

The Nuclear Review

December 2013 | Number 544

Vietnam's Emerging Nuclear Program

The US-Russian HEU Agreement—
“Megatons to Megawatts” Ends



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As Vietnam charts a path to economic improvement, its nuclear energy program has emerged as one of its most ambitious projects yet. For the past few years, the Southeast Asian nation has been making plans to enter the commercial nuclear sector and has chosen seven prospective coastal sites for nuclear power plants. Aspiring for 15-16 GWe of nuclear capacity by 2030, several countries have expressed interest in participating in Vietnam's nuclear program.

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On the Cover

Vietnam has selected the province of Phu Yen as the location for a future nuclear power station.

Recent Transactions

Uranium Sales

Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U ₃ O ₈)	Price within Percentage Range of Current Exchange Value, or Long-Term U ₃ O ₈ Price Indicator, as Applicable ¹	Buyer	Seller	Remarks
9529	2014	51-100	90-97	Utility	Intermediary	U ₃ O ₈
9530	2013	101-300	R	Utility	Intermediary	U ₃ O ₈
9531	2013	51-100	90-97	Intermediary	Producer	U ₃ O ₈
9532	2013	51-100	90-97	Intermediary	Producer	U ₃ O ₈
9533	2013	51-100	90-97	R	Producer	U ₃ O ₈
9534	2014	101-300	98-102	Producer	Intermediary	U ₃ O ₈
9535	2013	51-100	90-97	Intermediary	R	U ₃ O ₈
9536	2013	51-100	90-97	R	Intermediary	U ₃ O ₈
9537	2013	101-300	98-102	Intermediary	Intermediary	U ₃ O ₈
9538	2013	101-300	98-102	Intermediary	Intermediary	U ₃ O ₈
9539	2013	51-100	R	Intermediary	Intermediary	U ₃ O ₈
9540	2013	51-100	98-102	Intermediary	Intermediary	U ₃ O ₈
9541	2013	51-100	98-102	R	Intermediary	U ₃ O ₈
9542	2013	51-100	98-102	R	Intermediary	U ₃ O ₈
9543	2013	51-100	98-102	R	Intermediary	U ₃ O ₈
9544U	2014	301-600	98-102	Intermediary	R	UF ₆
9545	2014	101-300	98-102	Intermediary	R	U ₃ O ₈
9546	2014	51-100	98-102	Intermediary	R	U ₃ O ₈
9547	2014	51-100	98-102	R	Intermediary	U ₃ O ₈
9548	2014	51-100	98-102	R	Intermediary	U ₃ O ₈
9549	2014	51-100	98-102	Intermediary	Intermediary	U ₃ O ₈
9550	2014	101-300	R	R	Intermediary	U ₃ O ₈
9551	2013	51-100	98-102	Intermediary	Intermediary	U ₃ O ₈
9552	2013	51-100	98-102	Intermediary	Intermediary	U ₃ O ₈
9553	2013	51-100	98-102	R	Intermediary	U ₃ O ₈
9554U	2014	101-300	98-102	R	Intermediary	UF ₆
9555	2013	101-300	98-102	Intermediary	Producer	U ₃ O ₈
9556	2014	51-100	Less than 85	R	Intermediary	U ₃ O ₈
9557	2016	601-1000	R	Utility	R	U ₃ O ₈
9558	2015	R	R	Intermediary	R	U ₃ O ₈
9559	2016	R	R	Intermediary	R	U ₃ O ₈
9560	2015	301-600	R	R	Intermediary	U ₃ O ₈
9561	2016	301-600	R	R	Intermediary	U ₃ O ₈
9562U	2015-2020	1001-3000	R	Utility	Intermediary	UF ₆

R TradeTech either does not know, or TradeTech has restricted information to protect client or source confidentiality. TradeTech may delay reporting some transactions in order to protect proprietary information.

MR Represents transactions with market-related pricing.

¹ Price ranges *Below 90, 90-97, 98-102, 103-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Market Value. Endpoints of each range are included within that range.

Recent Transactions

Natural Uranium Loans

Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U ₃ O ₈)	Interest Rate within Percentage Range of Current Loan Rate ¹	Borrower	Lender	Remarks
No loans were reported.						

Conversion Sales

Transaction Number	Delivery Period	Approximate Quantity (thousand kgU as UF ₆)	Price within Percentage Range of Current Conversion Value, or Long-Term Conversion Price Indicator, as Applicable ¹	Buyer	Seller	Remarks
9544C	2014	101-300	98-102	Intermediary	R	
9554C	2014	51-100	98-102	R	Intermediary	
9562C	2015-2020	301-600	R	Utility	Intermediary	European delivery
9563	2014	50 or less	98-102	Utility	R	N. American delivery

Enrichment Sales

Transaction Number	Delivery Period	Approximate Quantity (thousand SWU)	Price within Percentage Range of Current SWU Value, or Long-Term SWU Price Indicator, as Applicable ¹	Buyer	Seller	Remarks
No enrichment sales were reported						

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MR Represents transactions with market-related pricing.

¹ Price ranges *Below 90, 90-97, 98-102, 103-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Market Value. Endpoints of each range are included within that range.

Market Values Summary

Spot Price Indicators

NUEXCO Market Values	Nov 30, 2013	Oct 31, 2013	Units
Exchange Value	\$35.90	\$34.25	US\$ / lb U ₃ O ₈
Daily U ₃ O ₈ ²	\$—	34.25	US\$ / lb U ₃ O ₈
UF ₆ Value	\$102.50	\$98.50	US\$ / kgU as UF ₆
Loan Rate	1.00	1.00	Percent / annum
Conversion Value			
– North American	\$8.50	\$9.00	US\$ / kgU as UF ₆
– European	\$9.00	\$9.50	US\$ / kgU as UF ₆
SWU Value	\$100.00	\$100.00	US\$ / SWU
Transaction Value	\$35.30	\$35.00	US\$ / lb U ₃ O ₈
– Based on	63	58	Transactions
– Over	3	3	Months
– Involving	8.2	6.9	Million lbs U ₃ O ₈ Eq.
Uranium Supply & Demand			
– Active Supply	6.0	5.7	Million lbs U ₃ O ₈ Eq.
– Active Demand	5.9	5.3	Million lbs U ₃ O ₈ Eq.
– Supply/Demand Ratio	1.0	1.1	

Mid-Term/Long-Term Price Indicators

Indicators	Nov 30, 2013	Oct 31, 2013	Units
Mid-Term U ₃ O ₈	\$39.00	\$37.25	US\$ / lb U ₃ O ₈
Long-Term U ₃ O ₈	\$50.00	\$50.00	US\$ / lb U ₃ O ₈
Long-Term Conversion			
– North American	\$16.00	\$16.00	US\$ / kgU as UF ₆
– European	\$17.00	\$17.00	US\$ / kgU as UF ₆
Long-Term SWU	\$114.00	\$114.00	US\$ / SWU

²The Daily U₃O₈ Spot Price Indicator is not published on weekends or US bank holidays.

Definitions

- The Exchange Value is our judgement of the price at which spot and near-term transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.
- The UF₆ Value is our judgement of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the last day of the month.
- The Loan Rate is our judgement of the annual interest rate at which uranium loans could be concluded as of the last day of the month.
- The Conversion Value is our judgement of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded as of the last day of the month.
- The SWU Value is our judgement of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the last day of the month.
- The Transaction Value is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:
 - Transactions closed within the previous three-month period for which delivery is scheduled within one year of the transaction date;
 - At least 10 transactions;
 - Transactions involving a sum total of at least 2 million pounds equivalent U₃O₈.
- The Mid-Term Price Indicator for U₃O₈ is our judgement of the base price at which transactions for mid-term or intermediate delivery of natural uranium concentrates could be concluded as of the last day of the month, for

transactions in which the price at the time of delivery would be an escalation of the base price from a previous point in time.

8. The Long-Term Price Indicators for U₃O₈, Conversion, or SWU are our judgement of the base price at which transactions for long-term delivery of that product or service could be concluded as of the last day of the month, for transactions in which the price at the time of delivery would be an escalation of the base price from a previous point in time.

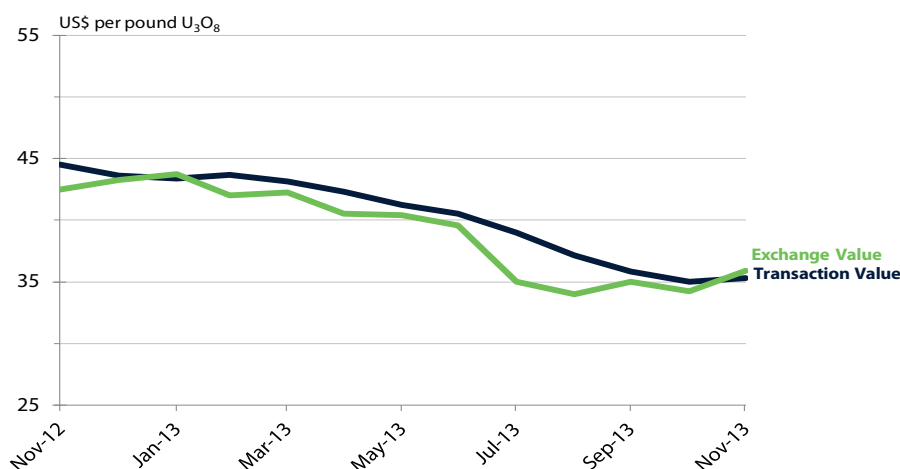
Derivations and Comments

- All Market Values are expressed in terms of US\$.
- All Market Values are based on:
 - Data from recently completed transactions.
 - Data from pending transactions.
 - Firm bids to buy or borrow, and firm offers to sell or lend.
 - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which we are not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which we are not aware of firm offers to sell or lend.
- In the determination of all Market Values, we do not consider:
 - Prices associated with deliveries under old or renegotiated contracts, or other than arm's-length transactions.
 - Charges for transportation other than that customarily provided by suppliers.
 - Prices of services or materials delivered under long-term contracts with primary suppliers.
- In calculating the Transaction Value, we do not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future Exchange Values or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it cannot currently be determined.
- The sample time for the Transaction Value is extended for up to six months, if necessary to satisfy the minima for the number of transactions (10) and quantity of material (2 million pounds equivalent U₃O₈). The sample time is extended beyond six months only as necessary to include a minimum of five transactions and 1 million pounds equivalent U₃O₈. Any required currency conversions to US dollars are made on the basis of conversion rates in effect on or near the transaction date.

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Exchange Value & Transaction Value

Nov 2012 - Nov 2013



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November Market Review

Uranium

The month of November was marked by a series of market developments and announcements that could play a significant role in the global uranium market throughout 2014. In the last week of November, the US Department of Energy (DOE) said it would enter negotiations with the GE-Hitachi/Cameco joint venture Global Laser Enrichment to build and operate a laser enrichment facility at the Paducah facility in Kentucky. DOE also plans to place a contract with AREVA to process off-spec uranium at AREVA's Richland fabrication facility.

A number of uranium supply-side deferrals or cancellations were announced over the past month. Russia's Rosatom put its Honeymoon project in Australia on standby and halted further investment in its global uranium production activities, while Kazakhstan's state nuclear entity Kazatomprom will curtail expansion of its uranium production and maintain output at 2013 production levels (approximately 55 million pounds U_3O_8).

Several other uranium producers announced delays or introduced cost-cutting measures in response to low prices, including Paladin Energy and Cameco. In addition, the US-Russian HEU 'Megatons to Megawatts' program, which provided over 14,000 tonnes of LEU to the market annually over the past 20 years came to an end in November,

and investment banker Goldman Sachs announced it would seek to exit the uranium market and sell its uranium trading business.

Prices responded to the supply-side cutbacks earlier in the month by rising to \$36.25 per pound U_3O_8 before settling back to \$35.90 at month end. Several producers were successful in placing remaining uncommitted production for 2013, and offer prices gradually increased as sellers appeared to be under less pressure to conclude transactions before year end. Most buyers have covered any remaining needs for 2013, and are now looking to secure material for 2014 requirements.

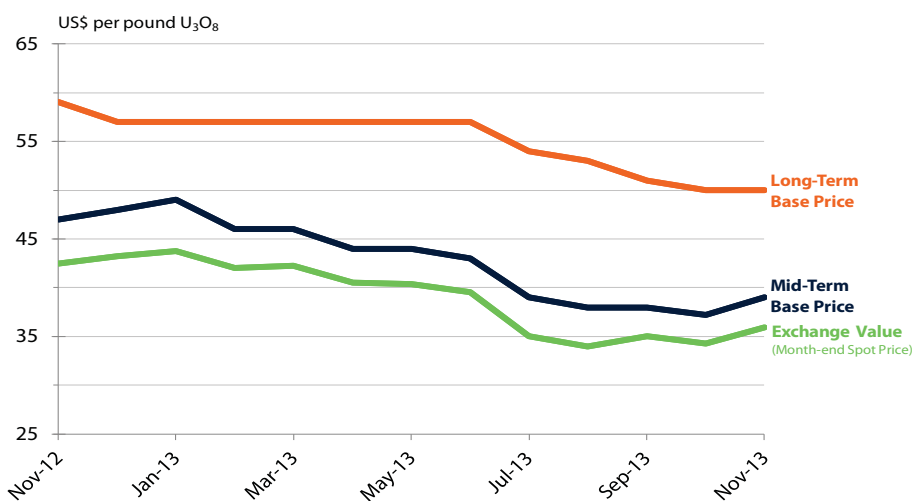
A total of 27 transactions involving nearly 4.3 million pounds U_3O_8 equivalent were reported in November, bringing year-to-date transaction volume to 38.2 million pounds U_3O_8 equivalent.

TradeTech's **Exchange Value** for November 30 was **\$35.90** per pound U_3O_8 , an increase of \$1.65 from the October 31 Value, and a decrease of \$0.10 from the November 27 Daily U_3O_8 Spot Price Indicator.

Seven transactions involving deliveries over the 2015-2020 period were reported in the term uranium market for November. One non-US utility selected a preferred supplier for delivery of about 1.2 million pounds U_3O_8 equivalent as UF_6 for delivery over a six-year period.

New demand in the term market emerged with a US utility seeking delivery of material in 2016 and 2017. At month end, one non-US utility continued to evaluate offers for about 1 million pounds U_3O_8 equivalent contained in UF_6 for delivery over a five-year period beginning in 2015. One non-US utility was reviewing offers for

U3O8 Prices
Nov 2012 - Nov 2013



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approximately 2 million pounds U₃O₈ contained in UF₆ or enriched uranium product (EUP) to be delivered over the 2015-2020 period. Another non-US utility was evaluating term offers for EUP with initial delivery beginning in 2015. A US utility was reviewing offers for nearly 1 million pound U₃O₈ for delivery in 2017-2019.

TradeTech's **Mid-Term U₃O₈ Price** was **\$39.00** per pound U₃O₈, up \$1.75 from the October 31 Value of \$37.25 per pound U₃O₈. The **Long-Term U₃O₈ Price** remained at **\$50.00** per pound U₃O₈, unchanged from last month's value.

The term uranium market reflects a range of prices depending upon delivery location and timing, material form, payment terms, and other conditions. The most important factor influencing term prices is delivery schedule.

Utility requirements are largely covered in the near term with the majority of utility buyers looking to capitalize on low interest rates and the willingness of some sellers to offer lower prices in the mid-term delivery period. Sellers, however, remain reluctant to commit large volumes for an extended time period at current prices. As a result, buyers looking to lock in deliveries in the very long term face higher prices than buyers seeking earlier delivery.

Buyers are increasingly contracting for shorter time periods and earlier

delivery in order to take advantage of the price disparity.

This demand drift from the long-term market to the mid-term market serves to offset the limited competition in the long-term supply arena and reduce upward pressure on the long-term uranium price.

Three transactions were reported in the UF₆ market in November.

TradeTech's **UF₆ Value** was **\$102.50** per kgU as UF₆, an increase of \$4.00 from the October 31 Value. The increase was due to the higher price for the uranium component as the UF₆ Value continues to track the movement in its uranium and conversion component prices.

The **Transaction Value** rose to **\$35.30** per pound U₃O₈, based on 63 transactions over 3 months, involving 8.2 million pounds U₃O₈ equivalent.

Active uranium supply rose to **6.0** million pounds U₃O₈ equivalent. **Active uranium demand** increased to **5.9** million pounds U₃O₈ equivalent. The corresponding **supply/demand ratio** was **1.0**.

Near-Term Uranium Sales Summary

Nov 30, 2013

	# of Sales	Million lbs U ₃ O ₈ Eq.
U ₃ O ₈	25	3.5
Natural UF ₆	2	0.8
EUP	0	0.0
Total	27	4.3 ³

Year-to-Date 2013

	# of Sales	Million lbs U ₃ O ₈ Eq.
U ₃ O ₈	238	32.9
Natural UF ₆	20	3.6
EUP	5	1.6
Total	263	38.2 ³

³ Due to independent rounding, total may not equal the sum of individual components.

The uranium loan market was quiet in November with no new activity reported.

TradeTech's November 30 **Loan Rate** remained at **1.00** percent per annum, unchanged from last month's rate.

Conversion

Four transactions were reported this month in the conversion market. A US utility purchased approximately 50 tU of conversion services and a non-US utility selected a supplier for approximately 500 tU of conversion contained in UF₆ to be delivered over the 2015-2020 time frame. Two other utilities selected suppliers for small quantities of conversion contained in UF₆.

At month end, one US utility was evaluating offers for 800 tU of conversion for delivery in 2014-2020, with optional deliveries of up to 200 tU for delivery in 2017-2020.

One non-US utility was evaluating offers for about 400 tU of conversion contained in UF₆ for delivery between 2015 and 2019. A non-US utility requested offers for delivery of conversion over a 10-year period.

Active Spot Supply & Demand⁴

Nov 30, 2013

	Available for Sale	Inquiries to Purchase	Units
U ₃ O ₈	6.0	5.9	Million lbs U ₃ O ₈ Eq.
Conversion	1.7	0.7	Thousand tU as UF ₆
SWU	2.4	0.1	Million SWU

⁴ For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

NUEXCO SWU Value

US\$ per SWU

	Nov 30, 2013	May 31, 2013	Nov 30, 2012
SWU Value	\$100	\$110	\$120

Calculated Worth of Enriched UF₆US\$ per kgU as enriched UF₆

Product Assay	This Month Nov 30, 2013	6 Months Ago May 31, 2013	12 Months Ago Nov 30, 2012
2.0 w/o ²³⁵ U	\$578	\$647	\$690
2.5 w/o ²³⁵ U	\$781	\$874	\$932
3.0 w/o ²³⁵ U	\$989	\$1,105	\$1,179
3.5 w/o ²³⁵ U	\$1,199	\$1,339	\$1,431
4.0 w/o ²³⁵ U	\$1,411	\$1,576	\$1,684
4.5 w/o ²³⁵ U	\$1,626	\$1,815	\$1,940
4.95 w/o ²³⁵ U	\$1,820	\$2,031	\$2,172

The **North American Conversion Value** was **\$8.50** per kgU as UF₆, down \$0.50 from last month's value. The **European Conversion Value** was **\$9.00** per kgU as UF₆, also down \$0.50 from the October 31 Value.

The **November 30 Long-Term Conversion Price Indicator for North American delivery** was unchanged at **\$16.00** per kgU as UF₆. The **Long-Term Conversion Price Indicator for European delivery** was **\$17.00** per kgU as UF₆, also unchanged from last month's value.

Enrichment

A number of utilities were in negotiations with potential enrichment suppliers.

At month end, a non-US utility continued to evaluate offers for nearly 1 million SWU or SWU contained in EUP to be delivered over the 2013-2032 time period. Another non-US utility was evaluating offers for 2 million SWU for delivery beginning in 2016. A US utility was evaluating offers for nearly 2 million

SWU. One other buyer continued to review offers for nearly 1 million SWU. Several other utilities were evaluating offers for SWU or SWU contained in EUP.

While enrichment demand has been steady, near-term supplies remain more than sufficient to meet requirements. Spot enrichment suppliers, in particular, are competing aggressively for each new sales opportunity.

TradeTech's **SWU Value** for November 30 was **\$100.00** per SWU, unchanged from the October 31 Value. The **Long-Term SWU Value** for November 30 remained at **\$114.00** per SWU, also unchanged from last month.



Uranium Supply

Available for Sale

Project Number	Quantity (thousand pounds equivalent U ₃ O ₈)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1000U*	200	700	2014-2015	U ₃ O ₈ /UF ₆
1001U*	—	1,000	2014-2015	U ₃ O ₈ /UF ₆
1002*	300	500	2014-2016	U ₃ O ₈
1003U*	—	1,200	2014-2015	U ₃ O ₈ /UF ₆
1004U*	300	750	2014-2016	U ₃ O ₈ /UF ₆
1005*	—	800	2014-2015	U ₃ O ₈
1006U*	400	800	2014-2016	U ₃ O ₈ /UF ₆
1007U*	—	800	2014-2016	U ₃ O ₈ /UF ₆
1008U*	—	800	2014-2016	U ₃ O ₈ /UF ₆
1009*	—	800	2014-2015	U ₃ O ₈
1010*	—	1,500	2014-2016	U ₃ O ₈
1011*	—	800	2014-2016	U ₃ O ₈
1012*	500	600	2014	U ₃ O ₈
1013U*	500	1,000	2014-2017	U ₃ O ₈ /UF ₆
1014*	200	—	2014	U ₃ O ₈
1015*	200	—	2014	U ₃ O ₈
1016*	900	400	2014-2015	U ₃ O ₈
1017*	500	300	2014-2015	U ₃ O ₈
1019*	200	500	2014-2015	U ₃ O ₈
1021*	200	—	2014	U ₃ O ₈
1107*	300	—	2014	U ₃ O ₈
1125*	300	—	2014	U ₃ O ₈
1126*	200	—	2014	U ₃ O ₈
1127*	400	—	2014	U ₃ O ₈
1128*	100	—	2014	U ₃ O ₈
1129*	300	—	2014	U ₃ O ₈
Total	6,000			

* New or revised since last month.

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5 For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

6 For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*

Active projects removed since last month: *none reported*

Uranium Supply

Available for Loan

Project Number	Quantity (thousand pounds equivalent U ₃ O ₈)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1024*	—	500	2014-2015	U ₃ O ₈
1025*	200	500	2014-2015	UF ₆
1026*	400	—	2014	U ₃ O ₈
1027*	500	—	2014	U ₃ O ₈
1028*	500	500	2014-2016	U ₃ O ₈
1029*	1,000	—	2014-2015	U ₃ O ₈
Total	2,600			

* New or revised since last month.

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6 For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*
Active projects removed since last month: *none reported*

Uranium Demand

Inquiries to Purchase

Project Number	Quantity (thousand pounds equivalent U ₃ O ₈)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1030*	100	—	2014	U ₃ O ₈
1033*	200	—	2014	U ₃ O ₈
1035*	800	—	2014-2016	U ₃ O ₈
1036*	200	—	2014-2015	U ₃ O ₈
1038U*	313	—	2014	U ₃ O ₈ /UF ₆
1042*	300	—	2014-2015	U ₃ O ₈
1043*	500	—	2014	U ₃ O ₈
1108*	500	—	2014	U ₃ O ₈
1109*	300	—	2014	U ₃ O ₈
1110*	300	—	2014	U ₃ O ₈
1111*	100	—	2014	U ₃ O ₈
1113*	200	—	2014	U ₃ O ₈
1139U*	195	—	2014	U ₃ O ₈ /UF ₆
1140U*	209	—	2014	U ₃ O ₈ /UF ₆
1141*	500	—	2014	U ₃ O ₈
1142*	260	—	2014	U ₃ O ₈
1143*	300	—	2015	U ₃ O ₈
1151*	650	—	2014	U ₃ O ₈
1047	—	1,000	2013-BEYOND	U ₃ O ₈
1048	—	1,700	2013-2020	U ₃ O ₈
1049	—	2,500	2014-2018	U ₃ O ₈
1050	—	1,000	2015-2019	U ₃ O ₈
1052	—	2,200	2013-2019	U ₃ O ₈
1053	—	3,000	2013-2016	U ₃ O ₈
1054U	—	2,912	2013-2032	U ₃ O ₈ /UF ₆ /EUP
1056	—	4,400	2018-2023	U ₃ O ₈
1057	—	1,200	2013-2016	U ₃ O ₈
1058	—	2,000	2013-2017	U ₃ O ₈
1059	—	750	2014-2018	U ₃ O ₈
1061	—	8,000	2014-2023	U ₃ O ₈
1064U	—	261	2014-2015	U ₃ O ₈ /UF ₆
1065	—	800	2017-2019	U ₃ O ₈
1066	—	8,000	2017-2025	U ₃ O ₈
1068U	—	261	2014-2020	U ₃ O ₈ /UF ₆ /EUP

* New or revised since last month.

R TradeTech either does not know, or that TradeTech has restricted that information to protect client or source confidentiality. TradeTech may delay reporting some projects in order to protect proprietary information.

⁵ For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

⁶ For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*
Active projects removed since last month: *1130U, 1150*

Uranium Demand

Inquiries to Purchase (cont.)

Project Number	Quantity (thousand pounds equivalent U ₃ O ₈)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1115	—	2,000	2013-2014	U ₃ O ₈
1116	—	400	2013-2014	U ₃ O ₈
1117	—	300	2013-2014	U ₃ O ₈
1118U	—	3,000	2017-2020	U ₃ O ₈ /UF ₆ /EUP
1119U	—	2,100	2015-2020	U ₃ O ₈ /UF ₆ /EUP
1121	—	300	2013-2016	U ₃ O ₈
1131U	—	2,000	2015-2020	U ₃ O ₈ /UF ₆ /EUP
1144	—	1,300	2016	U ₃ O ₈
1145U	—	1,000	2015-2019	U ₃ O ₈ /UF ₆
1152	—	1,200	R	U ₃ O ₈
1155*	—	100	2016	U ₃ O ₈
1156*	—	100	2017	U ₃ O ₈
Total	5,927			

Inquiries to Borrow

Project Number	Quantity (thousand pounds equivalent U ₃ O ₈)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1069	1,000	—	2013	UF ₆
Total	1,000			

* New or revised since last month.

R TradeTech either does not know, or that TradeTech has restricted that information to protect client or source confidentiality. TradeTech may delay reporting some projects in order to protect proprietary information.

⁵ For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

⁶ For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*
Active projects removed since last month: *1136U*

Conversion Supply and Demand

Available for Sale

Project Number	Quantity (thousand kgU as UF ₆)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1000C*	—	383	2014-2015	U ₃ O ₈ /UF ₆
1001C*	100	383	2014-2015	U ₃ O ₈ /UF ₆
1003C*	—	574	2014-2015	U ₃ O ₈ /UF ₆
1004C*	115	287	2014-2016	U ₃ O ₈ /UF ₆
1006C*	260	383	2014-2016	U ₃ O ₈ /UF ₆
1007C*	—	383	2014-2016	U ₃ O ₈ /UF ₆
1008C*	—	306	2014-2016	U ₃ O ₈ /UF ₆
1013C*	191	800	2014-2016	U ₃ O ₈ /UF ₆
1018C*	115	306	2014-2016	U ₃ O ₈ /UF ₆
1070*	—	500	2014-2015	
1071*	300	500	2014-2015	
1072*	100	500	2014-2015	
1073*	—	500	2014-2015	UF ₆
1074*	200	780	2014-2014	UF ₆
1075*	—	1,000	2014-2015	
1076C*	—	950	2014-2014	UF ₆ /EUP
1077*	250	—	2014-2014	
1078*	100	—	2014-2015	UF ₆
Total	1,731			

* New or revised since last month.

R TradeTech either does not know, or that TradeTech has restricted that information to protect client or source confidentiality. TradeTech may delay reporting some projects in order to protect proprietary information.

5 For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

6 For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*
Active projects removed since last month: *none reported*

Conversion Supply and Demand

Inquiries to Purchase

Project Number	Quantity (thousand kgU as UF ₆)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1038C	120	—	2013	U ₃ O ₈ /UF ₆
1079	500	—	2013-2014	Conversion
1080	50	—	2013-2014	Conversion
1139C	75	—	2014	U ₃ O ₈ /UF ₆
1054C	—	1,114	2013-2032	U ₃ O ₈ /UF ₆ /EUP
1064C	—	100	2014-2015	U ₃ O ₈ /UF ₆
1068C	—	1,000	2014-2020	U ₃ O ₈ /UF ₆ /EUP
1083	—	2,000	2019-2023	Conversion
1084	—	1,700	2013-2015	Conversion
1085	—	500	2015-2019	Conversion
1086	—	5,600	2013-2018	Conversion
1087	—	900	2013-2019	Conversion
1088	—	2,000	2016-2020	Conversion
1118C	—	1,150	2017-2020	U ₃ O ₈ /UF ₆ /EUP
1119C	—	803	2015-2020	U ₃ O ₈ /UF ₆ /EUP
1131C	—	765	2015-2020	U ₃ O ₈ /UF ₆ /EUP
1136C	—	76	2013	U ₃ O ₈ /UF ₆
1137	—	750	2016-2025	Conversion
1145C	—	375	2015-2019	U ₃ O ₈ /UF ₆
1153	—	800	2014-2020	Conversion
Total	745			

* New or revised since last month.

R TradeTech either does not know, or that TradeTech has restricted that information to protect client or source confidentiality. TradeTech may delay reporting some projects in order to protect proprietary information.

5 For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

6 For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*
Active projects removed since last month: *1037C, 1130C, 1140C*

SWU Supply and Demand

Available for Sale

Project Number	Quantity (thousand SWU)		Delivery Period	
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1076S	—	5,934	2014-2015	UF ₆ /EUP
1090	—	2,000	2014-2020	SWU
1091	400	2,000	2014-2016	SWU
1092	—	200	2014	SWU/EUP
1093	—	300	2014	SWU
1094	800	2,000	2014-2016	SWU/EUP
1095	500	—	2014-2015	SWU/EUP
1096	100	—	2014-2015	SWU/EUP
1097	100	200	2014-2015	SWU/EUP
1123	500	1,000	2014-2018	SWU
Total	2,400			

Inquiries to Purchase

Project Number	Quantity (thousand SWU)		Delivery Period	Remarks
	Spot or Near-Term ⁴	Intermediate or Long-Term ⁵		
1154	30	—	2014	SWU
1054S	—	812	2013-2032	U ₃ O ₈ /UF ₆ /EUP
1068S	—	12	2014-2020	U ₃ O ₈ /UF ₆ /EUP
1099*	—	1,000	2014-2017	SWU
1101	—	1,900	2013-2017	SWU
1103	—	900	R	SWU
1105	—	2,000	2016-2025	SWU
1118S	—	134	2017-2020	U ₃ O ₈ /UF ₆ /EUP
1119S	—	94	2015-2020	U ₃ O ₈ /UF ₆ /EUP
1131S	—	89	2015-2020	U ₃ O ₈ /UF ₆ /EUP
1138	—	1,500	2015-2017	SWU
1147	—	500	2018-2022	SWU
1148	—	300	R	SWU
1149	—	R	R	SWU
Total	189			

* New or revised since last month.

R TradeTech either does not know, or that TradeTech has restricted that information to protect client or source confidentiality. TradeTech may delay reporting some projects in order to protect proprietary information.

5 For delivery within one year, measured from the date of this Review. This category excludes material deliverable within one year under other than spot or near-term contracts.

6 For delivery beyond one year, measured from the date of this Review.

Active projects reclassified as Inactive since last month: *none reported*
Active projects removed since last month: *1098, 1100, 1102, 1104*

Market Values Expressed in Selected Currencies⁷

Argentina to Kazakhstan

	Argentina (peso)	Australia (dollar)	Brazil (real)	Canada (dollar)	China (yuan)	Czech Rep. (koruna)	Euro. Union ⁸ (euro)	Hungary (forints)	India (rupee)	Japan (yen)	Kazakhstan (tenge)
Exchange Value											
<i>per pound equivalent U₃O₈ as concentrates</i>											
Nov 30, 2013	220.43	39.41	83.86	38.10	218.68	722.99	26.41	7,961.58	2,242.78	3,677.34	5,538.29
Nov 30, 2012	205.23	40.73	89.14	42.26	264.82	824.97	32.73	9,165.30	2,325.60	3,505.36	6,392.85
<i>per kgU as concentrates</i>											
Nov 30, 2013	573.06	102.45	218.01	99.06	568.52	1,879.62	68.66	20,698.40	5,830.75	9,560.31	14,398.38
Nov 30, 2012	533.56	105.89	231.73	109.86	688.47	2,144.74	85.08	23,827.81	6,046.06	9,113.18	16,620.04
UF₆ Value											
<i>per kgU as UF₆</i>											
Nov 30, 2013	629.35	112.51	239.43	108.79	624.37	2,064.25	75.41	22,731.53	6,403.48	10,499.38	15,812.68
Nov 30, 2012	581.89	115.49	252.72	119.81	750.84	2,339.03	92.79	25,986.31	6,593.76	9,938.72	18,125.61
Transaction Value											
<i>per pound equivalent U₃O₈ as concentrates</i>											
Nov 30, 2013	216.74	38.75	82.46	37.47	215.03	710.91	25.97	7,828.52	2,205.30	3,615.88	5,445.73
Nov 30, 2012	214.89	42.65	93.33	44.25	277.28	863.79	34.27	9,596.60	2,435.04	3,670.32	6,693.69
<i>per kgU as concentrates</i>											
Nov 30, 2013	563.48	100.74	214.37	97.41	559.02	1,848.21	67.52	20,352.47	5,733.30	9,400.53	14,157.74
Nov 30, 2012	558.67	110.88	242.64	115.03	720.87	2,245.67	89.08	24,949.11	6,330.58	9,542.03	17,402.16
Conversion Value^{9,10}											
<i>per kgU as UF₆</i>											
Nov 30, 2013 (NA)	52.19	9.33	19.86	9.02	51.78	171.18	6.25	1,885.05	531.02	870.68	1,311.30
Nov 30, 2013 (E)	55.26	9.88	21.02	9.55	54.82	181.25	6.62	1,995.94	562.26	921.90	1,388.43
Nov 30, 2012 (NA)	50.70	10.06	22.02	10.44	65.43	203.82	8.09	2,264.37	574.56	866.03	1,579.41
Nov 30, 2012 (E)	53.12	10.54	23.07	10.94	68.54	213.52	8.47	2,372.19	601.92	907.27	1,654.62
<i>per pound U as UF₆</i>											
Nov 30, 2013 (NA)	23.67	4.23	9.01	4.09	23.49	77.65	2.84	855.05	240.87	394.93	594.79
Nov 30, 2013 (E)	25.07	4.48	9.54	4.33	24.87	82.21	3.00	905.34	255.04	418.17	629.78
Nov 30, 2012 (NA)	23.00	4.56	9.99	4.74	29.68	92.45	3.67	1,027.10	260.62	392.82	716.41
Nov 30, 2012 (E)	24.09	4.78	10.46	4.96	31.09	96.85	3.84	1,076.01	273.03	411.53	750.52
SWU Value											
<i>per SWU</i>											
Nov 30, 2013	614	110	234	106	609	2,014	74	22,177	6,247	10,243	15,427
Nov 30, 2012	579	115	252	119	748	2,329	92	25,878	6,566	9,897	18,050

⁷ Calculated using currency exchange rates for the last business day of the month, as published in *The Wall Street Journal*.

⁸ The following European Union nations are using the Euro as their official currency: Belgium, Finland, France, Germany, Italy, The Netherlands, Slovak Republic, and Spain.

⁹ North American delivery

¹⁰ European delivery

¹¹ Although Namibia has its own national currency, the South African Rand remains a legal tender in Namibia, as the Namibia Dollar is linked to the South African Rand on a 1:1 basis.

¹² The following West African nations are using the CFA franc as their official currency: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Sénégal, and Togo.

Market Values Expressed in Selected Currencies⁷

Mexico to W. Africa

	Mexico (peso)	Pakistan (rupee)	Russia (ruble)	S. Africa ¹¹ (rand)	S. Korea (won)	Sweden (krona)	Switzerland (francs)	Taiwan (dollar)	UK (pound)	USA (dollar)	W. Africa ¹² (CFA franc)
Exchange Value											
<i>per pound equivalent U₃O₈ as concentrates</i>											
Nov 30, 2013	470.60	3,892.64	1,183.91	365.48	37,982	235.18	32.53	1,064.97	21.93	35.90	17,302.72
Nov 30, 2012	550.15	4,107.41	1,312.53	373.44	46,028	283.29	39.44	1,235.45	26.55	42.50	21,466.75
<i>per kgU as concentrates</i>											
Nov 30, 2013	1,223.47	10,120.02	3,077.91	950.17	98,746	611.42	84.58	2,768.70	57.02	93.33	44,983.38
Nov 30, 2012	1,430.28	10,678.39	3,412.29	970.86	119,662	736.50	102.54	3,211.92	69.01	110.49	55,808.96
UF₆ Value											
<i>per kgU as UF₆</i>											
Nov 30, 2013	1,343.64	11,114.08	3,380.25	1,043.50	108,445	671.48	92.89	3,040.66	62.62	102.50	49,401.93
Nov 30, 2012	1,559.85	11,645.72	3,721.40	1,058.81	130,502	803.22	111.82	3,502.87	75.26	120.50	60,864.55
Transaction Value											
<i>per pound equivalent U₃O₈ as concentrates</i>											
Nov 30, 2013	462.74	3,827.58	1,164.12	359.37	37,347	231.25	31.99	1,047.17	21.56	35.30	17,013.54
Nov 30, 2012	576.04	4,300.70	1,374.29	391.01	48,194	296.62	41.30	1,293.59	27.79	44.50	22,476.95
<i>per kgU as concentrates</i>											
Nov 30, 2013	1,203.02	9,950.89	3,026.47	934.29	97,095	601.20	83.16	2,722.43	56.06	91.77	44,231.57
Nov 30, 2012	1,497.59	11,180.91	3,572.87	1,016.55	125,293	771.16	107.36	3,363.06	72.26	115.69	58,435.26
Conversion Value											
<i>per kgU as UF₆</i>											
Nov 30, 2013 (NA)	111.42	921.66	280.31	86.53	8,993	55.68	7.70	252.15	5.19	8.50	4,096.75
Nov 30, 2013 (E)	117.98	975.87	296.80	91.62	9,522	58.96	8.16	266.99	5.50	9.00	4,337.73
Nov 30, 2012 (NA)	135.92	1,014.77	324.27	92.26	11,372	69.99	9.74	305.23	6.56	10.50	5,303.55
Nov 30, 2012 (E)	142.39	1,063.10	339.71	96.65	11,913	73.32	10.21	319.76	6.87	11.00	5,556.10
<i>per pound U as UF₆</i>											
Nov 30, 2013 (NA)	50.54	418.06	127.15	39.25	4,079	25.26	3.49	114.37	2.36	3.86	1,858.25
Nov 30, 2013 (E)	53.51	442.65	134.63	41.56	4,319	26.74	3.70	121.10	2.49	4.08	1,967.56
Nov 30, 2012 (NA)	61.65	460.29	147.09	41.85	5,158	31.75	4.42	138.45	2.97	4.76	2,405.65
Nov 30, 2012 (E)	64.59	482.21	154.09	43.84	5,404	33.26	4.63	145.04	3.12	4.99	2,520.20
SWU Value											
<i>per SWU</i>											
Nov 30, 2013	1,311	10,843	3,298	1,018	105,800	655	91	2,967	61	100	48,197
Nov 30, 2012	1,553	11,597	3,706	1,054	129,960	800	111	3,488	75	120	60,612

⁷ Calculated using currency exchange rates for the last business day of the month, as published in *The Wall Street Journal*.

⁸ The following European Union nations are using the Euro as their official currency: Belgium, Finland, France, Germany, Italy, The Netherlands, Slovak Republic, and Spain.

⁹ North American delivery

¹⁰ European delivery

¹¹ Although Namibia has its own national currency, the South African Rand remains a legal tender in Namibia, as the Namibia Dollar is linked to the South African Rand on a 1:1 basis.

¹² The following West African nations are using the CFA franc as their official currency: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Sénégal, and Togo.

Vietnam's Emerging Nuclear Program

Vietnam has a long and rich history dating back to the Paleolithic Age. As with any country in a geopolitical location, many generations of Vietnamese have experienced both economic and social hardships and opportunities. More recently, however, Vietnam has become one of the fastest-growing economies in the world and is eager to be a developed country by 2020.

*As it charts a path to economic improvement, the Southeast Asian nation's nuclear energy program has emerged as one of its most ambitious projects yet. For the past few years, Vietnam has been making plans to enter the commercial nuclear sector and has chosen seven prospective sites along its 2,200 mile (3,500 kilometer) coastline (**Figure 1**). Aspiring for 15-16 GWe of nuclear capacity by 2030, several countries have expressed interest in participating in Vietnam's nuclear program.*

Economic Reform— Vietnam's Doi Moi Policy

Vietnam initiated its Doi Moi (Renewal) Policy in 1986, in pursuit of a "socialist-oriented market economy" to revive its stagnant economy. One purpose of the reform was to create a multi-sector market economy regulated by the government. The economy began to grow and went from a centralized planned economy heavily dependent on imports to one that is market oriented.

The agricultural sector was improved, which drove growth in farm exports and reduced rural poverty. In addition, the economic reform attracted more foreign investment and homegrown entrepreneurs created a boom in local markets.

According to the government, the Doi Moi Policy helped to improve living standards, enhanced democracy,

consolidated national defense and internal security, and broadened international relations, which lifted embargos and reduced isolation. Every few years, Vietnam reconfirms its commitment to the Doi Moi Policy and extends the strategy.

Vietnam avoided an economic collapse in the early 1990s, due to its economic reform that slowed other transitional economies. Furthermore, during the East Asian financial crisis of the late 1990s, and the recent global financial crisis, it was able to maintain positive growth rates, though at a slower pace, according to the World Bank.

The World Bank ranks Vietnam as 57 out of 189 nations in terms of gross domestic product (GDP), just behind Kuwait. The General Statistics Office of Vietnam (GSO) recorded 2011 GDP as nearly VND2.8 quadrillion (US\$131 billion) and preliminary

2012 GDP as approximately VND3.2 quadrillion (US\$153 billion) — a 16 percent increase. As reported by the GSO, the inflation rate in Vietnam as of October 2013, is 5.92 percent, much lower than the 67.4 percent rate seen in 1990.

Rising Energy Needs

Vietnam is home to 90 million people, which ranks it among the top 20 nations in world population. Electricity Vietnam (EVN) produced 54.4 billion kWh of electricity in 2012, which was 3.6 billion kWh more than it originally planned. A forecast by the Ministry of Industry and Trade (MoIT) has nationwide electricity demand reaching 562 billion kWh by 2030, yet supply could only meet one-half of that requirement (**Figure 2**). Residents consume about one-third of the electricity generated while the industry sector uses more than one-half. Blackouts are becoming common. Moreover, the International Energy Agency (IEA) reports about 2 million Vietnamese residents do not have access to electricity.

With a growing economy, rising middle class, and large population, Vietnam is consuming more energy than it is producing and imports electricity from neighboring China to keep up with energy demand. Nearly one-half of Vietnam's current electricity supply comes from natural gas and the remainder from conventional resources (**Figure 3**). The country has a wealth of natural resources and is the second largest producer of coal in Southeast Asia

after Indonesia (**Figure 4**). Still, its domestic coal and hydropower production is tapering off and Vietnam could possibly be a net energy importer by 2015.

Aware of the frequent power outages and the need to fill future energy shortages, Vietnam has been actively pursuing nuclear energy since 2002, as a source of domestic electricity production. In 2009, the country's Parliament approved construction of the country's first nuclear power plants. It has taken steps in development of a legal framework, site preparation, and workforce

training to operate and maintain the safety of the plants.

Current & Future Nuclear Projects

Vietnam has a large-scale plan to build seven, two-unit nuclear stations by 2030, at an estimated cost of US\$50 billion. If the country could achieve this goal, then it would bring the total generation capacity to approximately 15,000-16,000 MWe. Based on this plan, TradeTech estimates the uranium requirement for Vietnam's nuclear program would be 6.8 million pounds U₃O₈ per annum. In addition, nuclear power is expected to provide 10 percent of

the country's domestic electricity generation capacity.

However, the International Atomic Energy Agency (IAEA) is estimating Vietnam will have 2,000 MWe of installed nuclear generating capacity by 2030, in a low case scenario and 4,000 MWe in a high case scenario.

Ninh Thuan 1

The first nuclear project in Vietnam is located at Phuoc Dinh in the province of Ninh Thuan.

In October 2010, Vietnam's MoIT and Russia's state nuclear power entity Rosatom signed an agreement for construction of two reactors at Ninh Thuan 1. The turnkey construction project will have two Generation III+ 1,200 MWe VVERs with commercial operation scheduled for the 2020-2021 time frame. Rosatom affiliate JSC Atomstroyexport will build the plants for EVN. Russia will reportedly supply long-term nuclear fuel for the plants and manage spent fuel treatment.

Furthermore, Russia will provide a \$8 billion loan to Vietnam for the construction of Ninh Thuan 1, which is expected to cost about \$10.5 billion. "We are very thankful to the Russian side for the credit and aid provided in order to fulfill the project," Vietnamese Prime Minister Nguyen Tan Dung said during his visit to Moscow in May 2013.

Ninh Thuan 2

The site for a second nuclear station, also in the province of Ninh Thuan, has been selected at Vinh Hai.

In January 2011, Vietnam and Japan signed an intergovernmental agreement for the construction of the estimated \$13 billion project,

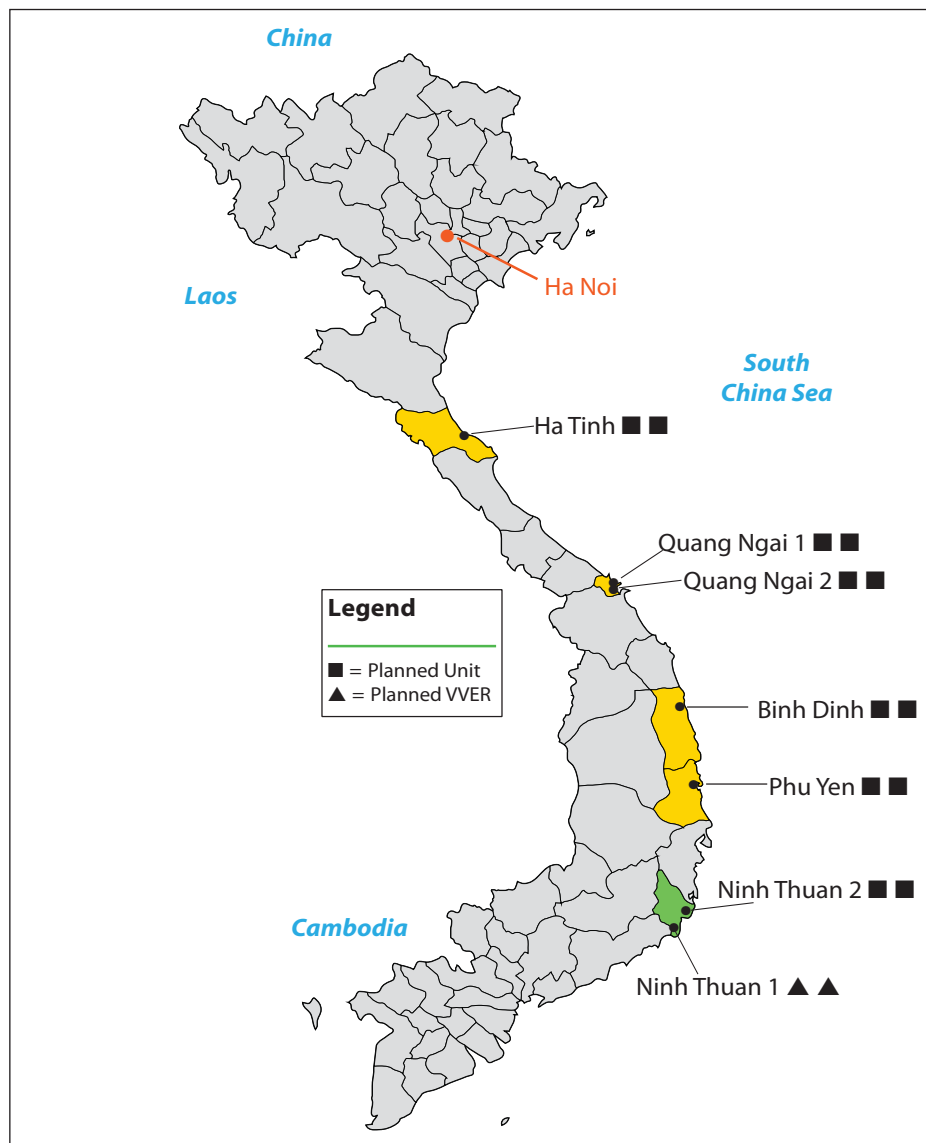


Figure 1 Vietnam's Proposed Nuclear Power Plant Sites

which would be Japan’s first overseas nuclear power station construction project. Japan Atomic Power Co. has a contract to conduct the feasibility study for EVN, which is expected to be completed this month. EVN signed a Memorandum of Understanding (MoU) with International Nuclear Energy Development of Japan Co., Ltd. (JINED), which calls for JINED to carry out certain tasks to ensure design, construction, and operation can be implemented efficiently, including human resource development, financial support,

reliable fuel supply, and radioactive waste disposal. With total costs of approximately \$13 billion, Japan will help finance the project with loans from the Japan Bank for International Cooperation (JBIC).

JINED was formed in 2010, with the intent to create proposals and conduct research activities for nuclear power plants project orders in emerging countries. JINED—a consortium of 13 Japanese utilities and companies —along with Japan’s Ministry of

Ninh Thuan 2 will house two 1,000 MWe reactors, which are scheduled for commercial operation in the 2021-2022 period.

Future Projects & Nuclear Agencies

Vietnam has identified five additional sites for future nuclear power projects; however, financing and feasibility are yet to be determined. Vietnam is currently in Phase 2 of its four-part nuclear power infrastructure development.

Phase 2 defines preparatory work for the construction of a nuclear power plant after a policy decision has been taken; Phase 3 is to implement the first nuclear power plant; and Phase 4 is to maintain and continually improve the infrastructure.

To prepare itself for the projects, Vietnam has set up agencies necessary to oversee the impending nuclear program. It should also be noted that the country is seeking guidance from the IAEA in establishing its nuclear program.

The National Nuclear Safety Council was created in 2010, to consult the Prime Minister on nuclear safety matters. The Safety Council, led by the Chair of the Ministry of Science and Technology (MoST), is working with the Agency for Radiation and Nuclear Safety (ARNS). It suggests policies to the Prime Minister regarding nuclear safety and produces guidelines for working with atomic energy and nuclear power. The Safety Council will also review ARNS nuclear power plant safety analysis reports and safety inspection results. Before any licenses are granted and tests begin, the National Nuclear Safety Council plans to consult domestic and foreign nuclear safety experts.



Economy, Trade, and Industry (METI) and other entities are collaborating on Ninh Thuan 2.

Although a plant technology has not been officially announced for Ninh Thuan 2, the ATMEA 1 reactor is a possible choice, which is a Generation III+ PWR developed jointly by Japan’s Mitsubishi Heavy Industries Ltd. and AREVA of France. Japan and France will partner in evaluating and deciding on which type of reactor is most suitable for the location, said Bernard Bigot, General Manager of France’s Atomic Energy and Alternative Energies Commission, at a press conference held in Vietnam last year.

Figure 2 Electricity Transmission Lines in Vietnam

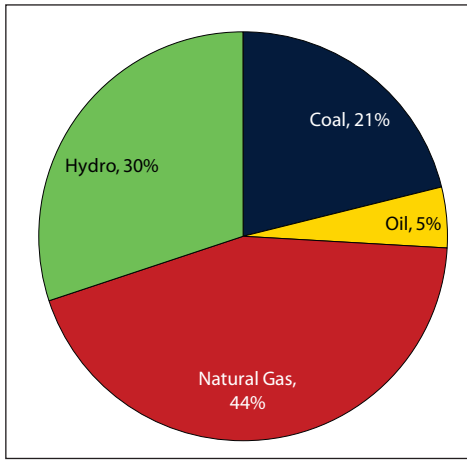


Figure 3 Vietnam's Electricity Supply Mix – 2011

This year, the National Council for Atomic Energy Development and Application was established and will work under the Chair of MoST. The Atomic Energy Council will advise the Prime Minister on the strategies and directions for nuclear energy development and application. In addition, it is to identify priority areas in science and technology for each phase of development and help draft policies. The agency will also collaborate with experienced international organizations and countries to conduct surveys, lead discussions, and collect feedback on matters pertaining to atomic energy development and application.

The technical subcommittees (of the State Steering Committee) on nuclear safety and security, including education, training, information and communication, were also established this year.

Nuclear Training

Since Vietnam does not have an existing commercial nuclear program, it lacks the skilled workforce to operate the power plants.

In 2010, the government approved a VND3 trillion (US\$143 million)

project for human resources development in the nuclear sector. Seven major educational institutions in Vietnam should have training programs by 2015, with enrollment of 250 students each. When the first nuclear power plant goes into operation, Vietnam aims to have 2,400 engineers and hundreds of graduates working at the plant and several hundred more promoting, applying, and ensuring nuclear safety.

In addition to training future nuclear workers at home, several hundred students will be sent overseas to study in countries with established nuclear expertise. Vietnam intends to send students to train in Russia and Japan. At least 100 students will be sent to National Research Nuclear University in Obninsk, Russia, to study nuclear power plant installations. Also, the MoST-Rosatom Practical Arrangement on specialist training has Vietnamese personnel studying nuclear technologies and safety at the Central Institute for Continuing Education and Training in Obninsk. Vietnamese students will also be sent to Japan for education and training at the Japan Nuclear Energy Safety Organization; the Ministry of Education, Culture, Sports, Science, and Technology; METI; Japan Atomic Energy Research Institute; and the Japan Atomic Energy Agency, among others.

In September this year, Hungary and Vietnam signed a bilateral agreement concerning nuclear training, research, administration, and technology. The joint nuclear training program known as HUNIVETT has enabled Vietnamese specialists to travel to Hungary for theory and practice training courses at Budapest University of Technology and the MVM Paks Nuclear Power Plant’s Maintenance Training Centre.

“Hungary’s greatest, most priceless and unique treasure is knowledge,” Hungarian Minister of State Pal Kovacs said, adding that, in the spirit of sustainable development, Hungary is ready to begin educational support with countries that are making responsible decisions allowing for long-term and secure supply for future generations.

Possible Cooperation

As Vietnam’s nuclear power program starts to take shape, other countries have shown interest in participating.

South Korea

Vietnamese President Truong Tan Sang and South Korean President Park Geun-hye met in September this year at a summit in Hanoi to discuss economic cooperation and development aid projects for the Southeast Asian nation. Vietnam pledged to collaborate with South Korea to pursue a bilateral free trade agreement, as well as pursue nuclear power development and help Korean companies participate in energy and infrastructure projects in Vietnam. South Korea is currently working on a free trade agreement (FTA) with Vietnam, which, if successful, could reach \$70 billion in bilateral trade by 2020. Both countries expect the FTA to be ratified by year-end 2014.

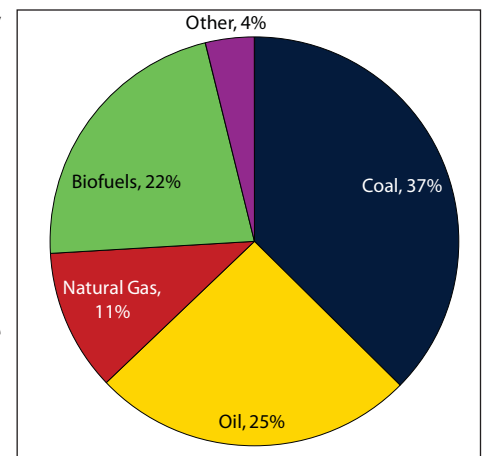


Figure 4 Vietnam's Energy Sector Production Mix – 2011

United Kingdom

MoST of Vietnam and the United Kingdom’s Foreign and Commonwealth Office signed a MoU last month to collaborate on the peaceful use of atomic energy. The countries will cooperate with each other in education and training, human resources development, research of civil nuclear power plants, and the application of radiation and radioactive isotopes. Furthermore, Vietnam and the UK will work together to strengthen the management of radioactive waste and used materials, along with infrastructure, financial consultation, information and communications, and emergency response.

USA

The USA reached an agreement with Vietnam to sell nuclear fuel and technology to the Asian nation in an effort to boost Vietnam’s planned civilian nuclear power program and curb the proliferation of nuclear weapons. The “123 agreement,” initialed by US Secretary of State John Kerry and Vietnam Foreign Minister Pham Binh Minh on the sidelines of an East Asia summit in Brunei in October, reportedly prohibits Vietnam from enriching or reprocessing plutonium or uranium while developing nuclear energy.

Under the new agreement, US companies will be allowed to export nuclear-related fuel, expertise, reactors, and equipment for Ninh Thuan 2 or any future power plants Vietnam may need. The agreement is subject to a 90-day congressional review once US President Barack Obama signs it—if Congress does nothing, the pact will go into effect.

Vietnam is party to most relevant nonproliferation treaties and agreements, including the Treaty on the Nonproliferation of Nuclear Weapons, the Comprehensive Nuclear Test Ban Treaty, the Chemical Weapons Convention, and the Biological and Toxin Weapons Convention. However, it is not a member of any of the main export control regimes—“national laws or international arrangements established to restrict the sale of certain goods to certain countries, or to ensure that safeguards or end-use guarantees are applied to the export and sale of sensitive and dual-use technologies and materials,” as noted by the Nuclear Threat Initiative.

With a growing economy, rising middle class, and large population, Vietnam is consuming more energy than it is producing and imports electricity from neighboring China to keep up with energy demand. Nearly one-half of Vietnam’s current energy supply is derived from natural gas.

Setbacks & Challenges

As Vietnam progresses with its nuclear power program, it has experienced some setbacks and faces significant challenges ahead.

The construction of Ninh Thuan 1 has been delayed from 2014 to 2017, according to Vietnam’s Radiation and Nuclear Safety Agency, which could mean the country will miss its goal of having the first nuclear power plant in commercial operation by 2020.

Ninh Thuan 2 may also be delayed due to the lack of qualified agencies providing regulatory oversight. Japan’s now defunct Nuclear and Industry Safety Agency was in charge of safety examination of parts and machinery for export and financing

nuclear technology; the new Nuclear Regulation Authority did not assume this commitment. Furthermore, by law, Japan must confirm that the importing country has established nuclear safety regulations and conforms to international standards before the JBIC can provide loans for export. Presently, a solution has not been presented.

Whether Vietnam can attain its nuclear capacity goal of 15-16 GWe has yet to be determined. If plans succeed for an operational power plant, then Vietnam will become the only Southeast Asian nation with a nuclear program. The country managed to revive a stagnant

economy 27 years ago by enacting its Doi Moi Policy. It would need to come up with another bold plan to keep the lights on across the country.



US-Russian HEU Agreement— 'Megatons to Megawatts' Ends

This month, the 'Megatons to Megawatts' program ended with the arrival of 160 tonnes of low-enriched uranium (LEU) aboard the M.V. Atlantic Navigator at the Port of Baltimore, Maryland. The ship originated in St. Petersburg, Russia, its 10 type 30B cylinders signed by yard workers as part of a ceremony held by Techsnabexport (TENEX) and attended by executives from US uranium enricher USEC, Inc. The event officially signaled the end of what is widely recognized as one of the most successful nonproliferation efforts to date.

Officially known as the Agreement between the Government of the United States of America and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons, the accord was approved in February 1993. The agreement provided a means to remove surplus military-grade, high-enriched uranium (HEU) from stockpiles created by disarmament agreements; to facilitate shipment and delivery of material, USEC and TENEX were appointed to implement the program on behalf of the US government and the Russian State Atomic Energy Corporation (ROSATOM), respectively. These agencies signed their first commercial contract on January 14, 1994, and shipments commenced the next year.

Under terms of the agreement, also known as 'Megatons to Megawatts' Agreement, Russia dismantled nuclear warheads deemed in excess of its strategic military inventory, reduced the component HEU metal to shavings,

oxidized, and then fluorinated the highly fissile material.

The resulting uranium hexafluoride (UF₆) gas was then blended with a slightly enriched (1.5%) UF₆ stream to form LEU in a concentration more suitable for commercial reactors. The LEU was then shipped to USEC in exchange for cash and equivalent volumes of natural uranium. By the end of the agreement, Russia had removed 500 tonnes of HEU from its stockpiles and supplied the USA with 15,259 tonnes of LEU (4.4% product assay) and 89 million SWU. In exchange, the USA returned to Russia more than 163,000 tonnes of natural uranium and US\$17 billion (the initial value of the agreement signed in 1994, was \$13 billion).

The natural uranium component of the

agreement functioned according to a price mechanism controlled by a market-related option price, which had been comfortably below prevailing market prices for the past few years. The agreement, signed by TENEX, Cameco, COGEMA (today AREVA), and NUKEM, prescribed a controlled dissemination of material, and was largely fed into long-term contracts.

To date, the Megatons to Megawatts program has repurposed enough fissile material to arm 20,000 warheads and has provided about one-third of the enrichment services needed by the US commercial reactor fleet (**Figure 1**).



Figure 1 'Megatons to Megawatts' Program Facts

Russian HEU material has provided about one-half of all US commercial reactor fuel during the course of the agreement; thus, with nuclear power generating about 19 percent of US electricity in the past decade, nearly 10 percent of US electricity has been derived from weaponized uranium formerly allocated for Russian military hardware. The agreement yielded the equivalent of 62.8 trillion cubic feet of natural gas or 2.9 billion tons of coal and supplied enough energy to satisfy two years of all US electricity demand.

While 'Megatons to Megawatts' was successful in displacing military-grade HEU, it also displaced natural uranium supply, and thus, had an adverse impact on exploration and mining activities. The agreement contributed to downward pressure on the uranium market price for a number of years, as the agreement constituted a major component of predictable secondary supply. In addition, the terms of the agreement and its many amendments often

placed USEC in the position of purchasing SWU from TENEX at prices above the marginal cost of production at its Gaseous Diffusion Plants in Kentucky and Ohio; this differential represented a politically motivated "peace premium" on the transactions and was periodically offset by US government subsidies.

Russia Passes on Extended Agreement

In recent years, efforts to extend the Megatons to Megawatts program were met with resistance from Russian authorities. While the program's primary intent was to reduce the number of nuclear weapons overall, it provided stability in an uncertain time to a fragmented Russian military complex and established a stream of revenue for a country recently emerging from financial crisis. Today, however, uranium prices are low and an economically functional Russia is actively engaged in emerging uranium markets on a commercial basis. With Rosatom creating a new subsidiary in Rusatom Overseas and

embracing a build-own-operate sales model, conserving enrichment capacity for its own needs appears reasonable.

As of 2011, Russia's total HEU inventory stood at around 750 tonnes, though significant uncertainties push the deviation to +/-120 tonnes. The US government itself has declared 370 tonnes of HEU to be surplus material and has allocated much of it to USEC as UF₆ for downblending and subsequent sale to utilities. As of 2011, the US HEU inventory totaled 610 tonnes and, so far, the country has downblended 160 tonnes with plans to increase that amount to 180 tonnes.

Transitional Supply Contract

Future transactions will be conducted according to the terms of a \$2.8 billion commercial arrangement signed in 2011, which allows TENEX to supply 21 million SWU to USEC over 10 years. The terms of the Transitional Supply Contract are largely similar to the Megatons to Megawatts program: TENEX will downblend HEU and deliver LEU to USEC, which will then compensate TENEX for the required SWU with cash and equivalent volumes of natural uranium used in downblending. Under this new agreement, however, HEU will be sourced from commercial Russian stockpiles, not military surplus material.

The delivery schedule calls for a gradual increase in the amount of delivered LEU until 2015, when annual supply reaches one-half the volume allowed under the Megatons to Megawatts program, and deliveries are expected to continue through 2022. The agreement provides an option to USEC to double



Figure 2 First Cylinder of Uranium Delivered to the USA under the US-Russian HEU Agreement
Source: US Energy Information Administration

the amount of material it wishes to purchase, up to the same levels as under the HEU Agreement.

Amended US-Russia Antidumping Suspension Agreement

US nuclear plant operators will also gain increased access to Russian material as the HEU Agreement reaches its end of life. Under a 2008 Amendment to the US-Russia Antidumping Suspension Agreement, which defines the parameters by which commercial Russian LEU may be imported into the USA, higher quantities of imported material will be allowed in the 2014-2020 period. Excepting uranium allocated for initial cores, LEU imports (4.4% product assay and 0.3% tails assay) are limited to 41,389 kilograms (kg) in 2013, but increase to 485,279 kg in 2014, and 514,754 kg in 2015, with all limits being lifted by 2021; these quantities

are intended to represent 20 percent of the US market. LEU purchased by USEC under the Transitional Supply Contract in excess of the limits imposed by the Russian Suspension Agreement must be sold to available international markets.

Figure 3 shows Russian import quotas as a percentage of US uranium requirements. (**Note:** Due to variation in US requirements since the amendment was drafted, Russian imports may appear to exceed 20 percent; whether the US Department of Commerce enforces the 20 percent limit as a hard cap or if excesses are remedied through tails and product assay adjustments remains to be seen.)

The Domenici Amendment

In 2008, the Domenici Amendment to the Russian Suspension Agreement, provisioned an

additional 5 percent above the established 20 percent US import quota if Russia would downblend an additional 300 tonnes of HEU between 2014 and 2025. The amendment also closed a legal loophole whereby SWU contracts were not subject to antidumping trade law (US Courts had previously ruled that SWU is a service and not a fungible good).

In Conclusion

Megatons to Megawatts has inspired other “swords to ploughshares” initiatives, such as the US National Nuclear Security Administration’s smaller downblending effort that has aimed to reduce Russian HEU stockpiles by 200 tonnes. While such programs represent a volume of secondary supply that can have an adverse influence on primary uranium production and spot price, many believe that the overall benefit of reducing the global nuclear weapons threat outweighs short-term market impacts. The program has also unequivocally demonstrated that commercial interests can serve larger public policy goals; the last shipment under the HEU agreement contained enough uranium to arm about 80 warheads, will remain in the US supply chain until 2017, and will fuel reactors until around 2020.

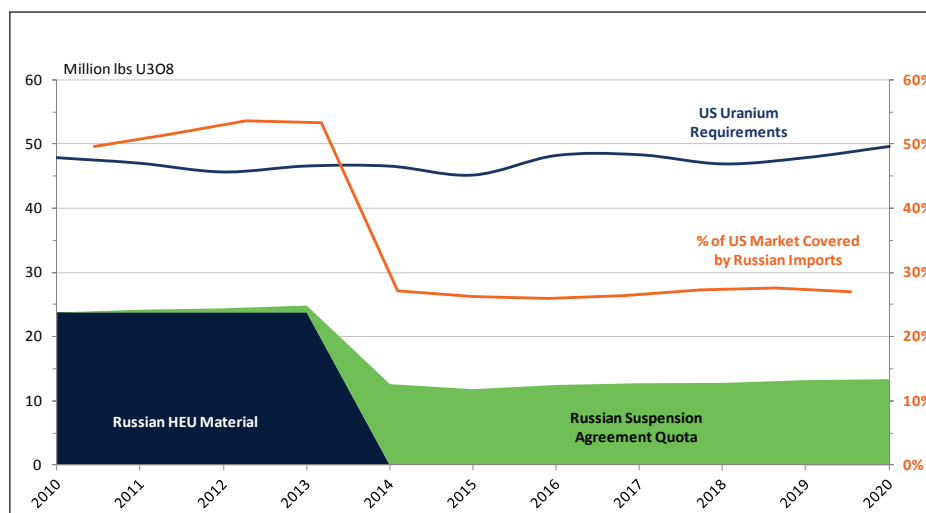


Figure 3 Russian Import Quotas vs. US Uranium Requirements



Calendar of Events

2014

Jan 20-22

5th Annual Nuclear Power Asia
Hanoi, Vietnam
Contact: Shantal Chapman
Clarion Events
Phone: +65-6590-3970
Email: info@clarionevents.asia
<http://www.nuclearpowerasia.com/>

Jan 22

Nuclear Fuel Supply Forum
The Mayflower Renaissance Hotel
Washington, DC, USA
Sponsor: Nuclear Energy Institute
Contact: Linda Wells
Phone: +1-202-739-8039
Fax: +1-202-785-4019
Email: ljw@nei.org
<http://www.nei.org>

Feb 3-6

20th Annual Investing in African Mining Indaba
Cape Town, South Africa
Contact: Mining Indaba LLC
Phone: 1-800-831-8333 or +1-859-746-5700
Fax: +86-86-21-5831-1668
Email: info@miningindaba.com
<http://www.miningindaba.com/>

Feb 5-6

Platt's 10th Annual Nuclear Energy Opportunities for Growth & Investment
Renaissance Hotel
Washington, DC, USA
Contact: Ron Berg
Platts
Phone: +1-781-430-2118
Email: ron.berg@platts.com
<http://www.platts.com/conferencedetail/2014/pc409/index>

Feb 25-26

Nuclear Industry Congress Africa 2013
Cape Town, South Africa
Contact: SZ&W Group
Phone: +86-21-5830-0710
Fax: +86-86-21-5831-1668
Email: info@szwgroup.com
<http://www.szwgroup.com/nuclear-industry-congress-africa-2014/>

Feb 25-26

Small Modular Reactor/Long-Term Operations/Subsequent License Renewal Workshops/R&D Summit
Ronald Reagan Building & International Trade Center
Washington, DC, USA
Sponsor: Nuclear Energy Institute
Contact: Linda Wells
Phone: +1-202-739-8039
Fax: +1-202-785-4019
Email: ljw@nei.org
<http://www.nei.org>

Feb 26-28

Canadian Nuclear Association Conference & Trade Show 2014 "Developing the Next Generation"
The Westin Ottawa Hotel
Ottawa, Ontario, Canada
Contact: Jessica Clifford
Phone: +1-613-237-4262 x105
Email: conference@cna.ca
<http://www.nwma.org>

Mar 2-6

WM2014 Conference
Phoenix Convention Center
Phoenix, Arizona, USA
Contact: Jaclyn Russell
WM Symposia
Phone: +1-480-557-0263
Email: onlinereg@wmarizona.org
<http://www.wmsym.org/>

Apr 8-10

World Nuclear Fuel Cycle Conference
Intercontinental Hotel
San Francisco, California, USA
Sponsor: World Nuclear Association & Nuclear Energy Institute
Email: wnfc_contact@world-nuclear.org
<http://www.wnfc.info/>

Apr 8-11

Spring 2014 Nuclear Non-operating Owners Group
Omni Charlottesville Hotel
Charlottesville, Virginia, USA
Contact: Allyson Pittman
Phone: +1-804-290-2183
Email: apittman@odec.com
-or-
Contact: Steve Ruppel
Phone: +1-407-355-7767
Email: steve.ruppel@fmpa.com
<http://www.nnog.com>

Jun 15-19

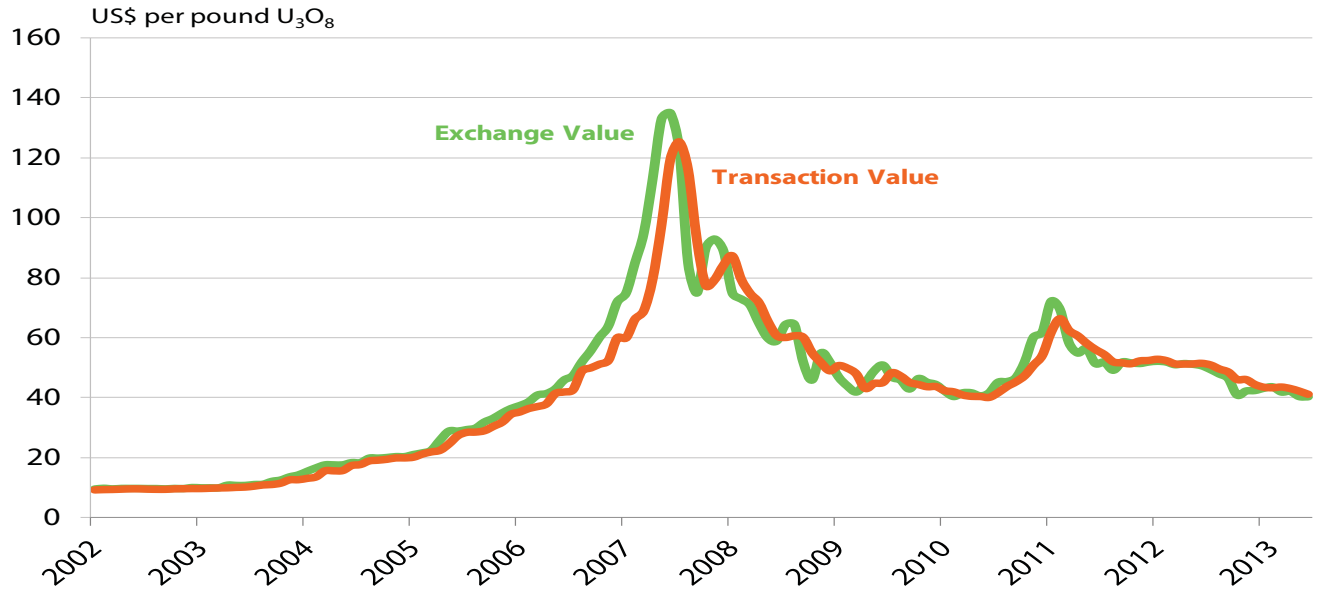
2014 ANS Annual Meeting
Grand Sierra Resort
Reno, Nevada, USA
Contact: Danielle L. Urbina
Director, ANS Meetings & Exhibits
Phone: +1-708-579-8214
http://www.ans.org/meetings/c_1

Jul 16-17

Australian Uranium Conference 2014
Hyatt Regency Perth
Perth, Western Australia
Contact: Vertical Events
Phone: +61-8-9388-2222
Email: info@verticalevents.com.au
http://www.ans.org/meetings/c_1

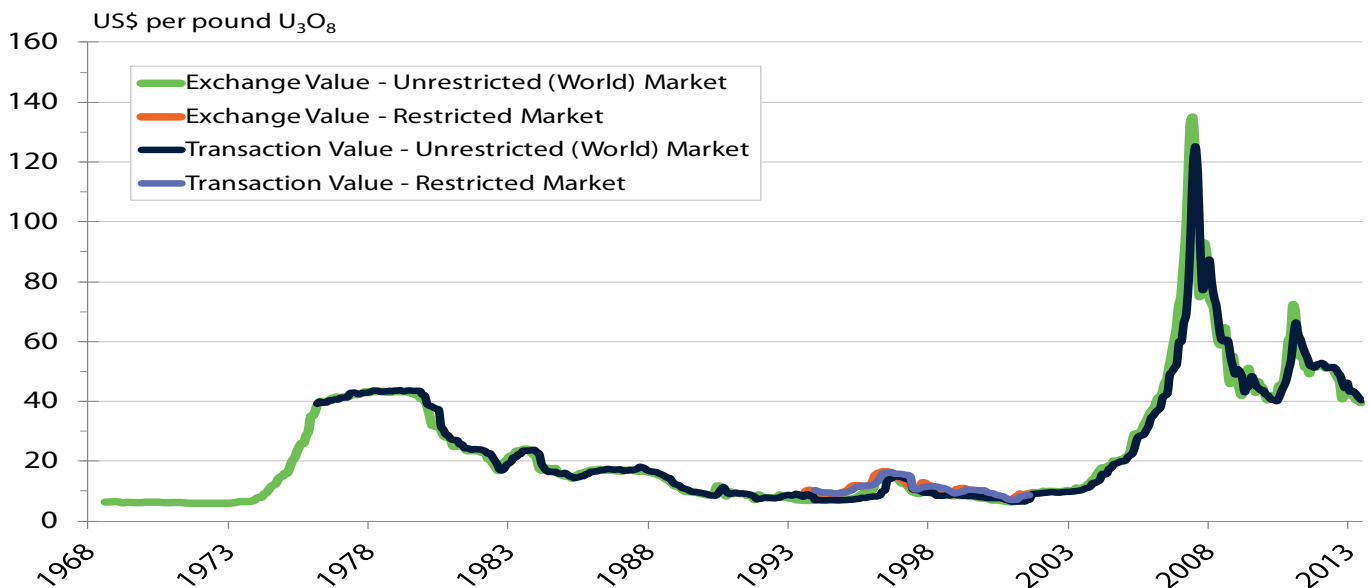
Historical Exchange & Transaction Values

Exchange Value & Transaction Value
2002-2013



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Exchange Value & Transaction Value
1968-2013



©2013 TradeTech

Historical Market Values & Indicators¹

Exchange Value²

Determined as of the last day of the month indicated (US\$ / lb U₃O₈)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003	10.10	10.10	10.10	11.00	10.90	10.90	11.20	11.30	12.25	12.70	13.75	14.40
2004	15.60	16.75	17.75	17.75	17.75	18.50	18.50	20.00	20.00	20.20	20.50	20.50
2005	21.20	21.75	22.60	26.00	29.00	29.00	29.50	30.00	32.00	33.25	35.00	36.50
2006	37.50	38.75	41.00	41.50	43.00	46.00	47.50	52.00	55.75	60.25	64.00	72.00

Prices from 1968-2002, and 2007-present are available to clients only.

Transaction Value³

Determined as of the last day of the month indicated (US\$ / lb U₃O₈)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003	9.85	9.95	10.05	10.10	10.25	10.35	10.65	11.05	11.20	11.65	12.75	12.80
2004	13.25	13.75	15.75	15.75	15.85	17.50	17.85	19.05	19.30	19.60	20.05	20.05
2005	20.30	21.35	22.05	22.60	24.75	27.45	28.55	28.65	29.10	30.55	31.95	34.55
2006	35.35	36.50	37.15	38.05	41.45	42.00	42.70	48.95	50.00	51.25	52.50	60.00

Prices from 1976-2002, and 2007-present are available to clients only.

¹ Complete definitions, including derivations and comments, can be found on page 4.

² The Exchange Value is TradeTech's judgement of the price at which spot and near-term transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

³ The Transaction Value is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

- a) transactions closed within the previous three-month period for which delivery is scheduled within one year of the transaction date;
- b) at least 10 transactions; and
- c) transactions involving a sum total of at least 2 million pounds equivalent U₃O₈.

UF₆ Value⁴

Determined as of the last day of the month indicated (US\$ / kgU as UF₆)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003	30.40	30.75	30.75	33.50	33.50	33.50	33.50	33.50	36.75	38.25	41.00	44.25
2004	48.50	51.50	53.50	53.50	53.75	56.10	56.10	61.00	61.00	62.00	63.00	63.00
2005	67.00	68.00	70.00	80.00	88.00	87.25	87.25	87.25	94.75	98.25	103.00	106.00
2006	108.00	112.00	119.00	120.00	124.00	132.00	136.00	148.00	157.00	169.00	179.00	199.00

Prices from 1985-2002, and 2007-present are available to clients only.

Loan Rate⁵

Determined as of the last day of the month indicated (percent / annum)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2004	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
2005	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
2006	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	7.50	7.50	7.50

Rates from 1968-2002, and 2007-present are available to clients only.

⁴ The UF₆ Value is TradeTech's judgement of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the last day of the month.

⁵ The Loan Rate is TradeTech's judgement of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Conversion Value⁶

Determined as of the last day of the month indicated (US\$ / kgU as UF₆)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003 - NA ⁷	5.05	5.05	5.05	5.00	5.00	5.00	5.00	5.00	4.90	5.00	5.15	6.50
2003 - E ⁸	6.00	6.20	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.75	6.75
2004 - NA	6.80	7.00	7.00	7.00	7.25	7.75	7.75	9.00	9.00	9.00	9.00	9.00
2004 - E	7.50	8.00	8.00	8.00	8.50	9.00	9.00	10.00	10.00	10.00	10.00	10.00
2005 - NA	11.00	12.00	12.00	12.00	12.00	11.50	11.50	11.50	11.50	11.50	11.50	11.50
2005 - E	12.00	12.00	12.00	12.00	12.00	11.50	11.50	11.50	11.50	11.50	11.50	11.50
2006 - NA	11.00	11.50	11.50	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75
2006 - E	11.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.25	12.25

Prices from 1981-2002, and 2007-present are available to clients only.

⁶ The Conversion Value is TradeTech's judgement of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded as of the last day of the month.

⁷ North American delivery

⁸ European delivery

SWU Value⁹

Determined as of the last day of the month indicated (US\$ / SWU)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003 - U ^{10, 12}	90	90	90	92	92	88	88	88	88	88	88	88
2003 - R ^{11, 12}	108	108	108	108	108	108	108	108	108	108	108	110
2004 - U	88	88	88	88	88	88	88	88	88	88	88	88
2004 - R	110	110	110	110	110	110	111	111	111	111	111	111
2005 - U	88	88	88	88	88	90	90	90	90	90	90	90
2005 - R	113	113	113	113	113	113	113	113	113	113	113	113
2006 - U	90	105	105	105	107	107	110	115	117	120	124	126
2006 - R	118	120	122	124	125	125	128	129	131	134	135	135

Prices from 1986-2002, and 2007-present are available to clients only.

⁹ The SWU Value is TradeTech's judgement of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the last day of the month.

¹⁰ Unrestricted

¹¹ Restricted

¹² The designation of Unrestricted/Restricted Market Values for SWU products was dropped in Review No. 510, since the Unrestricted Market distinction had become irrelevant with the revision to the US-Russian Suspension Agreement, which allows Russia to provide up to 20 percent of US utility enrichment requirements in 2014-2020, at which time the Suspension Agreement is scheduled to be terminated.

Mid-Term/Long-Term Price Indicators¹³

Determined as of the last day of the month indicated

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mid-Term U₃O₈ (\$ / lb U₃O₈)												
Long-Term U₃O₈ (\$ / lb U₃O₈)												
Conversion (\$ / kgU as UF₆)												
<i>N. American</i>												
<i>European</i>												
SWU (\$ / SWU)												

Prices from 1997-present are available to clients only.

¹³ The Mid-Term Price Indicator for U₃O₈ is TradeTech's judgement of the base price at which transactions for mid-term or intermediate delivery of natural uranium concentrates could be concluded as of the last day of the month, for transactions in which the price at the time of delivery would be an escalation of the base price from a previous point in time. The Long-Term Price Indicators for U₃O₈, Conversion, or SWU are TradeTech's judgement of the base price at which transactions for long-term delivery of that product or service could be concluded as of the last day of the month, for transactions in which the price at the time of delivery would be an escalation of the base price from a previous point in time.

Australia

Year	Period	Consumer Price Index ¹ (1989/1990 = 100) (2011/2012=100)	Producer Price Index Final Commodities ² (1998/1999 = 100)	Average Weekly Ordinary Time Earnings Adult Australia ³ (Australian Dollars)	Wage Price Index — Australia ⁴ (2003-04 = 100)
2002	Avg	138.1	110.0	868.44	94.0
2003	Avg	141.9	111.1	923.25	98.3
2004	Avg	145.2	114.1	958.43	101.8
2005	Avg	149.1	118.0	1,007.90	105.9
2006	Avg	154.4	122.6	1,047.28	110.2
2007	Avg	158.0	125.8	1,093.78	114.7
2008	Avg	164.8	132.5	1,141.38	119.5
2009	Avg	167.9	134.0	1,201.45	112.6
2010	Avg	172.6	136.0	1,257.83	105.0
2011	Avg	178.5	140.1	1,312.40	109.0
2012	Avg	180.0/ 101.9 ⁵	121.0	1,373.30	112.9
Jan	2012	—	—	—	—
Feb	2012	—	—	—	—
Mar	2012	179.5	140.7	—	111.4
Apr	2012	—	—	—	—
May	2012	—	—	1,352.70	—
Jun	2012	180.4	141.4	—	112.2
Jul	2012	—	—	—	—
Aug	2012	—	—	—	—
Sep	2012	101.8	100.9	—	113.5
Oct	2012	—	—	—	—
Nov	2012	—	—	1,393.0	—
Dec	2012	102.0	101.1	—	114.3
Jan	2013	—	—	—	—
Feb	2013	—	—	—	—
Mar	2013	102.4	101.4	—	115.0
Apr	2013	—	—	—	—
May	2013	—	—	1,422.70	—
Jun	2013	102.8	101.5	—	115.5
Jul	2013	—	—	—	—
Aug	2013	—	—	—	—
Sep	2013	104.0	102.8	—	116.6

P = Preliminary R = Revised since last month

1 Weighted average of eight capital cities of Australia; through the June 2012 quarter, the Base Year was the Financial Year July 1989 to June 1990 = 100.0. Starting with September 2012 quarter, the Base Year was adjusted to Financial Year July 2011-June 2012 = 100.0

2 Australian Bureau of Statistics: "Producer Price Indexes, Australia, Final Commodities." From the September quarter 1999 through the July quarter 2012, the Base Year was 1998-99; beginning in the September quarter of 2012, the Base Year was adjusted to new index reference period of 2011-12.

3 Australian Bureau of Statistics: "Average Weekly Earnings, States & Australia"

4 Australian Bureau of Statistics: 2001-August 2004 data from "Wage Cost Index of Total Hourly Rates of Pay, Excluding Bonuses - Sector Mining" report; from September 2004 to the present data from "Wage Cost Index of Total Hourly Rates of Pay, Excluding Bonuses" was changed to the Labor Price Index, Australia, with a new base year of 2003-04; changed to Wage Price Index in September 2012

5 Average Consumer Price Index for first two quarters/last two quarters of 2012, due to Base Year change starting with the September 2012 quarter.

Canada

Year	Period	Industrial Products Price Index: All Commodities ⁶ (2002 = 100) ⁷	Consumer Price Index: All Items ⁶ (2002=100) ⁸	Wage-earner Data: Average Hourly Earnings (C\$) ^{9,11}			
				Metal Ore Mining ¹⁰ (NAICS 2122)	Mining, Oil, and Gas Extraction (NAICS 21)	Fabricated Metal Products Manufacturing (NAICS 332)	Other Chemical Products Manufacturing (NAICS 3259)
2002	Avg	100.0	100.0	23.60	22.83	18.04	19.78
2003	Avg	98.8	102.8	22.88	23.12	18.85	20.21
2004	Avg	102.0	104.7	21.75	23.70	18.92	20.07
2005	Avg	103.6	107.0	23.77	26.06	19.23	20.22
2006	Avg	106.0	109.1	23.10	26.48	19.06	20.20
2007	Avg	107.6	111.8	23.71	27.74	19.24	22.18
2008	Avg	112.3	114.1	26.62	28.80	22.24	21.64
2009	Avg	108.4	114.4	30.89	30.99	23.24	20.21
2010	Avg	109.4	116.5	30.72	31.59	21.31	20.82
2011	Avg	114.5	119.9	34.99	35.09	23.71	22.42
2012	Avg	115.1	121.6	37.93	36.35	23.95	26.65
Jan	2012	115.0	120.9	39.72	38.74	23.19	25.99
Feb	2012	115.2	120.2	40.65	40.56	23.82	24.11
Mar	2012	115.4	121.7	39.57	39.64	25.28	22.71
Apr	2012	115.6	122.2	37.32	35.95	23.82	25.87
May	2012	115.6	122.1	40.80	36.36	25.22	30.70
Jun	2012	115.2	121.6	40.28	37.55	24.92	27.66
Jul	2012	114.6	121.5	39.61	36.48	22.99	24.74
Aug	2012	114.5	121.8	37.04	39.48	24.17	30.38
Sep	2012	115.2	122.0	35.35	36.72	24.16	26.87
Oct	2012	115.2	122.2	36.20	37.93	23.46	25.97
Nov	2012	114.6	121.9	34.80	37.19	23.24	25.01
Dec	2012	114.9	121.2	33.84	37.08	23.14	29.78
Jan	2013	115.0	121.3	34.85	40.04	23.41	30.89
Feb	2013	116.7	122.7	37.97	41.66	24.17	32.79
Mar	2013	116.7	122.9	37.73	42.21	24.17	35.94
Apr	2013	115.7	122.7	37.16	41.78	25.17	32.67
May	2013	115.8	123.0	35.36	38.74	25.07	30.09
Jun	2013	116.2	123.0	38.01	39.69	25.38	24.77
Jul	2013	116.1	123.1	42.54	41.25	24.30	26.70
Aug	2013	116.7	123.1	38.55 R	40.80 R	23.48 R	24.14 R
Sep	2013	116.4	123.3	38.74 P	41.16 P	24.91 P	25.47 P
Oct	2013	116.1 P	123.0	—	—	—	—

P = Preliminary R = Revised since last month

6 Statistics Canada: "Industry Price Indexes." Indexes for the most recent six months shown are subject to revision.

7 The Base Year changed from 1997 to 2002 as of August 1, 2010

8 The Base Year changed from 1992 to 2002 as of April 1, 2007

9 Statistics Canada: "Employment, Earnings and Hours"

10 As of April 1992, Statistics Canada no longer provides specific information on uranium mine wages. The data has been included with Metal Ore Mining.

11 2009 average hourly earnings represents partial year (January - October) as data for November and December was too unreliable to be published by Statistics Canada.

South Africa

Year	Period	Average Declared Working Costs/ Operating Costs per Metric Ton of Gold Ore Milled ¹² (Rand)	Average Operating Profit per Metric Ton of Gold Ore Milled ¹³ (Rand)	Consumer Price Index ¹⁴ (Dec 2012 = 100)	Production Price Index All Group ¹⁴ (2012 = 100)
2002	Avg	258.57	--	72.1	123.8
2003	Avg	314.64	--	76.3	125.9
2004	Avg	335.97	--	77.4	126.7
2005	Avg	376.59	--	80.0	130.6
2006	Avg	374.44	--	83.7	140.6
2007	Avg	405.87	210.28	89.7	154.7
2008	Avg	449.47	327.98	78.9	180.8
2009	Avg	405.78	255.20	84.6	180.7
2010	Avg	388.74	230.80	88.2	191.6
2011	Avg	405.60	324.34	92.6	207.6
2012	Avg	507.63	323.88	97.8	220.5
Jan	2012	—	—	95.2	212.5
Feb	2012	—	—	95.7	214.4
Mar	2012	429.91	294.60	96.8	214.1
Apr	2012	—	—	97.2	214.8
May	2012	—	—	97.2	215.8
Jun	2012	459.06	333.28	97.5	225.4
Jul	2012	—	—	97.8	229.0
Aug	2012	—	—	98.0	230.5
Sep	2012	549.06	361.48	98.9	221.2
Oct	2012	—	—	99.5	222.5
Nov	2012	—	—	99.8	223.1
Dec	2012	592.47	306.17	100.0	100.0
Jan	2013	—	—	100.3	102.7
Feb	2013	—	—	101.3	103.3
Mar	2013	399.29	228.82	102.5	104.2
Apr	2013	—	—	102.9	104.6
May	2013	—	—	102.6	104.9
Jun	2013	412.63	154.55	102.6	105.7
Jul	2013	—	—	103.8	106.4
Aug	2013	—	—	104.3	107.2
Sep	2013	440.46	209.41	104.8	107.6
Oct	2013	—	—	105.0	108.1
Nov	2013	—	—	105.1 P	108.3 P

P = Preliminary R = Revised since last month

¹² Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly

¹³ Consumer Price Index represents all income groups-weighted average; base year changed from 2000 to 2008 in *The NUCLEAR Review*, Report no. 487; base year changed from 2008 to December 2012 in *The NUCLEAR Review*, Report no. 534

¹⁴ Producer Price Index represents all commodities for consumption in South Africa; base year changed from 1995 to 2000 in *The NUCLEAR Review*, Report no. 393; base year changed from 2000 to 2012 in *The NUCLEAR Review*, Report no. 537.

United States

Year	Period	Producer Price Index ¹⁵		Consumer Price Index ¹⁶ (1982-84=100)	GNP Implicit Price Deflator ¹⁷ (2005 = 100)	GDP Implicit Price Deflator ¹⁷ (2005 = 100)	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US\$) ¹⁸			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)				Metal Ore Mining (NAICS 2122)	Other Nonferrous Metal Production (NAICS 3314)	Chemical Products Manufacturing (NAICS 325)	Other Electrical Equipment & Components (NAICS 3359)
2002	Avg	132.4	131.1	179.9	92.1	92.1	18.81	19.77	19.17	15.00
2003	Avg	139.1	138.1	184.0	94.1	94.1	21.90	18.69	18.52	14.75
2004	Avg	147.6	146.7	188.9	96.8	96.8	22.91	19.49	19.16	15.27
2005	Avg	160.2	157.4	195.3	100.0	100.0	22.66	20.08	19.67	15.75
2006	Avg	168.8	164.7	201.6	103.3	103.3	22.39	19.95	19.60	15.82
2007	Avg	175.1	172.6	207.3	106.2	106.2	23.50	19.46	19.56	16.71
2008	Avg	192.3	189.6	215.3	108.5	108.5	25.94	19.35	19.49	16.69
2009	Avg	174.8	172.9	214.5	109.8	109.8	25.93	18.72	20.30	17.25
2010	Avg	187.0	184.7	218.1	111.0	111.0	28.85	19.46	21.08	17.82
2011	Avg	202.0	201.0	224.9	113.4	113.4	29.96	20.84	21.46	18.50
2012	Avg	202.1	202.2	229.6	115.4	115.5	31.75	21.57	21.45	18.73
Jan	2012	201.4	200.7	226.7	—	—	31.51	21.43	21.74	18.73
Feb	2012	202.4	201.6	227.7	—	—	31.16	21.06	21.55	18.71
Mar	2012	205.1	204.2	229.4	114.6	114.6	31.59	21.08	21.55	18.81
Apr	2012	204.7	203.7	230.1	—	—	31.87	21.52	21.87	18.78
May	2012	202.6	201.9	229.8	—	—	32.47	21.93	21.52	18.68
Jun	2012	200.0	199.8	229.5	115.0	115.4	31.56	21.60	21.41	18.86
Jul	2012	199.6	200.1	229.1	—	—	32.10	21.91	21.59	18.70
Aug	2012	202.1	202.7	230.4	—	—	31.77	21.60	21.34	18.97
Sep	2012	203.8	204.4	231.4	115.8	115.8	32.38	21.72	21.43	18.54
Oct	2012	202.8	203.5	231.3	—	—	31.96	21.54	21.23	18.61
Nov	2012	200.7	201.8	230.2	—	—	31.83	21.38	21.09	18.77
Dec	2012	200.4	201.5	229.6	116.1	116.1	30.81	22.04	21.05	18.65
Jan	2013	201.6	202.5	230.3	—	—	30.53	21.55	21.24	18.85
Feb	2013	204.1	204.3	232.2	—	—	31.04	21.48	21.24	18.96
Mar	2013	203.3	204.0	232.8	106.1	106.1	31.09	21.58	21.18	18.77
Apr	2013	203.2	203.5	232.5	—	—	31.37	21.52	21.18	19.05
May	2013	203.3	204.1	232.9	—	—	31.75	21.70	21.47	18.82
Jun	2013	203.4	204.3	233.5	106.3	106.3	31.25	21.41	21.37	19.19
Jul	2013	203.6 R	204.4 R	233.6	—	—	31.42	21.42	21.48	18.89
Aug	2013	204.2 P	204.3 P	233.9	—	—	31.01	21.28	21.42	18.90
Sep	2013	204.0 P	204.0 P	234.1	106.9	106.8	31.74 R	21.15 R	21.45 R	18.75 R
Oct	2013	202.6 P	202.5 P	233.5	—	—	31.09 P	20.94 P	21.45 R	18.76 P
Nov	2013	200.9 P	201.0 P	233.1	—	—	—	—	21.44 P	—

P= Preliminary R= Revised since last month

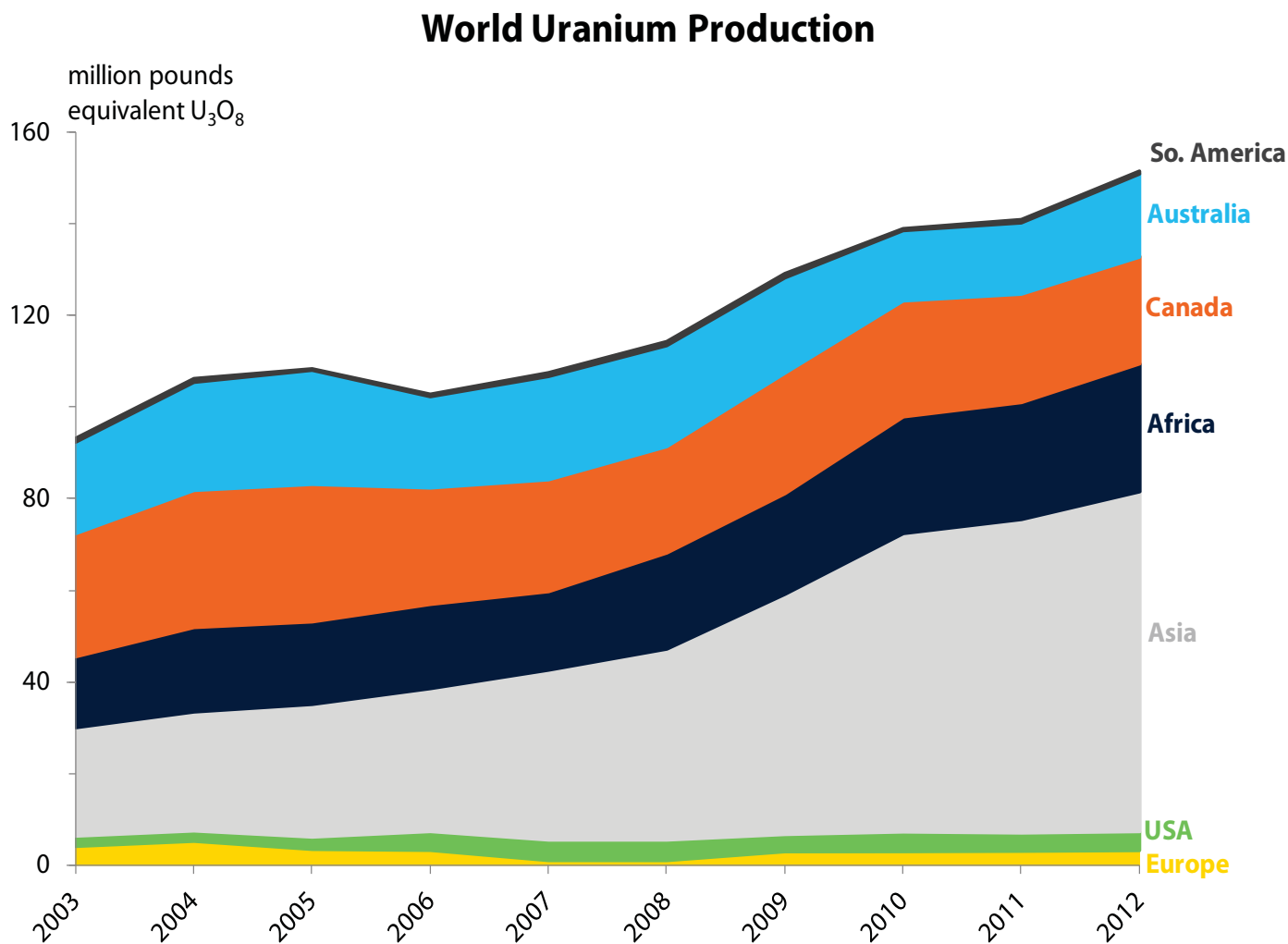
15 US Bureau of Labor Statistics, "Producer Prices and Price Indexes;" Producer Price Indexes are revised four months after they are first released, to reflect the availability of late reports and corrections by respondents.

16 US Bureau of Labor Statistics: Consumer Price Index for All Urban Consumers, US City Average

17 US Department of Commerce: Bureau of Economic Analysis; the Gross National Product (GNP) and Gross Domestic Product (GDP) Implicit Price Deflators (IDP) are published quarterly, and seasonally adjusted; base year change from 2000 to 2005 in *The NUCLEAR Review*, no. 492; base year change from 2005 to 2009 in *The NUCLEAR Review*, no. 540

18 US Bureau of Labor Statistics: "Employment and Earnings." 2002 data based on 1972 revision of SIC Manual; 2003 to present, data reflects new NAICS industry classification

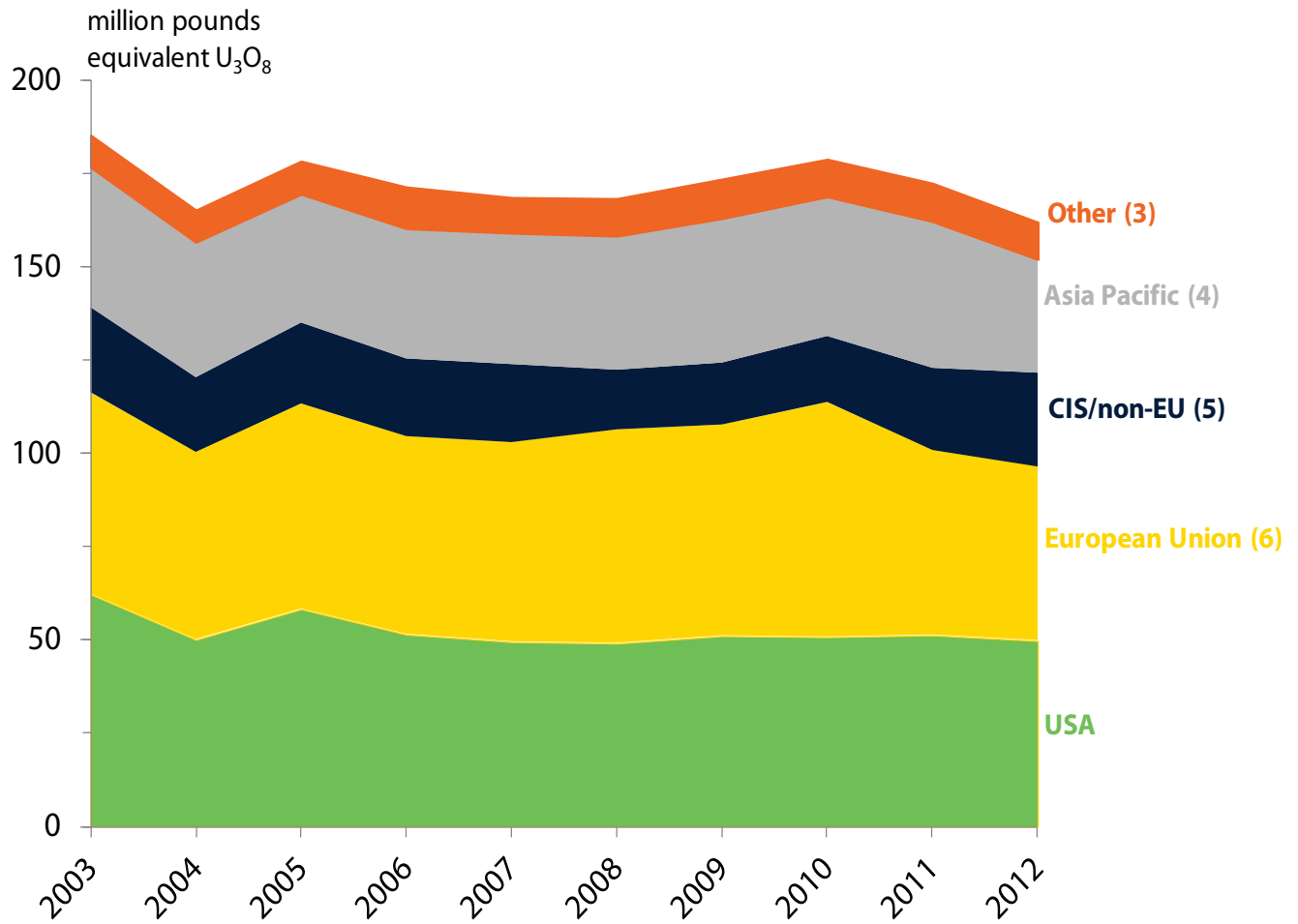
World Uranium Production¹ 2003-2012



¹ World uranium production in 2012 totaled 151.7 million pounds equivalent U₃O₈.

World Uranium Requirements² 2002-2012

Annual Uranium Requirements



² Calculated by TradeTech based on actual completion dates and operating performance, and TradeTech's estimate of enriching tails assay.

³ Other includes: Argentina, Brazil, Canada, India, Mexico, Pakistan, and South Africa.

⁴ Asian Pacific includes: Japan, China, South Korea, and Taiwan.

⁵ CIS/non-European Union includes as of 2007: Armenia, Kazakhstan, Russia, Switzerland, Turkey, and Ukraine. For data prior to 2007, this region includes: Armenia, Bulgaria, Czech Republic, Hungary, Kazakhstan, Lithuania, Romania, Russia, Slovak Republic, Slovenia, Switzerland, Turkey, and Ukraine.

⁶ European Union (EU) includes as of 2007: Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Italy, Lithuania, Netherlands, Romania, Slovakia, Slovenia, Spain, Sweden, and the UK. For data prior to 2007, this region includes: Belgium, Finland, France, Germany, Italy, Netherlands, Spain, Sweden, and the UK.

World Historical Uranium Production

(thousand pounds U₃O₈)

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Australia	19,686	23,427	24,747	19,742	22,387	21,917	20,752	15,339	15,555	18,175
Brazil	806	780	286	494	777	858	897	385	689	601
Canada	27,186	30,150	30,230	25,642	24,636	23,399	26,448	25,434	23,775	23,395
China	1,950	1,950	1,949	1,950	1,851	1,999	1,950	2,150	2,301	3,900
Czech Rep.	897	1,071	1,061	928	796	684	671	660	595	8
France	0	18	18	0	10	13	21	18	16	0
Germany	390	200	200	130	99	200	0	0	52	0
India	598	598	598	598	702	705	754	1,040	1,040	1,001
Kazakhstan	8,579	9,669	11,327	13,725	17,255	22,153	35,929	46,284	50,568	55,420
Malawi	0	0	0	0	0	0	270	1,742	2,199	2,862
Namibia	5,293	7,898	8,182	8,000	7,485	11,351	12,027	11,689	8,470	11,686
Niger	8,171	8,532	8,041	8,928	8,151	7,883	8,431	10,914	11,312	12,133
Pakistan	117	117	117	117	117	117	130	117	117	117
Portugal	0	0	0	0	0	0	0	0	0	0
Romania	234	234	234	234	200	200	195	200	200	234
Russia	8,189	8,319	8,920	8,839	8,873	9,154	9,266	9,260	7,781	7,467
South Africa	1,971	1,956	1,753	1,409	1,365	1,442	1,387	1,516	1,513	1,210
Spain	0	0	0	0	0	0	0	0	0	0
Ukraine	2,080	2,080	2,080	2,080	2,199	2,080	2,184	2,210	2,314	2,496
USA	2,228	2,228	2,689	4,106	4,541	3,879	3,778	4,316	3,996	4,149
Uzbekistan	4,602	5,241	5,980	5,902	6,032	6,078	6,315	6,239	6,499	6,239
TOTAL	92,977	104,468	108,412	102,824	107,476	114,112	131,405	139,513	138,992	151,686

P= Preliminary R= Revised since last month

Natural Uranium Deliveries to European Union Utilities/End Users⁷

Compiled from data published by the Euratom Supply Agency

Year	Volume of Deliveries to EU Utilities/ Users ⁸ (tU)	Percentage of Deliveries under Spot Contracts ⁹	Spot Contracts ⁹ Average Price		Multiannual Contracts ¹⁰ Average Price		Multiannual Contracts (MAC-3) Average Price ¹¹	
			in Euros per kgU	in US Dollars per pound U ₃ O ₈	in Euros per kgU	in US Dollars per pound U ₃ O ₈	in Euros per kgU	in US Dollars per pound U ₃ O ₈
2002	16,900	8.0	25.50	9.27	34.00	12.37	—	—
2003	16,400	18.0	21.75	9.46	30.50	13.27	—	—
2004	14,600	4.0	26.14	12.51	29.20	13.97	—	—
2005	17,600	5.0	44.27	21.19	33.56	16.06	—	—
2006	21,400	7.8	53.73	25.95	38.41	18.55	—	—
2007	21,932	2.4	121.80	64.21	40.98	21.60	—	—
2008	18,622	2.9	118.19	66.86	47.23	26.72	84.75	47.94
2009	17,591	5.2	77.96	41.83	55.70	29.88	63.49	34.06
2010	17,566	4.1	79.48	40.53	61.68	31.45	78.11	39.83
2011	17,832	3.9	107.43	57.52	83.45	44.68	100.02	53.55
2012	18,639	3.8	97.80	48.33	90.03	44.49	103.42	51.11

P= Preliminary R= Revised since last month

7 The 14 European Union (EU) member nations are: Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

8 The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Union are also excluded. The quantities covered are those which were entered into accounting records during the year stated. Quantities do not include reprocessed uranium.

9 "Spot" contracts are defined as those providing for either only one delivery or deliveries extending over a period of a maximum of 12 months, whatever the time between the conclusion of the contract and the first delivery.

10 "Multiannual" contracts are defined as those providing for deliveries extending over more than 12 months.

11 New "MAC-3" price index introduced in 2008 is based on a three-year moving average.

US Uranium Marketing Data¹²

Compiled from data published by the US Energy Information Administration

Year	Utility Domestic Purchases		Import	
	Average Price & Quantity of Deliveries to Domestic Utilities from US Suppliers ¹³		Average Price & Quantity of Deliveries to US Utilities Suppliers from Foreign Suppliers ¹³	
	(million lbs U ₃ O ₈ eq.)	(US\$ per pound U ₃ O ₈ eq.)	(million lbs U ₃ O ₈ eq.)	(US\$ per pound U ₃ O ₈ eq.)
2002	21.5	10.35	52.7	10.05
2003	20.5	10.84	53.0	10.59
2004	26.5	11.91	66.1	12.25
2005	27.2	13.98	38.5	14.63
2006	27.1	18.54	38.7	18.66
2007	17.8	33.13	32.5	32.58
2008	20.1	43.43	31.4	47.46
2009	16.9	44.53	32.2	46.55
2010	16.2	44.88	29.8	51.69
2011	19.4 R	53.41	34.9	56.87
2012	21.5	56.21	35.5	54.08

P = Preliminary R = Revised since last month

¹² 1984-2002: Energy Information Administration, *Uranium Industry Annual*.
2003 to present: Energy Information Administration, *Uranium Marketing Annual Report*.

¹³ Foreign suppliers are defined to include non-US based firms that market uranium into and from the USA.

US Uranium Marketing Data¹⁴

Compiled from data published by the US Energy Information Administration

Year	Utility Spot Purchases		Utility Total Purchases	
	Average Price & Quantity of Deliveries to US Utilities under Spot Contracts ¹⁵		Average Price & Quantity of of Total Deliveries of US Utilities ¹⁶	
	(million lbs U ₃ O ₈ eq.)	(US\$ per pound U ₃ O ₈ eq.)	(million lbs U ₃ O ₈ eq.)	(US\$ per pound U ₃ O ₈ eq.)
2006	6.3	39.48	66.5	18.61
2007	6.6	88.25	51.0	32.78
2008	8.7	66.95	53.4	45.88
2009	8.1	46.45	49.2	45.86
2010	8.2	43.99	46.6	49.29
2011	12.0	54.69	54.8	55.64
2012	8.1	51.04	56.9	54.99
US Utility Receipts of US-Origin Uranium ¹⁷				
	(million lbs U ₃ O ₈ eq.)	(US\$ per pound U ₃ O ₈ eq.)		
2006	10.8	17.85		
2007	4.0	28.89		
2008	7.7	59.55		
2009	7.1	48.92		
2010	3.7	45.25		
2011	5.2	52.12		
2012	9.8	59.44		
Imports of Uranium Directly by US Utilities ¹⁸				
	(million lbs U ₃ O ₈ eq.)	(US\$ per pound U ₃ O ₈ eq.)		
2006	55.7	18.75		
2007	47.0	33.05		
2008	45.6	43.47		
2009	42.8	45.35		
2010	42.9	49.64		
2011	49.6	55.98		
2012	47.7	54.07		

P= Preliminary R= Revised since last month

¹⁴ Source: Energy Information Administration, *Uranium Industry Annual*.

¹⁵ "Spot" contract is defined as a one-time delivery of the entire contract within one year of contract execution.

¹⁶ Includes deliveries of uranium under all contract types, including spot, short-term, medium-term, and long-term contracts.

¹⁷ Includes US utility receipts for all forms, including uranium concentrates (U₃O₈), uranium hexafluoride (UF₆) and enriched uranium product.

¹⁸ Includes US utility receipts for all origins and all forms, including uranium concentrates (U₃O₈), uranium hexafluoride (UF₆) and enriched uranium product, but under contracts with only non-US suppliers

Australian Annual U₃O₈ Exports¹⁹

Year ²⁰	Average Price (A\$ / kg U ₃ O ₈)	Volume (tonnes U ₃ O ₈)
2002-03	44.5	9,592
2003-04	40.0	11,215
2004-05	42.4	11,215
2005-06	53.2	10,252
2006-07	69.1	9,518
2007-08	87.3	10,139
2008-09	97.9	10,114
2009-10	99.4	7,555
2010-11	87.8	6,950
2011-12	87.8	6,917

P = Preliminary R = Revised since last month

¹⁹ Source: ABARE, *Australian Mineral Statistics* (previously *Quarterly Mineral Statistics*) and/or Uranium Information Centre

²⁰ Annual data are reported on the basis of the Australian financial year, which extends from July 1 of the first year, through June 30 of the following year.

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