delay the shuttering of reactors in an effort to limit the amount of gas burned in power generation (to say nothing of coal).

Fuel Cycle Diversification

The IEA did warn that the availability of enriched uranium is “another element of concern. Russia accounts for only 6% of global production of mined uranium, but over 40% of global enrichment capacity is located there.”

That’s an observation fully absorbed in Washington, where the Biden administration has pushed for Congress to appropriate over

\$4 billion to procure enriched uranium — or potentially to ramp up non-Russian fuel cycle capacities.

The war in Ukraine “has underscored the need to explore options for diversifying enriched uranium supplies,” argued the IEA, “including investment in new facilities as well as the reopening of existing conversion plants.”

Phil Chaffee, London

NEWBUILD

Southeast Asia Rethinks Nuclear Energy

Southeast Asian countries are once again looking more seriously at nuclear energy as a potential answer to high fossil fuel prices and the need to decarbonize power generation, with emerging technologies such as small modular reactors (SMRs) attracting particular attention.

The Philippines, Vietnam, Singapore and Indonesia are all studying or plan to have nuclear energy in their power mix over the coming decades, considering it as a low carbon, baseload electricity source guaranteeing a certain level of energy security. Critics argue that nuclear is one of the most expensive power sources and that it would be safer to develop cheaper renewables in a region regularly hit by earthquakes, typhoons and volcanic eruptions. Whatever else, the obstacles to nuclear development in the region remain formidable.

The idea of nuclear development has been bandied about for decades in the region with little progress to show as projects stalled following the Fukushima nuclear disaster in 2011. In recent years, however, the promotion of SMRs and advanced reactors and the urgent need for solutions to climate has given nuclear advocates more edge in national energy planning.

Philippines

President-elect Ferdinand Marcos recently held talks with a representative of Korea Hydro & Nuclear Power (KHNP) on possibly reviving the mothballed 620 megawatt Bataan nuclear power plant, which was completed in December 1984 during the administration of Marcos’ father.

While the plant never operated, support for its revival has waxed and waned ever since. With the Malampaya gas field, that has been providing up to 20% of the country’s electricity requirements, set to mature in 2027, pressure is growing for alternative sources. While nuclear wouldn’t replace that output anytime soon, Marcos sees it as an eventual means of lowering electricity rates and providing energy security.

“Nuclear remains to be the cleanest and cheapest way to produce energy. The problem is that the lead time for any power plant, not only nuclear, is a minimum of five years. So it’s going to take a lot of time,” Marcos recently told local media.

And KHNP “is ready to participate in nuclear power plant projects in the Philippines, ranging from rehabilitation of the Bataan nuclear plant to building small and large-sized nuclear plants,” KHNP senior manager for overseas nuclear business Choi Young-hwan reportedly said after talks with Marcos.

In this context, South Korea is expected to help the Philippines answer two key questions: Can Bataan be restarted and what needs to be done before restarting it? The \$2.2 billion Bataan nuclear plant never operated due to a strong anti-nuclear movement that based its campaign on safety and corruption issues.

Past pre-feasibility studies by both KHNP and Rosatom on reviving Bataan led to an executive order in January 2020 by President Rodrigo Duterte establishing an interagency committee that eventually recommended adopting a national nuclear energy program. That order recognized that a comprehensive legal and regulatory framework is needed to facilitate a program, as well as establishment of an independent nuclear regulator and ratification of key global nuclear safety and security conventions and treaties.

But doubts about reviving Bataan linger even among influential officials such as the director of the Department of Science and Technology’s Philippine Nuclear Research Institute, Carlo Arcilla. He opines that the government should instead focus on building SMRs on isolated islands that aren’t connected to the grid.

Vietnam

Vietnam could be reviving its plans to develop nuclear energy as part of its energy transition strategy. “Developing nuclear power is an inevitable trend,” Vietnam’s Industry Minister Nguyen Hong Dien recently told the national assembly. He further argued that there is no basis for completely abandoning the two projects in Ninh Thuan province, in the country’s southeast, that were suspended by the National Assembly in late 2016, arguing that the vote represented only a pause.

Russia’s Rosatom was set to build two VVER-1200 reactors in Phuoc Dinh, while a site in Vinh Hai had been awarded to a Japanese consortium, likely building either the AP1000 or Atmea1. But by the time the vote was taken in 2016 Rosatom was facing a delay of six years for starting construction on its first reactor — with a 2014 start date pushed back to 2020 — amid numerous challenges Vietnam faced in building up its regulatory and broader nuclear infrastructure.

Should the communist one-party state decide to revive its nuclear program the fact that it is not a democracy would probably make things simpler at least politically.

Singapore

Low-carbon alternatives such as geothermal and nuclear energy could play a part in Singapore’s future energy mix by supplying around 10% of the country’s energy needs, the Energy Market Authority said in a March report on ways for Singapore’s power sector to achieve net-zero emissions by 2050.

“Singapore has limited options to decarbonize its power sector and should stay open to all emerging low-carbon alternatives,” the regulator said. It recommended monitoring both the development of SMRs and nuclear fusion technologies in order to quickly adopt such technologies when and if they become viable and commercially competitive.

The Energy Market Authority also maintained that nuclear fuel can be stockpiled which would enhance Singapore’s energy security — a key topic in Southeast Asia as the price of coal, oil and gas skyrocketed on the back of Russia’s invasion of Ukraine.

That said, even in its scenario envisaging the adoption of nuclear energy, the regulator does not see actual development before the 2040s as more research and development is needed to prove the case for newer nuclear technologies. A 2012 government pre-feasibility study concluded that available nuclear technologies at the time were not suitable for deployment.

Indonesia

Last but by no means least, Indonesia wins the prize for ambition when it comes to possibly developing nuclear power: its energy ministry is considering a whopping 35,000 MW of new nuclear capacity — albeit starting from 2045 — as part of its plans to achieve net-zero emissions by 2060.

In addition, a draft law designed to support the development of so-called new and renewable energies is creating a conducive framework for the use of nuclear energy, according to local media.

The draft law provides that only state-owned companies would be allowed to build, operate and shut nuclear power plants. This would considerably hamper — if not put an end — to US-based ThorCon’s plans to develop and operate a 500 MW thorium molten salt power plant. However, a company official told Energy Intelligence that ThorCon is hoping the draft law to be changed before it is passed to allow private companies to develop and operate nuclear plants. It also expects government approval next year to proceed with its project, with construction starting in 2024-25.

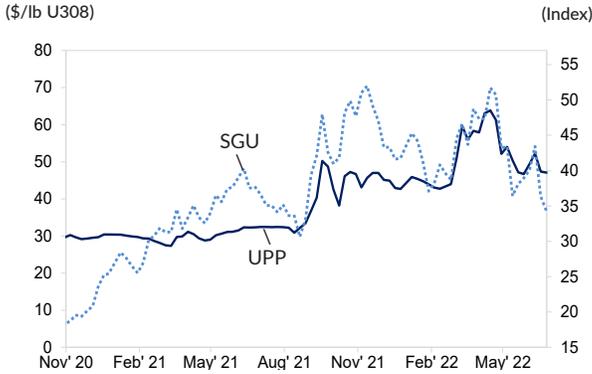
The draft law, in whatever form, is expected to pass ahead of the November G20 summit in Bali. Indonesia’s legal stance, as written in a 2014 presidential regulation, is that nuclear is “the last resort” to electrify the country. It’s unclear whether or how that position might be affected by the new law.

Marc Roussot, Singapore

URANIUM MARKET UPDATE

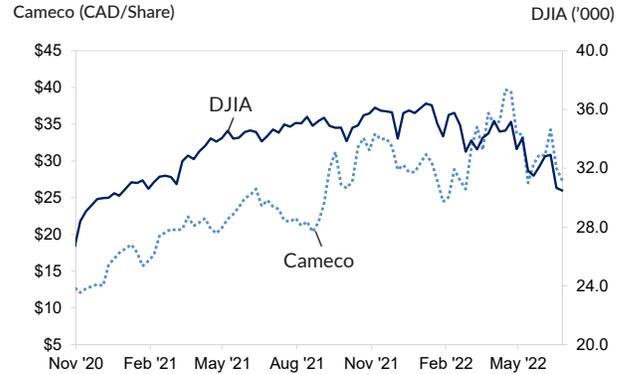
All prices as of Thursday, June 23, 2022

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



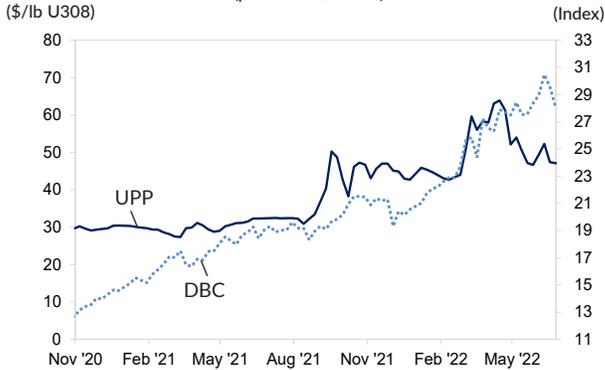
The Solactive Global Uranium Total Return Index, created by Structured Solutions AG, tracks the price movements in shares of companies active in the uranium mining industry. Calculated as a total return index and published in US\$, its composition is ordinarily adjusted twice a year.

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



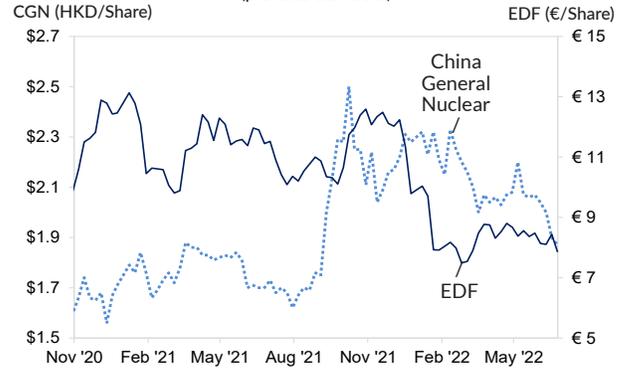
Canadian uranium miner Cameco's stock is valued in Canadian dollars compared with the US dollar on the Dow Jones Industrial Average (DJIA). Roughly two-thirds of DJIA's 30 component companies are manufacturers of industrial and consumer goods. The others represent industries ranging from financial services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