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Nuclear Buzz

USEC U-Sale Defies Expectations

By Andrea Jennetta, Publisher

Well, well, well. It's the first week of the New Year and already conventional uranium-market wisdom has been turned on its head.

As you all know, USEC sold in a single transaction 527,527 pounds U3O8e from the first tranche of material supplied by the Energy Department in an auction that closed on Dec. 17. USEC selected the winning bid that same day—and evidently was paid the next day at published market prices for December.

From what I am hearing, the buyer is a non-U.S. utility. By "non-U.S." I mean "Asian." Okay, really I mean Chinese. Let me be clear: I have absolutely no evidence to substantiate this. But that never slows me down.

So I ask myself the following questions:

- The economy of which country (cough *China* cough) managed to grow over the last 12 months, despite the global financial collapse and credit freeze?
- The utilities of which country (cough *China* cough) bought every pound of uranium they could get their hands on, particularly through spot transactions, over the last 12 months?

When the auction was announced, conventional wisdom went something like this: the pool of bidders would be quite small, limited to some producers,

Korean Group's UAE Victory Surprises Few Nuke Insiders

By Nancy E. Roth, Managing Editor

South Korea's long pursuit of nuclear know-how paid off big in the waning days of 2009, when United Arab Emirates officials announced that a consortium of mostly Korean nuclear giants had won a plum $20.4 billion contract to build the first nuclear reactors in the Middle East.

Early news reports on the Dec. 27 announcement focused on the low bid of the consortium of Korea Electric Power Co., Doosan, Samsung, Hyundai and Westinghouse—which came in an astonishing $16 billion below that of France's AREVA/Electricite de France-led consortium.

Apparently the EPR design's redundant safety systems require a heavier load of steel and concrete, adding to its construction price. The French, who drastically underbid for their EPR contract at Olkiluoto, Finland, were clearly in no mood to offer any more loss leaders.

The KEPCO team also beat the bid of a consortium that General Electric-Hitachi headed.

Korea: Economic Development Through Nuclear Power

But the story that has emerged from longtime industry observers and participants is that in effect Korea began assembling its bid package for the UAE tender 30 years ago, when it first set nuclear technology self-reliance as a national goal.

"A lot of us have seen this coming," veteran nuclear-industry specialist Edward Kee, vice president of NERA Economic Consulting, told *FCW*. While the nuclear industry in the U.S. foundered in the 1980s, Korea, lacking native energy resources and fully dependent on expensive energy imports, strove "with a singularity of purpose" to master nuclear energy technology, he told *FCW*.

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What if commercial ships go nuclear?
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traders and other financial players with access to cash and/or lines of credit, because:

- Utilities' fuel buying budgets were tapped out for 2009 and the general fiscal conservatism of utility risk management committees;
- The auction fell at the end of the fiscal year, a difficult time to justify to company boards, stockholders and investors a major cash outlay; and
- USEC's highly unusual 24-hour payment terms (versus the net 30 days that is routine for the industry).

In other words, USEC's desperate need for cash would give potential buyers leverage to negotiate down price, thereby leading to a further erosion of uranium prices, a consequence U.S. miners have warned and worried about since the scheme was announced last July.

Simpler still: if you want your money tomorrow, you'll give me a price break on the entire lot today. I think this is what's known as "cash and carry."

One of the problems with the uranium market's conventional wisdom is its U.S.-centric focus. (Again, anyone interested in setting up *FCW*'s Beijing and New Delhi offices should contact me.) So it is not surprising that industry observers could not foresee the possibility of utilities—Chinese or otherwise—purchasing the USEC auction material.

Perhaps *financial liquidity* is a better criterion of judging any potential pool of bidders for the auctions USEC will no doubt organize to sell material for future tranches of U.S. government UF6. Or any other auctions, for that matter. It could be that since our weird little market is liquidity-free, we simply cannot think in such terms. In any event, sorting buyers into the traditional categories of utility, producer, trader and broker really doesn't work anymore.

In today's static financial climate, the Chinese are the only ones who have discretionary funds. By discretionary, I mean cash. Who else has $20-25 million of idle capital laying around, waiting for use? Who else could scrape together that amount and pay within 24 hours? Only other Asian utilities.

One other factoid: Evolution Markets represented the utility that won the bid.

AREVA Loses

One of the big reasons AREVA lost the United Arab Emirates bid? The supply-chain snafus that have dogged the EPR project at Olkiluoto, which did not help the French company prevail in the eyes of the UAE nuclear authorities. The Korea Electric Power-led team no doubt benefited by comparison.

For more on the Korean consortium's dark-horse win, check out the article on page 1.

Where are the Loan Guarantees, DOE?

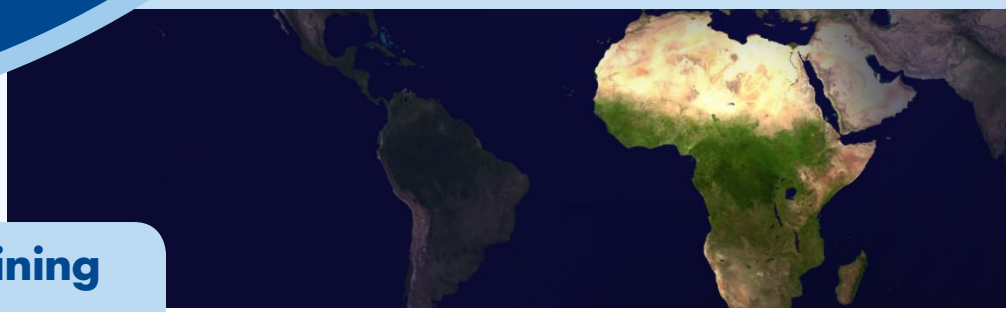
What is the holdup over there? It's been five years since the Energy Policy Act that put the loan guarantee program on the U.S. statute books passed.

And please don't cut any slack for the Energy Department or the Office of Management and Budget by arguing that loan guarantee awardees couldn't use any related loans until U.S. nuclear regulators approve their COL applications—now projected for late 2011. It's called "predictability"—and businesses need it to make their plans. Do you want to cut greenhouse gas emissions and create a new green economy/industry/high-paying, high-skilled jobs, or not?

Kazakhstan is Supplying… Iran?

No doubt you've heard about or actually read related news articles about some covert deal in which Kazakhstan is supplying Iran with uranium. As we all know from firsthand experience, questionable activities have indeed occurred in Kazakhstan with respect to its uranium deposits, production and joint ventures.

But that country has fine nonproliferation credentials; too much is riding on the future success of its uranium concern for the government to sanction any dubious transactions—or allow a rogue bureaucrat to conduct illegal trades on the side. The Kazakhs would put an end to those kind of shenanigans faster than you can say "Mukhtar Dzhakishev."



AFRICAN PROJECTS

Bannerman Lodges Mining Application for Etango

By Roger Murray, Special Correspondent

Australia's Bannerman Resources announced on Dec. 21 that it had applied to the Namibian Mines and Energy Ministry to mine its 80%-owned Etango uranium project. This followed a prefeasibility study and the start of a definitive feasibility study for Etango in mid-December (*FCW* #357, Dec. 16).

Bannerman also simultaneously filed an environmental and social-impact assessment with the Ministry of Environment and Tourism, which A. Speiser Environmental Consultants recently completed. The company plans to start construction of a mine and processing plant at Etango in 2011, aiming to begin production in 2013. Over the next three months, Bannerman said it would focus on several project-enhancement areas as part of the definitive feasibility study.

Share Price Takes a Dive

Bannerman also said it had received investor queries in response to the prefeasibility study. Apparently the company felt it needed to address these concerns quickly, as its share price had dropped 40% to just under A$0.70 ($0.64) on the Australian Securities Exchange (NSX) in December, the year's low, from A$1.20 ($1.10) at end-November.

The share price slide in fact had started before the prefeasibility study results were released in mid-December, but the price continued to fall and recovered only marginally, to A$0.72 ($0.66), as of Jan. 6.

One Australian private investor in Bannerman told *FCW* that investors had taken fright at Etango's large estimated capital cost of $555 million, coupled with the "relatively low" profit margin for the project. These numbers indicated that Bannerman would need to partner with a larger company to ensure it could raise the required funding. The firm itself had cited "a strategic partner" as one component (along with additional equity and project debt finance), in its financial model for the study.

Australian investors posting anonymously on the Hot Copper ASX forum have recently expressed similar views, including predictions that a predator would soon snatch Bannerman in its jaws.

Responding to a post asking if Bannerman had submitted detailed financial information in support of its mining license application, Chief Financial Officer Peter Kerr said on Jan. 6 that the application had included "Bannerman's previous capital raisings as well as future sources of development capital which may include equity and project/corporate debt … along with its relationships with banking counterparties capable of supporting Bannerman's future financing needs."

This was Bannerman's first key point in defending its prefeasibility study results. The study was based on an assumption of a long-term price of US$70/pound U3O8 because 2009 prices had ranged from US$62-70/pound, said the firm.

The startup date for Etango was "in line with generally anticipated strengthening uranium demand/supply fundamentals" due to new build in China, India and elsewhere, plus secondary supply reduction.

"The U3O8 spot market represents a minor proportion of transacted U3O8 volumes," said the firm, "and it is therefore inappropriate to assess the viability of the Etango project by reference to the spot price."

Bannerman also confirmed that the study's resource model had not incorporated drilling done since mid-2009, the results of which would bring additional near-surface and potentially higher-grade and lower-cost material into the mine plan in the early years, over and above expanding the resource estimate.

The definitive feasibility study would help identify cost-reduction opportunities. It would look at the possibility of optimizing the mine design and schedule; reducing unit costs through use of larger and more efficient equipment; competitively tendered contract mining quotes; optimizing the processing circuit; and unspecified "synergies through the sharing of key infrastructure."

This might refer to the development of a mine at the nearby Rossing South uranium deposit by Australia's Extract Resources.

The most recent exploration (as opposed to resource) drilling results for areas adjacent to the existing resource area, including

the recently discovered Hyena prospect, represented the initial phase for below-desert sand cover drilling. The firm said that it was further evaluating the results to determine the follow-up drilling plan. Bannerman clearly believes these additional areas may add sufficient mineralized ore to establish of satellite pits.

In an unannounced move, France's **AREVA** has bought a 10.6% stake in **Marenica Energy** (formerly West Australian Metals). In the transaction, which occurred on Dec. 21, AREVA bought 47.6 million shares from **Polo Resources**, the coal and uranium investment firm listed on London's Alternative Investment Market.

Neither AREVA nor Polo has commented publicly on the transaction, although it would appear to be a logical "fit" given the obvious synergies between AREVA's under-construction Trekkopje uranium mine and the Marenica uranium deposit, located just 30 kilometers to the north.

Both Trekkopje and Marenica are low-grade resources with similar mineralization characteristics, such that Marenica could offer an additional source of feed to AREVA's mine. A July 2009 Hanson Westhouse investor report on Marenica by Hanson Westhouse commented, "The possibility of Marenica providing either run of mine or part processed feed to AREVA or one of the another operations in the area provides additional development options that would reduce capex and provide earlier cash flows."

The report also noted that the Marenica (then West Australian) board had confirmed it had held informal talks with AREVA. Indeed, one informed source close to the company told *FCW* that AREVA had inquired about becoming an investor two years ago, but for whatever reason had decided not to proceed at that stage. The source expressed surprise that AREVA had chosen to buy Polo's shareholding now, which he said must have been more expensive than if the French group had participated in the A$9.9 million ($9.1 million) share placement of June last year, under which Polo became a "cornerstone investor" in Marenica Energy.

It is not clear why Polo would dispose of its holding six months later. Perhaps the company has needed additional cash to participate in the most recent share placement by **Kalahari Minerals**, so as to maintain its stake in the company.

Australia's **Forte Energy** has announced that a JORC-compliant maiden resource estimate for its Bir en Nar uranium project in Mauritania will be released during the 2010 first quarter (*FCW* #353, Nov. 18). Forte has nearly finished a 6,000-meter core drilling program aimed at delineating an initial (calcrete-hosted) resource for Bir en Nar. To date results, including intercepts exceeding0.5% eU3O8, and a high grade of 1.8% eU3O8 for one 1.6-meter intercept. Subject to the timely receipt of assay results on drill core being received, Australian consultants **Coffey Mining** expect to complete the resource estimate within this timeframe.

Elsewhere, ongoing field exploration over Forte's nine northern Mauritanian exploration licenses in the Reguibat Shield complex of Zednes region has located some promising findings, including other calcrete-hosted uranium anomalies near the Bir Moghrein prospect. The firm has accordingly tripled the size of its planned reverse circulation drilling program, which will begin in February around Bir Moghrein from 2,000 -6,000 meters, 300 holes, across 14 prospects.

The new uranium investment firm **AfNat Resources** (formerly Lithic Metals and Energy), has completed its reverse takeover of the private British Virgin Islands-registered company **Amber Resources**; shares in AfNat's enlarged share capital were admitted to London's Alternative Investment Market (AIM) on Dec. 24 (*FCW* #352, Nov.11). On completion, former Amber CFO Michael Humphries became an AfNat director.

AfNat's Non-Executive Chairman David de Jongh Weill is also a director of AIM-listed **Kalahari Minerals**, the largest shareholder in Australia's **Extract Resources**, the developer of the large Rossing South uranium deposit. AfNat, which as Lithic was focused on Zambian uranium and base metals exploration until mid-2009, has taken over Amber's portfolio of equity investments in **Bannerman Resources**, **Marenica Energy** and **Niger Uranium**.

Global Briefs

Strathmore Resources, which had previously signed a letter of intent to sell its Pine Tree-Reno Creek uranium properties to **Bayswater Uranium Corp**. now has an unsolicited superior competing offer of $17.5 million in cash from a foreign corporation. Bayswater must either complete the existing transaction or match the terms of the superior competing offer on or before Jan. 7.

Lithuania's Soviet-built nuclear power plant was shut down last Thursday as required by the European Union. EU contributed $1.1 billion to mitigate the costs of the shutdown. Lithuania now plans to inaugurate a new natural-gas plant by 2013, but experts think this might not generate enough energy to satisfy country's needs.

Dominion Power Co. may postpone its final decision on the design of its proposed third reactor at the North Anna site until mid-2010. Initially, Dominion planned to use **GE Hitachi**'s Economic Simplified Boiling Water Reactor, which the Nuclear Regulatory Commission has not yet certified. At the moment Dominion is exploring other options, as it has not been able to reach an engineering, procurement and construction agreement on the project with GE-Hitachi, which, however, said it remains very interested in working on the project.

CPS Energy and **Nuclear Innovation North America**, met Monday to settle the $32 billion lawsuit over their proposed nuclear project, before it goes to trial Jan. 25. The high cost estimate for the two-reactor project at the South Texas site led CPS to consider pulling out of the deal. NINA responded that CPS was in breach of contract. CPS came back with a $32 billion claim, charging that **NRG** and **Toshiba** had lured CPS into the project through "fraudulent, defamatory and illegal conduct."

Entergy Nuclear put a 20-year contract for electricity from its **Vermont Yankee reactor** last December, offering at 6.1 cents per kilowatt-hour, a 52.5% increase from the existing 4-cent contract. Vermont's two largest utilities, **Green Mountain Power** and **Central Vermont Public Service** declined the offer, which would force them to give up their claim in a 2002 revenue-sharing agreement that Entergy has estimated was worth $1 billion. While the leaders of the Vermont's legislature doubt the long-term value of the reactor to the state, Entergy argues that the contract would save Vermonters about $500 million over the next 20 years.

Reuters reports that the French utility group **GDF Suez** plans to ask Belgium's top court to annul the Belgian government's 2009 levy on nuclear power station operators in the country. The group said it had paid its contribution of $305.5 million part of a €250-million payment demanded from all nuclear operators in Belgium for 2009 and considers the principle of such a contribution "contestable" and "discriminatory" because it was only levied on nuclear producers.

Kazakhstan's state-owned energy company **Kazatomprom** reported that by Dec. 21 it had reached its annual production target of 13,500 tU. Kazatomprom added that at least another 400 tonnes would be produced by the end of the year. The total output of some 13,900 tonnes was to surpass Canada's and Australia's forecast production**,** making the company the leading uranium producer in 2009.

Uranium One amended its plan to sell 117 million shares to a consortium consisting of **Tokyo Electric Power Co., Toshiba Corp**. and the **Japan Bank for International Cooperation**. The share offer, which will raise C$291.1 million, will close on Jan. 15, at which point a long-term offtake agreement and strategic relationship agreement would also become effective.

The Directors of **Stonehenge Metals Ltd**. announced that the company entered into an acquisition agreement with **Yellow Sun Mines** to acquire 100% of Yellow Sun's wholly owned Korean subsidiary, **Chong Ma Mines Inc**. Chong Ma holds the rights to foururanium projects including 42 mining permits and 14 mining applications in South Korea. The projects reportedly contain 56 million pounds of U3O8, according to a 1986 report of the Korean Institute of Energy and Resources.

UEX Corp. announced the results of the summer 2009 drilling program and its plans for 2010 on its **Hidden Bay Project**. The summer 2009 drilling program included 49 drill holes totaling 15,071 meters, which found significant mineralization in several holes. The company plans to conduct scoping during 2010.

—Compiled by Madina Zainullina

Commercial Nuclear Ships: A New Market for Uranium?

By Rod Adams, Special to **Fuel Cycle Week**

To Americans the trade name for the China Ocean Shipping Co. sounds like the big-box competitor to Sam's Club. But COSCO may soon become a household word in the nuclear industry, now that Wei Jaifu, its president and CEO, has called on international shipping organizations to investigate the use of nuclear energy for powering merchant ships.

Wei has indicated that his company, now more accurately known as China Ocean Shipping Group, will take the lead in studying the application of nuclear, and in fact has already begun discussing it with the China National Nuclear Corp. Nuclear propulsion is common in military fleets, but questions remain about the use of nuclear in commercial shipping.

Still, if the study shows the technology is viable for commerce, shipping companies could develop into an important new consumer of uranium. That could have major implications for the global uranium market.

Not everyone is onboard, however. Peter Swift, the managing director of Intertanko, a professional association of independent tanker owners, has expressed reservations about the public acceptability of nuclear propulsion and the challenge of developing a corps of trained nuclear engineers able to man the ships. Each ship would require at least five qualified nuclear operators, which means it would take about half a million operators to run a global fleet of 100,000 ships large enough to operate profitably with nuclear energy.

On the other hand, Intertanko's website reveals a possible source of antinuclear bias. Tankers ensure that "the oil that keeps the world turning is shipped safely, responsibly and competitively," it points out. Clearly the group looks to the trade and transport of fossil fuel for its bread and butter—and may be reluctant to switch to a different power source.

NS Savannah: A Beautiful Flop

The idea of commercial nuclear shipping is not exactly new. In the 1955 President Dwight Eisenhower proposed the construction of a nuclear-powered cargo-passenger ship as an ambassador vessel for his "Atoms for Peace" initiative.

The result was Nuclear Ship Savannah, which was to become the first and only U.S. attempt to build a commercial nuclear ship. It cost $49.6 million, including a $28.3 million Babcock & Wilcox-made nuclear reactor, and First Lady Mamie Eisenhower christened her on July 21, 1959. She was, and still is, a beautiful piece of naval architecture with lines more reminiscent of a luxury yacht than a commercial vessel. She still resides in the Port of Baltimore.

Image provided by Rod Adams

In her salad days NS Savannah hosted dignitaries in her luxury cabins, regaling them with a swimming pool, library, banquet hall with dance floor—plus an excellent galley. Almost as an afterthought, she had a few bulk-cargo holds with loading cranes set up more to look good than to expedite loading.

But by the late 1960s her show vessel days were over, and as a cargo ship she was a bust. Apart from her limited capacity, her operating budget required of the maintenance of a shore-based support infrastructure that was idle most of the time. Plus in those days her fossil-fueled competitors were also able to purchase oil for $2-3 per barrel, far less than what nuclear fuel cost.

Uranium Fuel Now Beats Oil

But today the NS Savannah offers an instructive paradigm for determining the potential fuel demand of a fleet of nuclear ships.

In her day the standard nuclear fuel load would last a bit longer than two years at full power. That would be equivalent to about three years in typical trade use. Her nuclear core used about 6,800 kilograms of 4.5% enriched uranium in a 15 MWe steam engine. But at the much higher burnup rate of modern light-water fuel, a 6,800-kilogram fuel load in a 15 MWe steam engine would last an astounding 12 years.

If just 20% of the world's 100,000 commercial ships were to convert to nuclear, they would require an aggregate 1.2 million tU and 992 million SWU for each to have an initial 6,800-kilogram load of fuel. That means if manufacturers were to build a fleet of 20,000 ships over a 12-year period (1,667 ships per year), they would need to order about 100,000 tU and 82 million SWU annually—more than doubling today's uranium demand and increasing the need for enrichment by 240%.

The market value of that much activity would depend on the settled prices of uranium and enrichment services. At a price of $135 per SWU, the annual value of the enrichment services would be more than $11 billion. At various prices for uranium ($50, $100, and $150 per pound) the natural uranium market would be worth $11, $22, or $33 billion.

Considering the cost projections of Babcock & Wilcox for its new 125-MWe mPower reactor, a smaller, Savannah-sized power plant would cost roughly $5,000-$10,000 per kilowatt.

That means a 15-MWe propulsion unit with a 12-year fuel supply might cost $75 to $150 million. A portion of that cost would be its initial core, which would cost $16-30 million (assuming uranium prices between $50-150 per pound and an enrichment price of $135 per SWU).

This would replace a $40-million 15-MWe diesel engine, which would burn bunker fuel oil costing about $15,000 to $20,000 per day at today's prices. After 12 years of operating at a 67% capacity factor, that large diesel engine would consume approximately $75-$100 million in fuel oil and need to be refueled at least 20 times each year.

Of course, the diesel ship fuel bill would vary with market prices and could not be locked in with long-term contracts.

Post-Copenhagen Blues

EDF Renews Call for Upping Carbon Price

By Roger Murray, Special Correspondent

The price of carbon sank in the wake of the failure of U.N. climate change conference participants in Copenhagen to come to terms on specific carbon-dioxide emissions reduction targets. Now U.K. energy chiefs have begun warning that the low prices could jeopardize the large investment plans for new nuclear plants (*FCW* #355, Dec. 2).

In the immediate aftermath of Copenhagen, Dec.10 futures for E.U. allowances (EUAs) traded under the E.U. Emissions Trading Scheme on the European Climate Exchange in London slipped 1% to €12.53 ($18.16)/tonne CO2 in the last trading session of 2009. This left the yearend carbon futures price down 21% on the 2008 closing price.

The Dec.10 futures price slid even farther, to €12.41 ($17.99), at the start of 2010, while the daily (spot) price stood at €12.17 ($17.64) on Jan. 6. Spot EUAs trading on France's BlueNext finished 2009 in similar fashion, at €12.33 ($17.87)/tonne.

Last November, the International Energy Agency warned that the carbon price would have to reach €33 ($48)/tonne in 2020 and €73 ($106) by 2030 to make low-carbon technologies, such as nuclear, commercially attractive to investors.

EDF Energy Chief Executive Vincent de Rivaz, whose company proposes to build four new reactors in Britain, has called on the U.K. take action to to deliver a higher carbon price. The utility wants a floor price on the carbon credits fossil-fuel consuming companies must buy, in order to ensure a level playing field for investment in nuclear.

Acknowledging that Copenhagen had "made a start" and that the government was trying to broker a global agreement, De Rivaz said on Dec. 22 that "U.K. politicians must also continue to lead by ensuring that everything possible is done to encourage the transition to a low carbon economy."

He noted also that EDF believes that a "U.K.-specific minimum carbon price would help to deliver the low carbon investment needed in electricity generation. This is all the more urgent as it may take some time for an international carbon market to develop fully." De Rivaz maintained that this "would favor all low carbon technologies—including nuclear—and would help meet the UK's target of 80% reduction in carbon by 2050."

Support Growing for Price Intervention

De Rivaz's view is attracting wide backing from the U.K. energy sector, with leading executives virtually unanimous that Copenhagen's failure to establish a strong international price for carbon dioxide emissions had undermined the economic

rationale for developing new-build plants, according to a Dec. 23 report in *The Times*. The industry maintains that it can justify investment in new nuclear plants only if the price that operators of conventional fossil-fuel power stations pay to emit CO2 is high enough to make nuclear power competitive.

The estimated cost of building a new 1,000-MWe nuclear power station in the U.K. is about £2.7 ($4.3 billion)—more than four times the £600 million ($960 million) price tag on a gas-fired power plant of the same size.

Trading on European Climate Exchange began in 2005, when EUAs, which are futures contracts for European carbon-dioxide emissions, were introduced, with options on EUAs following in October 2006. Futures and options on Certified Emission Reductions were introduced in 2008. In 2009, two new spot-like contracts were added, the EUA and CER daily futures contracts.

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"Korea decided to make this a national effort, with a multiyear plan to develop manufacturing capacity as well as research and training programs tied in with the universities," added Kee.

Korea Hydro & Nuclear Power Co. Senior Vice President Myung-Jae Song offered the particulars in a 2008 article he authored for *Nuclear Engineering International*, noting that in its early years the Korean nuclear industry relied on foreign contractors to build and operate its first nuclear plants.

But after the first three reactors, KEPCO "geared up on self-reliance in construction technology" and performed "6% in architect engineering, 40% in equipment supply and 100% in construction" for the next six units, wrote Song. Subsequently Korean companies took the lead role in all nuclear construction, hiring foreign companies only as subcontractors.

By the early 1990s, however, Korean companies introduced the Optimized Power Reactor 1000, based on the System 80+ design licensed from the American firm Combustion Engineering (later acquired by Westinghouse). As Korea's first standard plant design concept, the OPR-1000 was a national declaration of nuclear technology independence. Six of the 1000-MWe units are now operating there.

One of the OPR1000's offspring is the APR-1400, a 1,350-MWe Generation III evolutionary design, two of which are now under construction at Shin Kori and six more to be built by 2021. It was the APR-1000 that won the UAE nod, allowing Korea to emerge as a global nuclear technology exporter.

Indigenous Supply Chain, UAE Relationships Helped

Kee also pointed out that Korea's vast nuclear manufacturing infrastructure also would have worked to the KEPCO consortium's advantage in the UAE tender.

In an all-day 159-slide pre-application presentation at the Nuclear Regulatory Commission last November KEPCO included a section on Doosan's manufacturing capabilities, including the facility shown below. That know-how was undoubtedly highlighted in the UAE proposal as well. KEPCO plans to apply for NRC certification of the APR-1400 in October 2011.

Korean companies have developed longstanding commercial relationships and a reputation as reliable, on-time, within-budget project managers in the UAE through their involvement in major infrastructure ventures over several years, according to Kee. That "greased the path" for KEPCO, he said.

Westinghouse Role: TBD

The UAE imposes strict confidentiality requirements on its contractors and bidders, making it difficult to ascertain what role Westinghouse, the only non-Korean member of the KEPCO consortium, will play in the project.

Some press accounts have hinted that UAE officials may have felt obligated to choose a team with an American participant in view of the U.S. government's recent ratification of a 1-2-3 Agreement with the Middle Eastern nation. The Obama administration in recent months has showcased the agreement as an ideal for nuclear commerce in the region, because at the outset the UAE declared itself uninterested in enrichment and reprocessing technologies, which could feed a weapons program.

But it appears more likely that Westinghouse is involved because of the technology licensing agreements it still holds with Korean nuclear industry participants. Some have suggested that Westinghouse, with its 20% owner Shaw, would be involved in component design—but its Korean partners will undoubtedly perform all manufacturing.

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