

The

Deregulation and Nuclear Fuel Demand

Ux

WEEKLY

One of the hottest topics around these days is the deregulation and restructuring of the electricity industry. This is particularly true in the United States, where the Clinton administration just submitted its deregulation plan, and states are implementing their own plans while utilities enter into merger agreements. (The Clinton plan and recent state and merger activities are discussed in the news briefs section beginning on page 2.) In an effort to characterize this complex and ever-changing subject and to analyze its impact on nuclear power and the nuclear fuel market, UxC has just completed the first report in a two-report study titled *Electricity Deregulation in the United States*. Some observations from this study appear below.

The typical reaction to deregulation is negative from the standpoint not only of nuclear power but also nuclear fuel demand. This view stems from past premature reactor shutdowns—the most recent case being the Zion units—and po-

tential for additional ones, which not only reduce demand but can immediately contribute supplies to the spot market. However, the picture is not as bleak as it may seem once it is realized that deregulation has also resulted in an increase in capacity factors as utilities seek to improve their performance and lower their costs.

One way to illustrate the impact that deregulation has had on the prospects for nuclear power and nuclear fuel is to compare forecasts made by the U.S. Energy Information Administration (EIA) in 1989 and 1997. As shown in the chart on page 2, in 1989 EIA saw some potential for growth in nuclear capacity, and no real potential for decline until after 2010. This situation was much different in the 1997 forecast, where at best EIA saw U.S. nuclear power staying at current capacity levels. The reference case in 1997 equaled the 1989 low case by the year 2015. And, the 1997 low case projects an almost complete collapse in U.S. nuclear power by 2015, leaving only about 20 GWe of capacity.

The 1997 EIA low case is based on the assumption that reactors in the U.S. are shut down 10 years prior to the end of their current operating licenses. While this assumption is not very scientific or even defensible, the very fact EIA would make it emphasizes the change in prospects for U.S. nuclear power due to deregulation. In a span of eight years, its forecasts have regressed from a

high of 160 GWe to a low of 20 GWe installed by 2015.

While EIA projects reduced installed nuclear power capacity, its forecasts for uranium requirements show the opposite pattern. The second chart on page 2 compares the uranium requirements associated with the three capacity forecasts made in 1989 with actual requirements and those projected in the 1997 reference case. Even though nuclear capacity has declined somewhat, actual and projected requirements are much higher through the year 2005, and are on par with the 1989 reference case forecast for the 2006-2010 period. Thus, just as the competitive pressures stemming largely from deregulation were a primary reason that EIA reduced its nuclear capacity forecasts from 1989 to 1997, their effect on capacity factors was one of the main reasons for the much higher uranium requirements.

In the competitive environment that results from deregulation, it would appear that capacity factors will represent a sort of litmus test for the continued operation of reactors, especially those in the U.S. If reactors do not attain or maintain a certain capacity factor, they will be prone to being shut down, with these targets varying depending on regional cost competition. This represents a sort of double-edged sword for nuclear fuel demand. Higher capacity factors would mean not only greater demand per reactor but more reactors operating, while lower capacity factors would mean fewer reactors would make the grade.

The chart on page 3 shows that capacity factors have grown considerably during the 1990s, declining only slightly recently, and the industry plans for additional increases. However, it should be noted that, as has been the case in the past, this future gain may occur at the expense of shutting down under-performing reactors. In almost all cases, reactors which have been shut down prematurely in the U.S. have had substandard, and in some cases abysmal, capacity factors.

Looking into the future, electricity deregulation in the U.S. has the potential to change not only the size of fuel demand but also its nature. Consolidation of the industry is a foregone conclusion, and competitive pressures are likely to affect pricing mechanisms, the form in which uranium is purchased (e.g., EUP), inventory policies, and the introduction of risk-sharing contracts.

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**Weekly
Ux Prices**

U₃O₈
\$10.70
(Unch.)

CIS U₃O₈
\$9.25
(Unch.)

NEWS BRIEFS

Administration unveils dereg plan—The Clinton Administration announced Wednesday its Comprehensive Electricity Competition Plan, which would provide customer choice by 2003 but would allow states to not deregulate if they felt their consumers would be better off under regulation. The plan joins at least six other deregulation bills already pending in the House of Representatives, none of which congressional leaders feel are likely to pass this year.

President Clinton said the proposal would “provide incentives for increased efficiency in the electricity market, saving American consumers \$20 billion a year and reducing greenhouse gas emissions.” Secretary of Energy Federico Peña said that under the plan, a family of four would save \$232 a year, the equivalent of a 5% income tax cut. He went on to say that federal legislation is needed to enable states to implement retail competition effectively, by modifying or repealing outdated federal laws, covering regional electricity markets, addressing concerns about market power and ensuring that the interstate electricity grid is reliable.

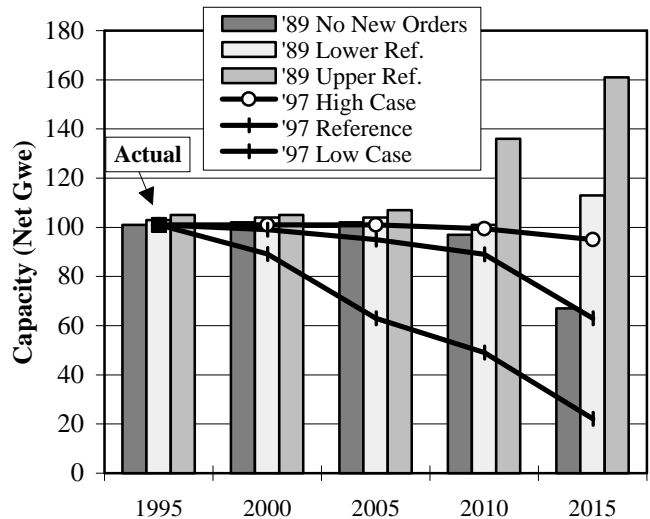
Key elements of the plan are as follows. It provides for customer choice by January 1, 2003 at the states’ discretion, supports stranded cost recovery and amends the tax code to allow deductions for nuclear plant decommissioning costs. It gives FERC the authority to require that utilities turn over operation of transmission facilities to an independent system operator. It requires all utility companies to disclose in a consistent format the information consumers need to comparison-shop for service. The plan establishes a Renewable Portfolio Standard to ensure that at least 5.5% of all electricity sales include generation from renewable energy sources by 2010, while providing economic incentives for increasing the efficiency of fossil generating plants. Finally, it updates federal electricity law to give FERC the authority to mitigate market power and repeals the Public Utility Holding Company Act of 1935 (PUHCA) and the “must buy” provision of the Public Utility Regulatory Policies Act (PURPA).

Regarding the fact that the proposal does not include specific provisions regarding the environmental benefits of nuclear power, Sen. Frank Murkowski said that he questioned DOE’s plan when it came to environmentally clean power, and that he was disappointed that it did not address how deregulation would affect public utilities like the Tennessee Valley Authority (TVA). Murkowski is chair of the Senate Energy and Natural Resources Committee, before which five deregulation bills are pending.

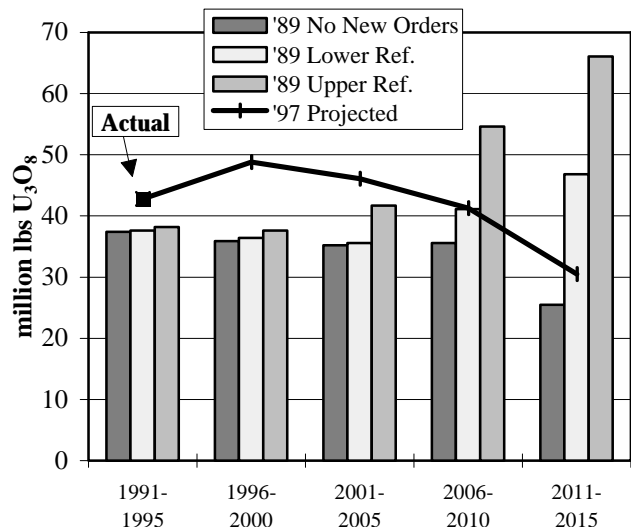
— Industry Calendar —

- **March 29-April 1**—NEI’s *FUEL CYCLE '98* is being held in Savannah, Georgia.
- **April 22-24**—Ameren UE is holding the UNFEG Meeting in St. Louis, Missouri.
- **May 17-19**—The World Nuclear Fuel Market (WNFM) will be held in Paris, France.
- **June 7-11**—American Nuclear Society’s 1998 Annual Meeting in Nashville, Tennessee.
- **September 9-11**—Uranium Institute 23rd Annual Symposium, London.
- **October 4-7**—NEI’s International Uranium Fuel Seminar '98 will be held in Tucson, Arizona.

Comparison of EIA 1989 and 1997 U.S. Nuclear Capacity Forecasts



Comparison of EIA 1989 and 1997 U.S. Uranium Requirements Forecasts



NEWS BRIEFS cont...

Dereg happenings around the U.S.—The California Power Exchange Corporation (PX) is expected to open its statewide electricity market tomorrow. The PX will initially open with a day-ahead market, in which a market price for electricity is established for every hour in the following day through an electronic bidding process. Transactions will then be scheduled for delivery with the California Independent System Operator.

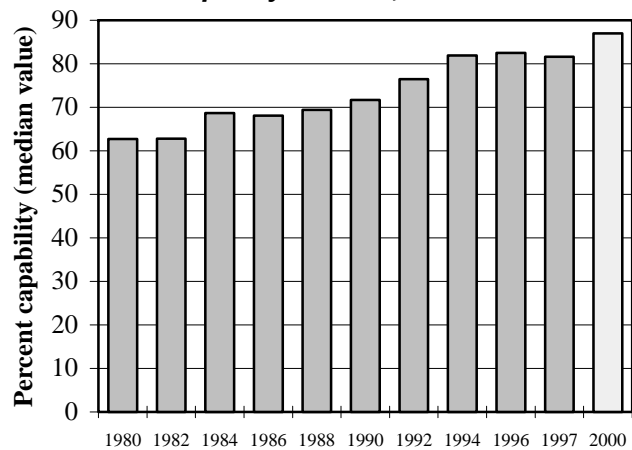
On the merger front, **American Electric Power (AEP)** and **Central and South West Corp. (CSR)** announced last week plans to file proxy material with the SEC regarding their proposed merger by the middle of next month. CSW also has plans to file for state regulatory approval of the merger in the four states in which its utility subsidiaries (Central Power & Light Co., West Texas Utilities, Public Service Co. of Oklahoma, and Southwestern Electric Power Co.) operate. The merged company would rank as the nation's third-largest electric utility with 4.6 million customers in 11 states. Utility officials said they hope to complete the merger in 12 to 18 months.

Meanwhile, **Western Resources Inc.** and **Kansas City Power & Light Co. (KCPL)** have agreed to restructure their merger plans to form a new publicly traded electric utility that is separate from Western Resources but controlled by it. The new plan would reduce the amount Western Resources would have to pay for KCPL by 9%. It would require Western Resources to combine its two electric utility business units, KPL and KGE, with almost all of the assets of KCPL in a new company to be called Westar Energy, a purely electric utility company serving over one million customers. Contingent upon clearance by state regulators and federal energy and nuclear regulators, company officials predict the transaction will become final by mid-1999.

The **Connecticut** legislative Committee on Energy and Technology last month approved a deregulation bill (RB5005) which would begin customer choice on January 1, 2000, and allow 100% customer choice by July 1 of that year. It provides for a 10% rate reduction and a competitive bidding process for the sale of fossil and hydro plants. Nuclear plants would not enter the auction process until 2003, and the bill does not resolve the securitization of nuclear costs if the plants are sold.

The **Virginia** House of Delegates voted 82-16 last month to approve a deregulation bill (HB1172) to allow consumers to choose their supplier by January 1, 2004. It requires Virginia utilities to submit a rate plan for the years 1999 through 2003 to the State Corporation

U.S. Capacity Factors, 1980-1997



Source: World Association of Nuclear Operators (WANO)

Commission (SCC) by January 1 of next year, and the SCC would then set rates through December 31, 2003. The bill must still pass the Virginia State Senate and be signed by the governor to become law.

In what might be viewed as unbundling in anticipation of deregulation, **Carolina Power & Light (CP&L)** has reorganized into three business units—Energy Supply, which produces electricity for retail and wholesale markets; Energy Delivery, which delivers electricity and other services to customers; and Retail Sales and Services, which provides products and services to customers in targeted market segments.

Generating assets continue to change hands across the country, as **Southern California Edison (SCE)** announced Wednesday the sale of its 1,500 MW gas-fired Ormond Beach Generating Station to **Houston Industries Power Generation**. The sale is subject to regulatory approval and is scheduled to close on June 1. It is the fifth SCE power plant bought by Houston Industries since November, including Mandalay, Ellwood, Etiwanda and Coolwater. The total price for all 12 SCE gas-fired plants sold to date is approximately \$1.188 billion, a premium over book value of \$569 million. The divestiture of generating assets is required by the restructuring of the industry in California.

Commonwealth Edison Company (ComEd) announced Monday its plans to file in early April for a \$3.4 billion securitized bond issue under the auspices of legislation passed in Illinois last year which allows the company to issue up to \$6.8 billion in securitized bonds. The company has not yet finished its evaluation of the use of proceeds, which could include stock repurchases. Illinois legislation does not directly link the issuance of the bonds to the recovery of stranded costs.

Pu disposition options discussed—The 5th annual conference on “Disposition of Weapons Grade Pluto-

NEWS BRIEFS cont...

mium and HEU" was held last week in Bethesda, Maryland. The conference focused primarily on programs to convert plutonium pits from weapons to a purified oxide form or to a form suitable for geologic disposal, the construction of mixed oxide (MOX) fabrication plants, and the subsequent use of MOX in a variety of reactor types. Only one short session was devoted to HEU.

There was irritation expressed with delays in DOE issuing an RFQ for a U.S. MOX facility and the prospects for the U.S. program in general. Even with prompt action, it appeared that it would be one or even two decades before significant amounts of weapons plutonium (WPU) could be burned in reactors and reduced to the spent fuel standard, as current programs to convert WPU pits to an oxide form would not result in a significant amount of oxide until 2005. In contrast, Russia has a facility that can convert 1.3 tonnes of metal to oxide per year, expandable to 3 tonnes per year. However, Russia does not yet have the technologies or facilities to use significant amounts of this plutonium in reactors.

While MOX USA and utility spokespersons recapitulated desires to build a MOX fabrication plant in the U.S., an address by Shirley Jackson, Chairperson of the NRC, revealed a long list of regulatory issues (who would be licensed, certificate of compliance versus whole licensing process, decommissioning responsibility, responsibility for waste and its disposition, need for new NRC regulatory procedures for transuranics, safeguards and physical security, transport, Price Anderson coverage, and mechanism for payment for regulation), and difficult questions about allocations of regulatory authority among NRC, DOE, the Defense Nuclear Safety Board, OSHA, EPA and other agencies.

Minatom Deputy Minister Yegorov called attention to Russia's need for reactor fuel, given that it has lost access to Central Asian uranium, but also observed that there is very limited capability to use plutonium in Russia. Instead, he emphasized "stabilization" (there are safety issues involved with Russian pits) and secure storage (at Mayak), research on reactor use (LWRs and fast reactors), improved capacity to convert pits to oxide, and international collaborations.

Senator Pete Domenici of New Mexico created the largest stir at the conference with a proposal (developed in collaboration with MIT's Tom Neff) for a "plutonium swap." Given the expected lengthy delays in disposing of WPU in new facilities in the U.S. and Russia that will not be built for many years, the proposal envisions shipping de-weaponized plutonium to existing European MOX facilities for fabrication into civil reactor fuel. The objective of this approach is remove WPU from both the U.S. and Russia expeditiously, preventing possible re-use and reducing proliferation risks by putting it under good physical security and IAEA safeguards.

Under the Domenici proposal, the U.S. and Russia would agree, collectively, to take back an equivalent amount of reactor-grade plutonium coming from European reprocessing. The result would be no net change in total amounts of plutonium or in programs to utilize it. Dominici called for a G7 + 1 initiative to structure incentives and finance the weapons plutonium destruction program and accelerated conversion of the WPU from weapons form to usable oxide.

Ux Price Definitions

The Ux Prices indicate, subject to the terms listed, the most competitive spot offers available for the respective product or service, of which The Uranium Exchange Company (Ux) is aware. The **Ux U₃O₈** price includes conditions for quantity, delivery timeframe, origin and location considerations while the **Ux CIS U₃O₈** price is the most competitive price for deliveries up to six months forward without regard to specific quantity or location. Both U₃O₈ prices are published weekly. The **Ux Conversion** price considers spot offers for delivery up to twelve months forward. The **Ux UF₆** value represents the sum of the conversion and U₃O₈ components as discussed above and, therefore, does not necessarily represent the most competitive UF₆ offers available. The **Ux SWU** price considers spot offers for deliveries up to twelve months forward. The Conversion, UF₆ and SWU prices are published the last Monday of each month.

The Ux Prices represent neither an offer to sell nor a bid to buy the products or services listed.

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Ux U₃O₈ 3/30/98 Price Conditions

Price:	\$10.70
Quantities:	2-400,000 lbs
Delivery:	3 months
Origin/Location:	Open origin/U.S. convertor Non-CIS/All other locations Matched/Any location

THE MARKET

Uranium—The Ux U₃O₈ Spot Price and CIS U₃O₈ Price are again unchanged at \$10.70 and \$9.25, respectively. The CIS Price remained constant during March and the restricted price declined slightly from a level of \$11.00 at the beginning of a month which was characterized by little volume.

For the month there were three transactions for somewhat over 300,000 pounds U₃O₈ equivalent, with much of this activity (two transactions for almost 300,000 lbs) having occurred during the past week. All of this buying was for actual needs as opposed to being for discretionary purposes, and the bulk of it had been undergoing evaluation for some time.

There are several utilities that are either evaluating offers or awaiting them. A U.S. utility seeking 200,000 lbs U₃O₈ for second or third quarter delivery has not yet concluded its evaluation process, and another U.S. entity looking for 100,000 lbs U₃O₈ for delivery in July is also evaluating. A non-U.S. utility, seeking up to 550,000 lbs U₃O₈ for December delivery, is awaiting offers which are due the first week of April.

The market can be characterized as being in a sort of limbo, waiting for something to happen. There are still a number of companies who could make discretionary purchases, as well as producers who could buy to make up potential production shortfalls. But, so far most in this group have not been induced to buy. It is likely that

they will not be persuaded to buy until price shows the beginning of a recovery.

Conversion—The spot conversion price remained at \$4.75/kgU for the month, after declining \$0.35/kgU in February. Conversion volume totaled about 220,000 kgU with 120,000 kgU in the form of UF₆ and the rest as conversion services. While there is some price-sensitive demand in conversion, it is lower than is the case with uranium. At this point sellers do not appear anxious to push price lower to attract additional demand.

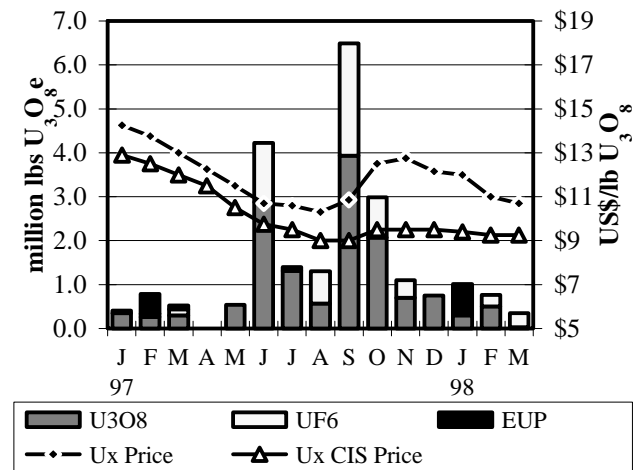
Enrichment—The restricted and CIS spot SWU prices also remained unchanged for the month at \$86 and \$84/SWU, respectively. A utility purchased 30,000 SWU in two transactions, as low volume has been a common theme in all three front-end markets this year. The U.S. utility seeking 100,000 SWU for delivery in early September is beginning to evaluate offers received last week. As this quantity is relatively large compared to the recent size of the spot market, the outcome of this procurement may give some indication as to where the spot SWU market is heading.

Ux Spot Prices	
<i>Month-end (3/30/98)</i>	
U ₃ O ₈	\$10.70
CIS U ₃ O ₈	\$9.25
Conversion	\$4.75
UF ₆	\$32.71
CIS UF ₆	\$28.92
SWU	\$86.00
CIS SWU	\$84.00

Industry Spot Prices							
	NuclearFuel		NUKEM		TRADE	Ux	Avg.
	Low	High	Low	High	TECH		
Weekly (3/30/98)							
U ₃ O ₈ (\$/lb)	(3/23)				(3/20)		
Restricted	10.20	10.80	—	—	10.60	10.70	10.60
Non-restr.	9.10	9.40	—	—	9.30	9.25	9.27
Month-end (2/28/98)							
U ₃ O ₈ (\$/lb)	(2/23)					(2/23)	
Restricted	10.50	11.10	11.00	11.40	10.75	11.00	10.94
Non-restr.	9.10	9.40	9.40	9.75	9.30	9.25	9.34
Conversion (\$/kgU)	—	—	4.90	5.15	4.90	4.75	4.89
UF₆ (\$/kgU)							
Restricted	—	—	—	—	32.95	33.49	33.22
Non-restr.	—	—	—	—	29.20	28.92	29.06
SWU (\$)							
Restricted	—	—	—	89.50	84.00	86.00	86.50
Non-restr.	—	—	88.00	—	82.00	84.00	84.67

Note: Definitions of these prices vary among companies. They are listed strictly for comparison purposes and are in U.S. dollars. Nukem's SWU price shows limits on its price range.

Ux Month-end Spot Prices vs. Volume by Form



The Laws of Golf

- Palm trees eat golf balls.
- Sand is alive. If it isn't, how do you explain the way it works against you?
- Golf balls never bounce off of trees back into play. If one does, the tree is breaking a law of the universe and should be cut down.
- A severe slice is a thing of awesome power and beauty.
- All 3-woods are demon-possessed.
- All vows taken on a golf course shall be valid only until the sunset of the same day.