

NUCLEAR INTELLIGENCE WEEKLY®

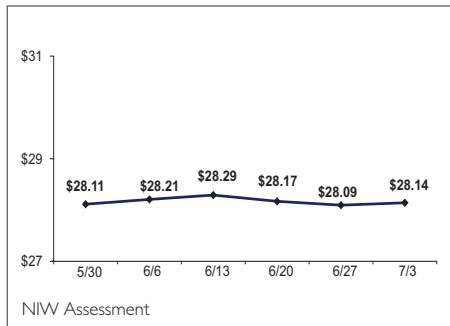
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UPP: \$28.14/lb U3O8



Market Points

China's total uranium demand for the next several years looks to be significantly lower than the pace at which the country has imported uranium since 2010, implying a substantial inventory buildup.

China National Nuclear Corp. has the government approvals needed to move forward with its proposed \$190 million acquisition of a 25% stake in Australia-traded Paladin's Langer Heinrich mine in Namibia. The deal is slated to be finalized later this month.

NIW's Uranium Price Panel put this week's spot uranium price at \$28.14/lb, a 5¢ increase from last week but still well inside the \$28-\$29/lb range where it has traded for nine weeks.

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WEEKLY ROUNDUP

Westinghouse in Talks With Blue Castle Over Seismic Option

NIW understands that Utah-based Blue Castle Holdings (BCH) is in talks with Westinghouse over its "specialized seismic option" for the AP1000. This option potentially allows BCH to choose the AP1000 for its twin-reactor project planned for Emery County — and, should that choice be made and then submitted for a construction and operating license at the Nuclear Regulatory Commission (NRC), Westinghouse would likely get a speedier review of design amendments it plans to submit in September 2015 (p3). This was confirmed by former NRC Chairman Nils Diaz, a BCH board member, who tells NIW: "I certainly believe that Blue Castle is very happy that Westinghouse has decided to put this special seismic option on its books. It will cover the seismic requirements that exist or are being determined for our site. ... I believe this approach by Westinghouse makes the AP1000 more attractive to us." He added that experts are currently on the so-called Blue Castle site conducting seismic studies and are about 50% finished. While the site is not over a fault line it is vulnerable to more seismic activity than nonactive sites in the eastern US, he added. Blue Castle said last year that it is aiming for commercial nuclear operations in 2024 (NIW Dec.6'13).

In an effort to tackle corruption in South Korea's nuclear industry, more than 1,500 senior managers and executives at six state-run companies are now required to disclose and report their assets and those belonging to their family members to the government, the energy ministry announced Monday (NIW Jun.27'14). The affected state-owned companies are the Korea Radioactive Waste Agency, Korea Electric Power Co. (Kepeco) and various Kepeco subsidiaries: fleet operator Korea Hydro & Nuclear Power; Kepeco Engineering & Construction, which designs nuclear reactors; and Kepeco KPS, which maintains them. Those subject to the regulation have till Aug. 31 to comply; violations could lead to up to a year in prison or a 10 million won (\$9,880) fine. Within Kepeco and Kepeco KPS only nuclear energy-related employees are affected. What impact the new rule, which took effect Jul. 1, will have is unclear. "It will cause engineers, who are in high demand in various sectors, to avoid the nuclear industry," predicts one source. He also says the rule is mostly "show" because most of the bribes are in cash, which means that forcing disclosures isn't likely to be effective. Also, the rule does little to discourage lower-level employees from dipping their toes into the bribery bonanza.

Senior negotiators from Iran and the P5+1 group of world powers in Vienna are preparing for marathon sessions and sleep deprivation over the next two-plus weeks as they try to craft a comprehensive nuclear agreement by Jul. 20, when a six-month interim deal expires. The meeting that began Jul. 2 was preceded by warnings of the consequences of failure — with US Secretary of State John Kerry threatening more sanctions in an op-ed, and Iran's Foreign Minister Mohammed Javad Zarif, in a YouTube video, saying it was time to "make history" and "end an unnecessary crisis that has distracted us from addressing together our common challenges, such as the horrifying events of the past few weeks in Iraq." This was a reference to a goal shared by the US and Iran of defeating Islamic State (formerly Isis) in Iraq and Syria. Iran has also threatened to increase enrichment activities in the absence of a deal. While progress has been made on the margins of the talks, substantial disagreements remain, though a second six-month extension could be invoked and is increasingly likely (NIW Jun.13'14).

MARKET

China's Growing Inventory

Uranium producers confronting an otherwise depressed market over the last several years have been able to maintain some optimism by looking to China's plans to introduce some 130 gigawatts of nuclear power through 2030. But substantial imports by the Chinese since 2010 have outpaced the level of China's annual uranium demand forecasted as far out as 2020.

A presentation given last week to the International Atomic Energy Agency in Vienna by officials from China National Nuclear Corp. (CNNC) subsidiary China Uranium Corp. put total uranium demand in China at 7,400 tons of contained uranium in 2015, increasing to 11,000 tU in 2020 and 24,000 tU in 2030 (see table). By contrast, China's imports came to just under 19,000 tU during last year alone, a significant increase over the 12,900-13,500 tU imported annually between 2010-12. Imports in 2014 have continued roughly apace with those in 2013: in May imports were 1,240 tU, 94% of which came from Kazakhstan, with the remainder from Australia, bringing 2014 totals for the first five months to 7,184 tU, according to official data carried by news agency Reuters.

China's state-owned nuclear companies have demonstrated a desire to bring uranium production in-house. This week Australia-traded Paladin announced that CNNC had final approvals to acquire a \$190 million, 25% stake in Namibia's Langer Heinrich mine, giving the Chinese company the right to purchase output equivalent to its share, or about 500 tU per year, at a spot-related price (NIW Jan.24'14). Less clear is the situation at the Azelik mine in Niger, which CNNC acquired in 2006; the presentation said it had reached a rate of 300 tU/yr versus a capacity of 700 tU, but no specific production totals or dates were provided. At home, CNNC has largely focused on Xinjian and Inner Mongolia since 2011, according to the presentation, which put total current domestic capacity at 1,800 tU, with the potential to rise to 2,900 tU.

Also this week, US-based Powertech's shareholders approved a merger with Hong Kong-traded Azarga. Azarga was set up in 2013 as a vehicle for mostly Asia-based investors to take stakes in uranium projects. The newly formed company — Azarga Uranium Corp. — could bring Powertech's Dewey Burdock in South Dakota and Azarga's Kyzyl Ompul project in Kyrgyzstan on line within two years, Azarga Uranium Chairman Alexander Molyneux told NIW in March (NIW Mar.14'14). That may be unwelcome news for producers hoping to see some excess supply weighing on the spot price, which settled this week at \$28.14 per pound U3O8, according to NIW's price panel, go off line. Trading remained slow, without even a large price dip following Exelon's uranium solicitation results, of the kind that usually happens when losers of such solicitations seek to quickly place material elsewhere.

Recent weeks have seen slightly more activity around enrichment with Spain's Enusa possibly having selected Areva for its term solicitation, and US utility Xcel Energy having sought material for delivery at the end of the year. But as with U3O8, buying interest does not necessarily translate to firm deals: it appears that Xcel, which stipulated it be allowed to decline deliveries at the last minute, was trying to hedge against potential sanctions on already-contracted Russian-origin material; so far there have been no deals, NIW understands. Otherwise, sources say the major question of the shipping ban on UF6 in 48Y-type cylinders hanging over enrichers and converters has been resolved within Europe, and they anticipate trans-Atlantic shipments to be resumed shortly (NIW Jun.13'14).

Further on enrichment, negotiations between the US Department of Energy and General Electric-led Global Laser Enrichment (GLE) are taking "a little longer than expected," chief executive of Australia's Silex Systems Michael Goldsworthy said. Silex leases the laser enrichment technology to GLE, which is negotiating to build a laser enrichment facility to re-enrich government-owned tails at the DOE-owned Paducah site. GLE had predicted that it could submit a license application by September (NIW Dec.2'13; NIW Feb.28'14).

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Forecasted Nuclear Capacity and Uranium Demand for China and China National Nuclear Corp.

	2015	2020	2025	2030
Nuclear Power Development Plan (GW)	China 40	58	100	130
	CNNC 18	26	45	59
Uranium Demand (tU)	China 7,400	11,000	18,500	24,000
	CNNC 3,300	4,800	8,300	11,000

Source: CNNC

URANIUM PRICE PANEL

For the week ended July 4, 2014

Weekly Spot Market Prices

	Change	July		June			May		Apr					
		3	27	20	13	6	30	23	16	9	2	25	18	11
Price (\$/lb U3O8)	0.05	28.14	28.09	28.17	28.29	28.21	28.11	28.02	28.44	28.93	29.88	31.36	32.23	32.96
Total Assessments	0.00	8.00	9.00	9.00	8.00	9.00	9.00	9.00	8.00	9.00	8.00	8.00	7.00	8.00
% within 1 StDev	-1.00	100.00	100.00	100.00	100.00	100.00	100.00	88.89	100.00	100.00	87.50	100.00	100.00	100.00
Low (\$/lb U3O8)	0.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	27.50	29.75	31.00	32.00	32.00
High (\$/lb U3O8)	0.00	28.50	28.25	28.50	28.50	28.50	28.25	28.10	28.75	30.80	30.00	32.00	32.75	33.75
Variability*	0.25	0.07	0.03	0.00	0.10	0.04	0.03	0.00	0.00	0.42	0.00	0.00	0.04	0.31

In order to maintain consistency with weekly price reporting, NIW will update the monthly spot prices in the Dec. 6th issue. The Uranium Price Panel (UPP) represents the average price assessment reported by active spot market participants for a transaction of 100,000 lbs of U3O8 by book transfer on the date given. In the UPP, participants are assigned a market position of seller, buyer or intermediate. Each week Energy Intelligence eliminates assessments that are statistical outliers, and double-checks the market position of intermediates. It then uses random elimination to maintain an equal number of buyer and seller assessments in the final average. "Variability" represents the absolute range of conceivable final averages resulting from this random elimination. "High" and "Low" assessments represent the extremes of the non-eliminated market assessments. For a detailed explanation of the price panel methodology, see www.energyintel.com.

Shoring up the AP1000's Seismic Qualifications

Westinghouse's recent announcement of plans for a "specialized seismic option" for its AP1000 is tacit acknowledgement by the company of something Westinghouse — and its potential and existing customers — have understood about the reactor design since it was certified by the US Nuclear Regulatory Commission (NRC) in December 2011: the AP1000 is not intended for seismically active regions (NIW Jun.27'14).

With plans in China for reactors in seismically-active inland regions, where Westinghouse has more commercial scope for its AP1000s, it makes sense for the company to add the belts and braces that might be needed to make the design more robust. And at least one source speculates that Toshiba, Westinghouse's parent company, is envisioning the day when new reactors might be built in Japan, which would obviously require reactors with strong seismic defenses.

Westinghouse itself only mentions potential customers "overseas" and hard rock sites West of the Mississippi, and refuses to divulge names. One such prospect in the US, however, is Blue Castle Holdings (BCH), according to former NRC chairman Nils Diaz, a company board member (p1). BCH is planning a twin-reactor project in Utah, with commercial operations in 2024, but has not yet selected a technology (NIW Dec.6'13). But Diaz tells NIW that the Westinghouse move "will cover the seismic requirements that exist or are being determined for our site. ...I believe this approach by Westinghouse makes the AP1000 more attractive to us."

Whether the planned nuclear plant ever gets built is open to question, but BCH might hold the key to something that Westinghouse needs ahead of anything else — namely speedy NRC review of any design amendment necessary to support its new seismic option. To accomplish that, having a potential US customer would help because of the staff's tendency to prioritize any design-related applications tied to active construction and operating license applications. US vendors, if they want to market any design internationally, "believe you need NRC certification," says Ed Lyman, of the Union of Concerned Scientists, but "the NRC doesn't like certifying designs, or doing licensing work, for theoretical applications."

Outside the US, besides China or even Japan, other prospective overseas clients that could benefit from the seismic option include Turkey and Vietnam, though NIW understands that Turkey is currently fairly low on the list of the company's marketing priorities and Vietnam, which had planned for 16 gigawatts of nuclear capacity by 2030, has put the brakes on its nuclear program (NIW Feb.28'14). That said, the country had indicated an interest in Japanese leadership of a second project, after a Russia-lead first project, and given its history of earthquakes and uncertain faultline parameters, any improved seismic features on a reactor would be attractive if and when it does decide to proceed.

A Topic of Contention at NRC

The issue of seismic qualifications became a topic of contention during the NRC's design certification process for the AP1000, with one long-time agency staffer, John Ma, registering a dissent against approval in December 2010. "Structural integrity cannot be assured for design basis events, because it has not been demonstrated that the [shield] building can absorb and dissipate energy imparted on the structure by an impact or seismic event," wrote Ma, who had other

concerns with the design as well. Westinghouse submitted a total of 19 design revisions (not all seismically related) before all five commissioners finally signed off on the design in December 2011. But the 2010 paper acknowledged that staff "were unable to achieve a consensus that the design has improved enough."

The issue surfaced after Fukushima, too, when Westinghouse and Chinese officials in China publicly stated that the AP1000 could withstand the force of a Fukushima-like earthquake; this was basically denied by a Westinghouse spokesman in the US who told NIW that the design could not have been built at Fukushima without seismically-related modifications (NIW Jan.30'12). Around that time the company began running seismic simulations on the design with its Chinese partner, the State Nuclear Power Technology Corp., in China, and started a two-year feasibility study and technical assessment of the seismic issue. "The challenge I brought to the team ... is to make sure this is a cost-effective option," says Rita Bowser, Westinghouse vice president, enhanced reactors. Bowser says only that the company is "looking at some material strengthening and perhaps some additional limited reinforcements. ...We haven't put actual values in the public domain. Essentially it's a curve of frequency and acceleration associated with seismic activity."

However "non-proprietary slides" from a presentation made by the company at a pre-submittal hearing before the NRC on Jun. 25 mentioned several "critical locations" where seismic margin assessments are being made. These include three areas of the auxiliary and shield building; containment internal structures at both the reactor vessel support elevation and the operating deck; and the steel containment vessel near the polar crane. But Westinghouse is equally keen to emphasize that this effort will have no bearing on current AP1000 newbuild projects in China or the US, and emphasizes that any seismic upgrading will amount to "a limited set of customizations." ☞

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Vogtle Monitors Wary Of Undisclosed Delays

Monitors in Georgia expressed concern this week over the ability of the Georgia Power-led consortium building two AP-1000s at the Vogtle site to avoid further cost increases and schedule delays (NIW Jul.5'13).

In testimony on Tuesday and in prepared remarks filed at the end of June, consultants and staff working for Georgia's Public Service Commission (PSC) expressed skepticism that the first unit could begin commercial operations in January 2018; argued that completion after the targeted date would be expensive and that corresponding additional costs could fall to the utility's customers; appeared concerned by the lack of a detailed publicly-available project schedule; and seemed fatigued by Georgia Power's trumpeting of its successes in defraying project costs.

The biggest question at the moment appears to be the timeline, which in turn will affect the ultimate project cost. Georgia Power in its January filing to the PSC — the combined ninth and tenth installments of the usually semi-annual Vogtle Construction Monitoring report — maintained that the first unit can still come on line by the fourth quarter of 2017, with final commercial operation in January of the following year.

But monitors for the PSC, William Jacobs and Steven Roetger, point out that monthly reports from the contracting consortium made up of US-based Westinghouse and Chicago Bridge & Iron (CB&I) continue to present “two distinct project schedules.” The first shows an official commercial operation date for Unit 3 — Vogtle is already home to two operating units — of January 2018. This schedule roughly sticks to Georgia Power’s original forecast that commercial operations could begin 54 months after first concrete was poured but adds three months, the testimony reads. The monitors further note a “fully impacted” second schedule, but the date, presumably later than January 2018, was redacted. Adherence to the schedule is sensitive in part because of ongoing litigation between Georgia Power and the three other project owners and the contracting consortium. This dispute is largely centered on the question of who is financially responsible for design modifications and resulting delays.

Making Up for Lost Time?

The monitors highlighted that Georgia Power appears to be relying on the contractors’ assertion that they can make up for ongoing delays by reducing the time allotted for installing the first-of-a-kind shield building. But Jacobs and Roetger were skeptical of this workaround, and pointed to historical weekly activity reports submitted by the company, noting that on a variety of tasks “not only have activity durations been expanded, but that the rate of expansion has increased over time.”

Georgia Power, though, remains optimistic that it can stick to the publicly-declared timeline. “We have seen an overall improvement in the Contractor’s transparency, cooperation and communication as well as execution with a focus on quality and schedule,” spokesperson Brian Green said, adding that the utility remains “confident” of the current schedule. The project was initially plagued by troubles at the Lake Charles facility in Louisiana, acquired by CB&I from Shaw last year (NIW Jun.7’13; NIW Nov.1’13).

Jacobs and Roetger, who is a PSC staff member, also raised questions about unresolved issues over the reactor coolant pumps that will be supplied by Curtiss-Wright as well as with safety-related squib valves, both of which are affecting the timely deployment of AP1000s in China (NIW Jun.20’14). While the valves aren’t thought to be needed in Georgia for about 18 months, the problem has gone on for longer than many in China had hoped. In written testimony, Jacobs and Roetger further expressed doubt that the planned timeline to resolve issues found in start-up testing is realistic.

On a more basic level, the monitors continue to express consternation that the “integrated project schedule” does not extend beyond the end of 2015. The full schedule is not yet completed because of “significant” modifications required to stick to the official target dates. Green said Georgia Power expects to receive a complete schedule from the contractors by year-end.

Delays will be expensive, the monitors note, with the PSC staff’s consultant Philip Hayet putting them at an average of \$1.2 million per day under different delay scenarios, and \$2 million per day with the cost of replacement power. Because Georgia Power is a regulated utility, it can seek to have additional costs covered by ratepayers.

Besides their concerns over delays and corresponding cost overruns, the monitors appeared irritated by the utility’s assertions that the project is bringing \$2 billion in additional ratepayer “benefits” — largely from taxpayer-supported programs — since the utility recovers project-related costs from customers (NIW Feb.21’14). “Customers were assigned the risk associated with the cost of the project, and as such, any additional benefits that arise have been ‘earned’ by ratepayers, not bestowed on them by the company,” Hayet wrote. ☞

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UNITED STATES

Nuclear Industry Fights to Maintain Ex-Im Bank

The Republican-controlled House of Representatives is considering whether to allow federal funding to elapse for the US Export-Import (Ex-Im) Bank — the global investment branch of the federal government that plays a key role in helping US nuclear vendors compete for newbuild projects around the world.

House Majority Whip Kevin McCarthy (R-California) was the latest to recommend against a reauthorization of funding for the Ex-Im Bank, as part of a broader push by Republicans to rein in the government’s soaring deficit. “One of the biggest problems with government is they go and take hard-earned money to do things that the private sector can do. That’s what the Ex-Im Bank does,” McCarthy argued in a recent television interview.

Although the Democrat-controlled Senate and White House are likely to fight any lapse in Ex-Im funding, the nuclear energy industry is taking the discussion seriously and arguing against any suspension of the bank’s operations, whether temporary or permanent. US-headquartered vendors General Electric and Westinghouse say they already find it difficult to compete for international projects alongside state-owned firms, particularly Russia’s Rosatom and France’s Areva.

“Often, in cases when the Ex-Im bank isn’t ultimately used as the financing, you may have a company that wouldn’t have won a tender without Ex-Im support. It is of tremendous value to some of the vendors competing toe-to-toe with Russia,” said Ted Jones, director of international supplier affairs for the Washington-based Nuclear Energy Institute (NEI). “Areva will have financing from the French credit export agency. And Russia doesn’t use a credit export agency — it finances straight out of its treasury.”

Funding for the Ex-Im Bank is slated to expire after Sep. 30 if not renewed. Budget proposals need to originate in the House, as a matter of procedure, but the Senate is likely to push back and call for the bank’s reauthorization as the two chambers work to iron out various budgetary agreements to send to the president’s desk in the coming months (NIW Jun.27’14).

Nuclear energy has been a heavy focus for the Ex-Im Bank, and the bank itself is a key player in Team USA, a high-level interagency effort led by the National Security Council to pro-

mote nuclear exports (NIW Jul.19'13). The bank has already committed to provide some \$2 billion in loans to back Westinghouse's contribution to Abu Dhabi's four-reactor Barakah project (NIW Sep.14'12). And it said last August that it was prepared to back Westinghouse's bid to build two new reactors in the Czech Republic to the tune of \$4 billion to \$5 billion (NIW Aug.2'13).

Though that tender has since been canceled by Cez, Westinghouse is now in exclusive talks with Bulgaria's state-owned Energy Holding EAD over supplying an AP1000 to the existing Kozloduy nuclear plant (NIW Dec.13'13). Both sides, together with Westinghouse parent company Toshiba, are trying to reach an initial commercial deal—likely including a Toshiba equity stake in the project company—by the end of September (NIW Jun.27'14). The uncertainty around whether Ex-Im could offer any financial support to Westinghouse is undoubtedly a significant complication in the Bulgarian talks.

The industry-backed NEI said Ex-Im Bank funds could make the difference in many other upcoming tenders. Specifically, exports of up to 15 new nuclear plants could hinge on the availability of Ex-Im Bank support over the next decade, NEI contended in a Jun. 25 statement submitted to the House Financial Services Committee. At roughly \$3 billion-\$5 billion per plant, those projects would represent \$45 billion-\$75 billion in potential US exports that could hinge on Ex-Im support, NEI claimed.

NEI is also taking a district-by-district approach to its lobbying efforts by trying to convince individual congressmen of the bank's role in US competitiveness. "What we're trying to do is making smaller companies — such as suppliers to Westinghouse — understand that they have skin in the game," Jones said. "They have a presence in hundreds of congressional districts."

The trade group is also calling for a long-term authorization of the Ex-Im Bank. The longer the better, NEI says, as long as it lasts beyond the last authorization of 2 1/2 years. "Short term re-authorizations cast doubt over the bank's reliability," Jones said. "For an industry such as nuclear energy, there's a very long lead for new projects. It puts us at a disadvantage against our international rivals, and they've already used it against us." ☼

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NEWBUILD

Areva Presses on Despite Continued Forging Slump

Areva's decision to spend €38 million (\$52 million) on a new 9,000 ton press at its Creusot forge in the Saone-et-Loire department in Burgundy comes at a curious time: the global nuclear market for forgings is falling apart. This was true in 2012 when Areva's management board approved the plans to replace an old 6,000 ton press (NIW Jun.27'14). And it was even becoming evident prior to the Fukushima crisis when the company did its analysis of the likely benefits of such an investment.

"When we made our analysis in 2010 the trend of the market was already there," Patrick Poret, the director of Areva's

heavy equipment manufacturing line, told NIW. He referred to a strategic analysis of the forging market that found slowing demand before the Fukushima crisis.

So why yes?

"We knew we were facing lower demand," Poret said, but "it was a necessity for us to improve our competitiveness." The new press allows for a "faster operation" and a "more precise operation," and "we are going to save time and money for these operations," said Poret. Creusot maintains an existing 11,300 ton press that Areva intends to keep operating. Perhaps more importantly for the economics of the new machine, it will enable the Creusot forge to make very thick "mold blocks" that are used by the automotive and plastics industry. Areva hopes to see 30-40% of its forgings from Creusot shift over to non-nuclear clients, though in 2014 the amount will likely be 15-20%, according to Poret.

That still leaves the forging operation more than 50% dependent on nuclear-related orders at a time when Japan Steel Works (JSW), which has the world's largest nuclear forging capacity, has seen sales from its Steel and Energy division (in which nuclear is the most important component) nearly halved since the Fukushima disaster began unfolding in March 2011 (see table).

But even prior to Fukushima, the nuclear forgings market was showing signs of weakness. South Korea's Doosan Heavy Industries appears to have dropped any mention of its previously-mooted plan to build a massive 17,000 ton press before 2011, and instead simply boasted of its 13,000 ton press that has been in use since 1982 (NIW Nov.30'12). And though the reason was largely political, UK-based Sheffield Forgemasters didn't push back too hard when the current government axed an £80 million (\$133 million) loan promised by the previous government to help the company build a new 15,000 ton press (NIW Jul.26'10).

JSW — Revised Assumptions

Of this handful of nuclear-qualified global forgers, only JSW actually proceeded with pre-financial crisis plans to add major new heavy forging capacity, largely because plans were too far gone when the market began to soften. In March 2010 JSW completed the installation of a second 14,000 metric ton press at its Muroan plant in the northern island of Hokkaido as part of an 80 billion yen (almost \$900 million) capital investment program, and it has largely regretted this ever since. An "assumption in our medium-term management plan for our Steel and Energy Products Business was that demand for our electric-power and nuclear-power products would bottom out and then start to recover in the second half of the fiscal year," JSW wrote in its English-language annual report for the year ended Mar. 31, 2013 (FY-2013). "However various governments around the world decided to review their electric-power and nuclear-power policies, which delayed this recovery process and as a result the point that demand will bottom out and start to recover has been significantly postponed."

Japan Steel Works Financials

(\$ million)	2009	2010	2011	2012	2013	2014
Steel and Energy Orders Received	1,222	1,325	1,189	950	652	556
Steel and Energy Sales	1,098	1,310	1,358	1,278	938	658
Total Sales	2,312	2,168	2,561	2,693	2,346	1,836
Total Net Income	163	188	199	153	181	166

Source: Company filings

Indeed, while year-on-year sales for the Steel and Energy division fell by 27% from FY-2012 to FY-2013, they fell by 30% the subsequent year. More strikingly, the Steel and Energy order book has fallen in value steadily since FY-2010, and the \$556 million order book in FY-2014 is 42% the value of the FY-2010 order book. The “bottoming out” that JSW is waiting for doesn’t appear to be anywhere on the horizon.

While diversification may go some ways toward ameliorating the pressure on heavy forgers these days, nuclear remains a core business for both JSW and Areva. The most visible product to come out of Creusot are forgings for Areva’s EPR: all but one of the reactor’s large components can be forged at the French plant. But only JSW’s plant is qualified to forge the EPR reactor pressure vessel nozzle shell, largely because it can accept enormous ingots of up to 600 tons — as opposed to the 260 ton ingot maximum that the two presses at Creusot can accept (NIW Nov.30’12). But Creusot also forges replacement parts such as steam generators for existing reactors in Europe and the US, including for much of EDF’s fleet. ☸

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CHINA

Rekindled Interest in Russian Floating Reactors

Although China and Russia signed a memorandum of understanding for pursuing floating reactor technology on a commercial scale, sources in Russia suggest the two sides might have varying visions of how cooperation might proceed. In the meantime, despite cost overruns and massive delays, Russia’s Rosatom is determined to complete a pilot project in the hope of eventually mass-producing these small, mobile facilities, although analysts have persistent doubts about the project’s technological and commercial feasibility.

Rosatom and the China Atomic Energy Authority signed the memorandum during President Vladimir Putin’s historic visit to Shanghai in May when the two countries concluded a \$400 billion natural gas supply deal. Details are sketchy and the memorandum contains no numbers, but essentially Russia is hoping to harness China’s shipbuilding prowess to manufacture a fleet of floating Russian-made KLT-40S reactors, with two each on a barge that would be tugged from one remote Arctic location to another.

Although the deal seems synergistic, it is fraught with tensions over technology rights and potentially increased geopolitical rivalry, with fears on the Russia side that the Chinese would ultimately simply copy and then mass-produce the technology, and then use floating reactors as a means of exploring for resources in the Arctic — in Russia’s backyard.

Playing the Trailblazer — For Now

For now, though, Russia sees floating nuclear plants as another sphere in which it can play the trailblazer, although it needs help with shipbuilding where it is notoriously weak. “We wouldn’t have such major problems right now if all the questions with shipbuilding were solved. Unfortunately, the shipbuilding industry in Russia leaves a lot to be desired,”

Yevgeny Romanov, head of Rosenergoatom, operator of Russia’s nuclear reactor fleet and the project client, told journalists earlier this month in Moscow. “It’s well known that as far as ship hulls are concerned, the Chinese and Koreans make them fast and fairly cheap. That’s why the idea arose to join forces so that the vessel is made by a Chinese enterprise, and the internal parts by us, then we might get a pretty good project.”

Apart from that, the project has been plagued with problems completing the reactor vessel, which is being manufactured by Baltic Factories, a St. Petersburg-based enterprise which does not belong to Rosatom. Work on that started in 2009 and is not expected to be completed until late 2016. Romanov explained that Baltic Factories is currently struggling with more orders than it can handle — and that’s with only one floating nuclear plant with two reactors. One can only guess what might happen if Rosatom were to order 10 floating facilities, Romanov said. Project costs are so overrun that reports suggest the price of one installed kilowatt on a floating reactor would be \$10,000.

Romanov says that he doesn’t see a need for a joint venture since this would imply a combination of technological know-how on the nuclear side; he isn’t naive about what may happen in the future. “I can’t speak for the Chinese, but knowing [the] ambitions of our Chinese colleagues, they would like to eventually duplicate the technology and have the know-how to build the nuclear component” of the project, Romanov said.

Analysts have not only the same doubts but reservations about the overall project. “For me a question arises about what the Chinese are interested in. Is it the floating nuclear plant, or just the reactor itself?” said Anton Khlopkov, director of the Center for Energy and Security Studies, a Moscow-based think-tank. He says there is a slew of unanswered questions about the technology since the pilot unit is incomplete and untested and no regulatory regimen exists for floating reactors. “If Rosatom indeed intends to develop a park of floating nuclear power plants, then they need to finish the first unit as soon as possible and resolve all the outstanding issues ... transmitting energy, changing fuel, creating a regulatory basis in conjunction with the IAEA, and so on.”

Accomplishing this, Khlopkov stresses, will be difficult. “Right now there’s a lot of skepticism on the market about the safety of nuclear technology ... and if Rosatom can’t convince everyone else that [floating nuclear plants] are safe, then not only will it be unable to sell the technology on the market, but it will undermine trust in standard VVER units.” ☸

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URANIUM

Marenica Seeks Investors in U-pgrade

While operating uranium mines fend off closure and uranium developers delay investments in any new mines, Australia’s Marenica Energy has effectively stopped work on its Namibian uranium deposit to focus entirely on its

potentially game-changing “U-pgrade process.” Last month the Perth-based company announced plans to spin off a new company called Uranium Beneficiation Pty Ltd, or UB, into which it will attempt to find investors interested solely in the U-pgrade process. Marenica itself will continue to own the self-titled deposit in Namibia, but given the supremely low grade of that deposit, it is likely to remain undeveloped for quite some time.

The U-pgrade process combines wet scrubbing, screening, gravity separation, flotation, upflow classification, de-sliming, and magnetic separation to remove magnetic gangue — all of which concentrates the uranium to roughly 1% of the previous mass (NIW Jul.19’13). According to Marenica studies over the past year, the company now estimates that the process could potentially reduce operating costs at applicable deposits by 50%-70%, and reduce capital costs by 30%-50% “compared to conventional heap leach technology on this style of deposit,” Marenica said in a statement.

In its test work over the past year at the Commonwealth Scientific and Industrial Research Organisation in Perth, Marenica has used ore from its own deposit as well as from several others, including Areva’s mothballed Trekkopje, also in Namibia (NIW Mar.21’14). And the company has the agreement of three companies (in both Namibia and Australia) to test ore from their deposits in a pilot plant — once it gets the funding to construct such a plant. But the preliminary results of the test work are certainly promising for any industrial operation: “We did the bulk of our work in Perth tap-water,” Marenica Chief Executive Murray Hill told NIW in an interview, but “we tried it in sea-water and we got the same results. That means that we don’t have to use expensive desalinated

water; you can use sea-water and then wash the sea-water out and you’ve got a nice, clean concentrate.”

But right now, like many uranium companies, Marenica’s challenges are more commercial than scientific. In order to build any pilot plant, Hill must secure investors in the UB spin-off. He has been traveling the globe looking for interested investors, and while he declined to name any names, he said that “there is an interest from Chinese companies.” This is no surprise—China’s private Hanlong Group already owns a 37% stake in Marenica, and would obviously be a potential investor in UB (NIW Nov.1’10). Hill estimates a capital cost of only \$6 million for the pilot plant, and that shouldn’t be an insurmountable goal — even if others are seeking interested parties for similarly revolutionary uranium processes. Wyoming-based Ablation Technologies, for instance, has bullish results for its ablation process that uses kinetic energy to force chunks of ore from sandstone-hosted uranium deposits. This, the company says, reduces ore volumes by over 90%, while simultaneously increasing the grade (NIW Mar.21’14).

But Hill is focused on different, high-calcrete deposits, and is confident that he will obtain sufficient investment. “From the time we get the money,” said Hill, “we expect that inside 12 months we’ll have finished [analyzing the process with] three ores and closed down different commercialization deals.” What might these deals look like? “There’s different structures to how we’d commercialize it,” said Hill. “We want X percent of your project, or we want a royalty, etc. There could be a very very different structure for Company A and Company B.” ☼

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CHINA

In one of the most definitive signs yet that China's planned newbuild projects will soon go forward, China Datang Corp. — one of the country's Big 5 utilities — announced on Jul. 2 that it will inject over \$50 million in capital into its Datang Nuclear Power Co. (DNPC) subsidiary. DNPC was established on Oct. 17, 2013 with some 200 million Yuan (\$32 million) representing a 60% direct stake from China Datang and a 40% indirect stake via its Hong Kong-listed subsidiary Datang International Power Generation Co. Now the shareholders have agreed to boost the capital by some \$54 million to “fully leverage the professional management and technological advantages” of DNPC's nuclear power business “for effectively proceeding with the preliminary work on the Liaoning nuclear project.” This is a reference to the Xudabao (Xudapu) nuclear project in Liaoning province planned by China National Nuclear Corp., which owns a 50% stake in the project (NIW Jun.20'14). The remainder of the shares are held by Datang International (24%), with Jiansu Guoxin Investment Group (12%), Zhejiang Zheneng Electric Power Co. (10%) and ZOC Investment Co. (4%). Datang International is transferring its share (valued at \$21 million) in Xudabao to DNPC as its contribution to the capital increase.

INDIA

India and France reiterated their commitment to building EPRs at Jaitapur in the western state of Maharashtra during a bilateral meeting between their respective foreign ministers, Sushma Swaraj and Laurent Fabius, in New Delhi on Jun. 30. Fabius, the first foreign minister from the west to visit India since the Bharatiya Janata Party and its allies formed a new government in May, was on a four-day visit to the South Asian nation. India's state-owned Nuclear Power Corp. of India Ltd. (NPCIL) and France's Areva in February 2009 signed an initial pact for building two 1,650 MW EPRs at Jaitapur as part of an eventual deal for six units. Work on the first two reactors was expected to start in 2012 and take about six years. However discussions have been bogged down on technical and commercial aspects and that start date has been pushed out to 2015 (NIW Dec.13'13). Asked whether the French minister raised any concerns about India's controversial nuclear liability law, India's Foreign Affairs Ministry Spokesman Syed Akbaruddin told reporters that the discussions were at the political level and it was agreed that it was for Areva and NPCIL to handle these issues.

RUSSIA

Russia's new fast neutron reactor, the BN-800, reached a milestone on Jun. 27 when operators removed control rods from the core, triggering a chain reaction (NIW Jun.20'14). Engineers will use this first criticality — measured at 0.1% of the unit's 880 megawatt base power — to study the neutron behavior, and plant director Mikhail Bakanov said in a statement that initial evidence suggests the chain reaction took place in accordance with design calculations. The next significant phase in the lengthy start-up program will be the so-called “energy launch” when the reactor is hooked up to the grid, after which operators will slowly ratchet up output until the BN-800, the world's largest working breeder, reaches nominal output (NIW Jan.3'14). This final stage is scheduled to take place next year.

SOUTH KOREA

Kim Yang-ho, the newly elected mayor of Samcheok, declared Tuesday that the government's plan to build a nuclear power plant in the east coast city must be scrapped, and that a referendum on the plan will be held in August or September if the central government refuses to withdraw it. Meanwhile, the municipal authority underscored its support for a referendum in a press release, which said that the very first report it submitted to the new mayor on his inauguration day was on the plan for a referendum against a nuclear power plant. An energy ministry official told NIW that a referendum result

would not have legal force because the plans are a “national project” although he said that to minimize conflict the ministry would take the results under consideration. Korea Hydro & Nuclear Power has already begun researching property rights on a 3.18 million square-meter site in Samcheok—a step ahead of actual acquisition and compensation for land owners. In September 2012 the energy ministry chose Samcheok as a site for a new nuclear power plant after the city made a bid for the project in 2010 (NIW Jun.20'14).

SWEDEN

Any final investment decision on a Swedish nuclear newbuild is 8-10 years away, Vattenfall's Head of Nuclear Development Mats Ladeborn told a conference in Prague on Jun. 30. In July 2012 the Swedish utility applied to the Swedish Radiation Safety Authority for clarity over the regulatory process for any new nuclear projects in the country (NIW Aug.3'12). Vattenfall forecasts the retirement of 40% of Sweden's current baseload capacity between 2025-45, and is dedicated to replacing that. While it plans to eventually produce an environmental impact assessment for new reactors, probably at the existing Forsmark or Ringhals sites, Vattenfall “is investigating if, when and how to replace existing nuclear power,” according to Ladeborn's presentation, which notes that today “and in the foreseeable future there is overcapacity in the market and low prices.” Vattenfall has long argued that it would need some sort of structural guarantee of profitability from the government to progress with any newbuild, but the current government has said it won't provide “any direct or indirect subsidies for new nuclear power production” (NIW Nov.22'13).

UNITED KINGDOM

Sandy Rupperecht, the Westinghouse executive who oversaw business development for the reactor vendor's newbuild unit since March 2012, has taken over as the head of Nugen, the UK newbuild developer planning three AP1000s for the Moorside site near Sellafield in west Cumbria. This news came as Westinghouse parent company Toshiba finalized its purchase of a 60% stake in Nugen, including Iberdrola's entire 50% stake in the company and one fifth of GDF Suez's 50% stake (NIW Jan.17'14). Toshiba maintains its targets of 2018 to make a final investment decision about proceeding with a Moorside newbuild, after which the first unit would come online in 2024 with all three units operating in 2026 (NIW Jan.17'14). Over the next four years, Nugen and Westinghouse plan on bringing the Moorside plans through the regulatory process, completing the UK generic design assessment for the AP1000, and locking in a contract-for-difference with the UK government to guarantee the price of output from the project. In 2014 Nugen management will focus on “site investigations, preliminary studies for site layouts and stakeholder engagement and preparation for stakeholder consultations,” according to a Jun. 30 Toshiba statement.

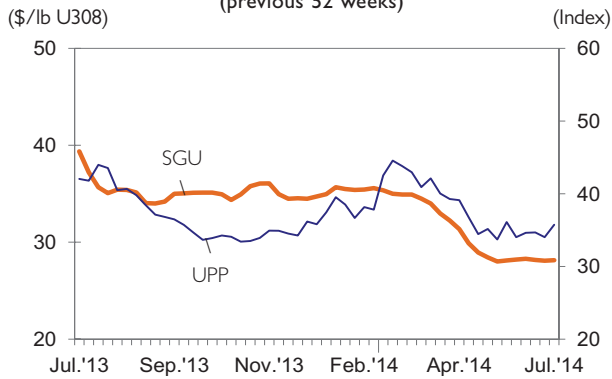
UNITED STATES

In a bid to diversify into oil and gas, Westinghouse announced its intent to purchase 100% ownership of Italy-based Mangiarotti, which manufactures components for the nuclear, oil and gas industries, and has been an important supplier to Westinghouse. The price was not disclosed but the company said the sale should be completed by early August. Westinghouse said its “primary interest” in acquiring the company was that it would allow it to expand into the oil and gas markets as well as additional manufacturing of reactors, pressure vessels, modules, and heat exchangers for the nuclear sector and the AP1000. “Our continued successful manufacturing expansion like Mangiarotti allows us to be a broader global provider in all energy fields,” said Westinghouse President and CEO Danny Roderick in the Jul. 2 statement. Westinghouse will continue Mangiarotti's operations at Monfalcone and Pannellia in Italy, the statement said, without mentioning a third Mangiarotti facility in San Giorgio di Nogaro. ☼

ENERGY INTELLIGENCE URANIUM MARKET UPDATE

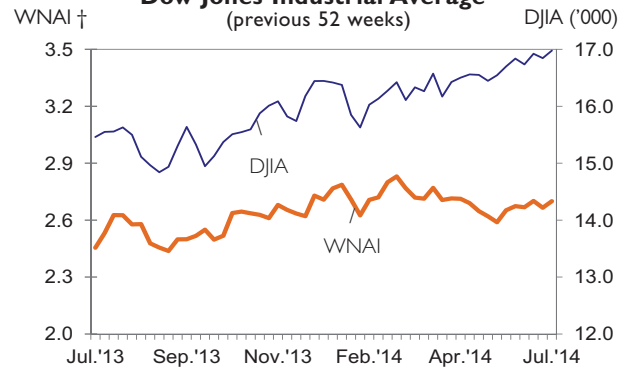
All prices as of Wednesday, July 3, 2014

UPP vs. Solactive Global Uranium Index*
(previous 52 weeks)



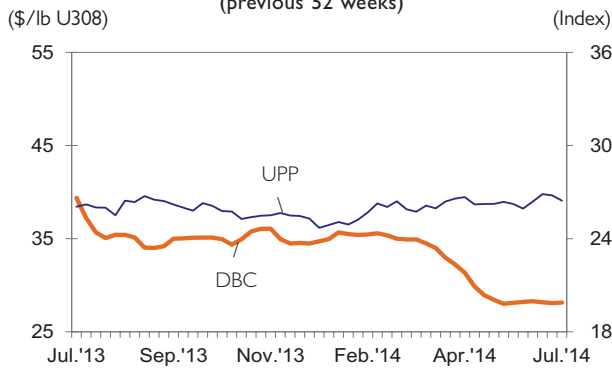
*Solactive Global Uranium Total Return Index, created by Structured Solutions AG, tracks the price movements in shares of companies active in the uranium mining industry. Calculated as a total return index and published in USD, its composition is ordinarily adjusted twice a year.

WNA Nuclear Stock Index vs. Dow Jones Industrial Average*
(previous 52 weeks)



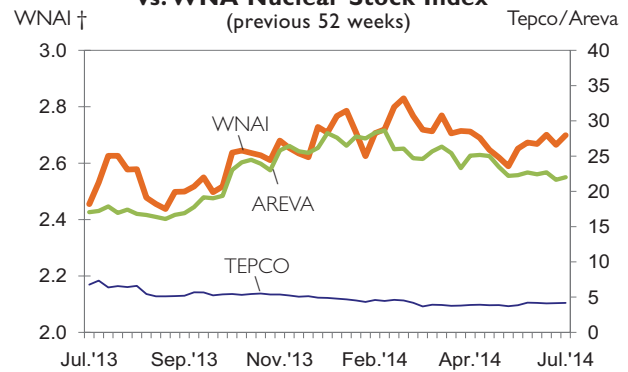
*Roughly two-thirds of the Dow Jones Industrial Average's 30 component companies are manufacturers of industrial and consumer goods. The others represent industries ranging from financial services to entertainment. †Index relative to value of 1.0 on Jan. 1, 2002.

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.

Tepco and Areva Stock Price vs. WNA Nuclear Stock Index*
(previous 52 weeks)



*Maintained by the World Nuclear Association, the World Nuclear Association Nuclear Energy Index includes companies that build nuclear power facilities, design and service reactors, operate nuclear reactors, supply nuclear components, technology, and fuel. †Index relative to value of 1.0 on Jan. 1, 2002.

Monthly Spot Market Prices

Change	2014					2013				
	June	May	Apr	Mar	Feb	Jan	Dec	Nov	Oct	Sep
Uranium (\$/lb U3O8)										
Low	+28.00	+28.00	+29.80	+34.00	+35.00	+34.50	+34.45	+34.30	+34.00	+34.00
High	-1.70	+28.30	+30.00	+34.00	+35.00	+35.70	+36.00	+35.00	+36.10	+35.15
Conversion (\$/kgU)										
Low	+7.75	+7.75	+9.00	+9.00	+9.00	+9.00	+9.25	+9.25	+9.25	+9.25
High	+10.50	+10.50	+11.00	+11.00	+11.00	+11.00	+10.75	+10.75	+10.75	+10.75
Enrichment (\$/SWU)										
Low	+91.00	+91.00	+91.00	+93.00	+93.00	+93.00	+98.00	+98.00	+99.00	+104.00
High	-2.00	+94.00	+96.00	+96.00	+98.00	+98.00	+98.00	+102.00	+102.00	+105.00

NIW monthly UF₆, SWU and U₃O₈ 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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