

# 2016 Uranium Marketing Annual Report

June 2017















This report was prepared by the U.S. Energy Information Administration (EIA), the statistical and
analytical agency within the U.S. Department of Energy. By law, EIA's data, analyses, and forecasts are
independent of approval by any other officer or employee of the United States Government. The views
in this report therefore should not be construed as representing those of the Department of Energy or
other Federal agencies.

i

#### **Contacts**

This report was prepared by the staff of the Power and Uranium Operations Team, Office of Electricity, Renewables, and Uranium Statistics. Questions about the preparation and content of this report may be directed to InfoNuclearData@eia.gov.

#### **Preface**

The U.S. Energy Information Administration (EIA) reports detailed data spanning 2012 through 2016 and summary data back to 1994 on uranium marketing activities in the United States in this report, 2016 Uranium Marketing Annual Report.

Data in this report are based on information reported on Form EIA-858, "Uranium Marketing Annual Survey." Form EIA-858 survey collects data on contracts, deliveries (during the report year and projected for the next ten years), enrichment services purchased, inventories, use in fuel assemblies, feed deliveries to enrichers (during the report year and projected for the next ten years), and unfilled market requirements for the next ten years.

Prior editions of this report may be found on the EIA website at <a href="http://www.eia.gov/nuclear/reports.cfm">http://www.eia.gov/nuclear/reports.cfm</a>.

Definitions for terms used in this report can be found in EIA's Energy Glossary: <a href="http://www.eia.gov/tools/glossary/">http://www.eia.gov/tools/glossary/</a>.

### **Contents**

Contacts	ii
Preface	iii
Tables	v
Figures	vii
Uranium purchases and prices	1
New and future uranium contracts	1
Uranium feed, enrichment services, uranium loaded	2
Uranium foreign purchases/sales and inventories	2

## **Tables**

able S1a. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 994-2016	4
able S1b. Weighted-average price of uranium purchased by owners and operators of U.S. civilian	
uclear power reactors, 1994-2016	. 6
able S2. Uranium feed deliveries, enrichment services, and uranium loaded by owners and	
perators of U.S. civilian nuclear power reactors, 1994-2016	. 8
able S3a. Foreign purchases, foreign sales, and uranium inventories owned by U.S. suppliers and	
wners and operators of U.S. civilian nuclear power reactors, 1994-2016	11
able S3b. Weighted-average price of foreign purchases and foreign sales by U.S. suppliers and	
wners and operators of U.S. civilian nuclear power reactors, 1994-2016	13
able 1. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by	
upplier and delivery year, 2012-16	15
able 2. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by	
rigin and delivery year, 2012-16	18
able 3. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by	
rigin country and delivery year, 2012-162	21
able 4. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by	
rigin and material type, 2016 deliveries	23
able 5. Average price and quantity for uranium purchased by owners and operators of U.S. civiliar	1
uclear power reactors by pricing mechanisms and delivery year, 2015-16	25
able 6a. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors	
anked by price and distributed by quantity, 2014-16 deliveries	27
able 6b. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors	
anked by price and distributed by purchaser, 2014-16 deliveries	28
able 7. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by	
ontract type and material type, 2016 deliveries2	29
able 8. Contracts signed in 2016 by owners and operators of U.S. civilian nuclear power reactors b	Эy
ontract type	30
able 9. Contracted purchases of uranium by owners and operators of U.S. civilian nuclear power	
eactors, signed in 2015, by delivery year, 2017-26	31
able 10. Contracted purchases of uranium from suppliers by owners and operators of U.S. civilian	
uclear power reactors, in effect at the end of 2016, by delivery year, 2017-26	33
able 11. Unfilled uranium market requirements of owners and operators of U.S. civilian nuclear	
ower reactors, 2016-26	35
able 12. Maximum anticipated uranium market requirements of owners and operators of U.S.	
ivilian nuclear power reactors, 2017-26, as of December 31, 2016	37
able 13. Deliveries of uranium feed by owners and operators of U.S. civilian nuclear power reactor	rs
y enrichment country and delivery year, 2014-16	39

Table 14. Deliveries of uranium feed for enrichment by owners and operators of U.S. civilian nuclear
power reactors by origin country and delivery year, 2014-1643
Table 15. Shipments of uranium feed by owners and operators of U.S. civilian nuclear power
reactors to domestic and foreign enrichment suppliers, 2016-25
Table 16. Purchases of enrichment services by owners and operators of U.S. civilian nuclear power
reactors by origin country and year, 2012-1645
Table 17. Purchases of enrichment services by owners and operators of U.S. civilian nuclear power
reactors by contract type in delivery year, 201647
Table 18. Uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors by year, 2012-
16
Table 19. Foreign purchases of uranium by U.S. suppliers and owners and operators of U.S. civilian
nuclear power reactors by delivery year, 2012-1650
Table 20. U.S. broker and trader purchases of uranium by origin, supplier, and delivery year, 2012-16
52
Table 21. Foreign sales of uranium from U.S. suppliers and owners and operators of U.S. civilian
nuclear power reactors by origin and delivery year, 2012-1654
Table 22. Inventories of natural and enriched uranium by material type as of end of year, 2012-16 56
Table 23. Inventories of uranium by owner as of end of year, 2012-1659
Table 24. Uranium sellers to owners and operators of U.S. civilian nuclear power reactors, 2014-16
62
Table 25. Enrichment service sellers to owners and operators of U.S. civilian nuclear power reactors,
2014-16 62

# **Figures**

Figure S1. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016 deliveries	5
Figure S2. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016 deliveries	
Figure S3. Uranium loaded into U.S. civilian nuclear power reactors, 1994-2016 Figure S4. Uranium enrichment services purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016	9 ır
Figure S5. Total commercial uranium inventories of U.S. suppliers and owners and operators of U.S civilian nuclear power reactors, 1994-2016	S.
Figure S6. Weighted-average price of foreign purchases and foreign sales of uranium, 1994-2016.	14
Figure 1. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by supplier and delivery year, 2012-16	16
Figure 2. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors by supplier and delivery year, 2012-16	
Figure 3. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16	19
Figure 4. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16	20
Figure 5. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by selected origin country and delivery year, 2012-16	22
Figure 6. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by material type, 2016 deliveries	24
Figure 7. Average price for uranium purchased by owners and operators of U.S. civilian nuclear power reactors by pricing mechanisms and delivery year, 2015-16	26
Figure 8. Contracted purchases of uranium by owners and operators of U.S. civilian nuclear power reactors, signed in in 2015, by delivery year, 2017-22	r
Figure 9. Maximum contracted purchases of uranium from suppliers by owners and operators of U.S. civilian nuclear power reactors, in effect at the end of 2015, by delivery year, 2017-24	
Figure 10. Annual unfilled uranium market requirements of owners and operators of U.S. civilian nuclear power reactors, as of 12/31/2015 and 12/31/2016	
Figure 11. Maximum anticipated uranium market requirements of owners and operators of U.S.	
civilian nuclear power reactors, 2016-25, as of December 31, 2015	
U.S. civilian nuclear power reactors by delivery year, 2014-16  Figure 13. Deliveries of uranium feed for enrichment by owners and operators of U.S. civilian	40
nuclear power reactors by selected origin country of feed and delivery year, 2014-16 Figure 14. Shipments of uranium feed by owners and operators of U.S. civilian nuclear power	42
reactors to domestic and foreign enrichment suppliers, 2017-25	r
reactors by selected origin country and year, 2012-16	46

Figure 16. Uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors by	year, 2012-
16	49
Figure 17. Foreign purchases of uranium by U.S. suppliers and owners and operators of L	J.S. civilian
nuclear power reactors by delivery year, 2012-16	51
Figure 18. U.S. broker and trader purchases of uranium by delivery year, 2012-16	53
Figure 19. Foreign sales of uranium from U.S. suppliers and owners and operators of U.S.	civilian
nuclear power reactors by origin and delivery year, 2012-16	55
Figure 20. Commercial inventories of natural and enriched uranium as of end of year, 20	12-16 57
Figure 21. Owners and operators of U.S. civilian nuclear power reactors inventories by m	aterial type
as of end of year, 2012-16	58
Figure 22. Commercial inventories of uranium by owner as of end of year, 2012-16	60

#### **Uranium purchases and prices**

Owners and operators of U.S. civilian nuclear power reactors ("civilian owner/operators" or "COOs") purchased a total of 50.6 million pounds  $U_3O_8e$  (equivalent¹) of deliveries from U.S. suppliers and foreign suppliers during 2016, at a weighted-average price of \$42.43 per pound  $U_3O_8e$ . The 2016 total of 50.6 million pounds  $U_3O_8e$  decreased 10% compared with the 2015 total of 56.5 million pounds  $U_3O_8e$ . The 2016 weighted-average price of \$42.43 per pound  $U_3O_8e$  decreased 4% compared with the 2015 weighted-average price of \$44.13 per pound  $U_3O_8e$  (Table 1).

Eleven percent of the 50.6 million pounds U<sub>3</sub>O<sub>8</sub>e delivered in 2016 was U.S.-origin uranium at a weighted-average price of \$43.92 per pound. Foreign-origin uranium accounted for the remaining 89% of deliveries at a weighted-average price of \$42.26 per pound (Table 2). Uranium originating in Kazakhstan, Russia and Uzbekistan accounted for 38% of the 50.6 million pounds. Australian-origin and Canadian-origin uranium together accounted for 40%. The remaining 22% originated from Brazil, Bulgaria, China, Czech Republic, Germany, Malawi, Namibia, Niger, South Africa and Ukraine (Table 3).

COOs purchased uranium of three material types for 2016 deliveries from 36 sellers, the same number of sellers as in 2015 (Table 4, Table 24). Uranium concentrate was 54% of the 50.6 million pounds  $U_3O_8e$  delivered in 2016. Natural UF<sub>6</sub> was 29% and enriched UF<sub>6</sub> was 17% (Table 4). During 2016, 22% of the uranium delivered was purchased under spot contracts at a weighted-average price of \$29.62 per pound. The remaining 78% was purchased under long-term contracts at a weighted-average price of \$46.11 per pound (Table 7). Spot contracts are contracts with a one-time uranium delivery (usually) for the entire contract and the delivery typically occurs within one year of contract execution (signed date). Long-term contracts are contracts with one or more uranium deliveries to occur after a year following the contract execution (signed date) and as such may reflect some agreements of short and medium terms as well as longer term.

#### New and future uranium contracts

In 2016, COOs signed 50 new purchase contracts with deliveries in 2016 of 8.7 million pounds  $U_3O_8e$  at a weighted-average price of \$24.86 per pound. Five new contracts were long-term contracts with 28% of the 2016 deliveries and 45 new contracts were spot contracts with 72% of the deliveries in 2016 (Table 8).

COOs report minimum and maximum quantities of future deliveries under contract, to allow for the option of either decreasing or increasing quantities. As of the end of 2016, the maximum uranium deliveries for 2017 through 2026 under existing purchase contracts for COOs totaled 175 million pounds  $U_3O_8e$  (Table 10). Also as of the end of 2016, unfilled uranium market requirements for 2017 through 2026 totaled 233 million pounds  $U_3O_8e$  (Table 11). These contracted deliveries and unfilled market requirements combined represent the maximum anticipated market requirements of 408 million pounds  $U_3O_8e$  over the ten-year period for COOs.

<sup>&</sup>lt;sup>1</sup>Uranium quantities are expressed in the unit of measure  $U_3O_8e$  (equivalent).  $U_3O_8e$  is uranium oxide (or uranium concentrate) and the equivalent uranium-component of uranium hexafluoride (UF<sub>6</sub>) and enriched uranium.

June 2017

#### Uranium feed, enrichment services, uranium loaded

In 2016, COOs delivered 43 million pounds  $U_3O_8e$  of natural uranium feed to U.S. and foreign enrichers. Fifty three percent of the feed was delivered to U.S. enrichment suppliers and the remaining 47% was delivered to foreign enrichment suppliers (Table 13). Fourteen million separative work units (SWU)<sup>2</sup> were purchased under enrichment services contracts from 12 sellers in 2016, the same number of sellers as in 2015 (Table 16, Table 25). The average price paid by the COOs for the 14 million SWU was \$131 per SWU in 2016, compared with the 2015 average price of \$136.88 per SWU. In 2016, the U.S.-origin SWU share was 33% and foreign-origin SWU accounted for the remaining 67%. Russian-origin SWU was 22% of the total, 18% from the Netherlands, 11% from Germany and 7% from the United Kingdom (Table 16).

Uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors during 2016 contained 43 million pounds  $U_3O_8e$ , compared with 47 million pounds  $U_3O_8e$  loaded during 2015. Eight percent of the uranium loaded during 2016 was U.S.-origin uranium, and 92% was foreign-origin uranium (Table 18).

#### **Uranium foreign purchases/sales and inventories**

U.S. suppliers (brokers, converters, enrichers, fabricators, producers, and traders) and COOs purchase uranium each year from foreign suppliers. Together, foreign purchases totaled 51 million pounds  $U_3O_8e$  in 2016, and the weighted-average price was \$40.45 per pound  $U_3O_8e$  (Table 19). Also, U.S. suppliers and COOs sold uranium to foreign suppliers. Together, foreign sales totaled 17 million pounds  $U_3O_8e$  in 2016, and the weighted-average price was \$33.66 per pound  $U_3O_8e$  (Table 21).

Year-end commercial uranium inventories represent ownership of uranium in different stages of the nuclear fuel cycle (in-process for conversion, enrichment, or fabrication) at domestic or foreign nuclear fuel facilities. Total U.S. commercial inventories (including inventories owned by COOs, U.S. brokers, converter, enrichers, fabricators, producers, and traders) was 144 million pounds  $U_3O_8e$  as of the end of 2016. Commercial uranium inventories owned at the end of 2016 by COOs totaled 129 million pounds  $U_3O_8e$ , an increase of 6% from year-end 2015. Uranium inventories owned by U.S. brokers and traders were 8 million pounds  $U_3O_8e$ . U.S. converter, enrichers, fabricators and producers owned 8 million pounds  $U_3O_8e$  of inventories at the end of 2016 (Table 22).

<sup>2</sup> Separative work unit (SWU): The standard measure of enrichment services. The effort expended in separating a mass F of feed of assay  $x_f$  into a mass P of product assay  $x_p$  and waste of mass W and assay  $x_w$  is expressed in terms of the number of separative work units needed, given by the expression SWU = WV( $x_w$ ) + PV( $x_p$ ) - FV( $x_f$ ), where

V(x) is the "value function," defined as  $V(x) = (1 - 2x) \ln((1 - x)/x)$ .

Table S1a. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016

million pounds U<sub>3</sub>O<sub>8</sub> equivalent

Purchased from other owners and operators of U.S. civilian nuclear power reactors, other

			Purchased from						Short, medium,
Delivery			U.S. brokers and	U.S. suppliers, (and U.S.		_	Foreign-origin		and long-term
year	Total purchased	U.S. producers	traders	government for 2007) 1	foreign suppliers	uranium	uranium	Spot contracts <sup>2</sup>	contracts <sup>3</sup>
1994	38.3	5.4	15.3	1.1	16.5	7.7	30.6	8.5	29.8
1995	43.4	5.3	16.2	0.6	21.4	5.2	38.2	13.6	29.8
1996	47.3	5.8	13.3	1.9	26.4	8.3	39.0	9.1	38.3
1997	42.0	5.7	9.9	3.0	23.4	8.1	33.9	5.5	36.5
1998	42.7	6.5	10.5	4.5	21.3	7.2	35.6	7.8	34.9
1999	47.9	5.2	10.4	5.6	26.8	11.4	36.5	8.0	40.0
2000	51.8	3.6	9.1	8.8	30.4	13.3	38.6	10.4	39.1
2001	55.4	2.3	11.7	11.4	30.0	13.2	42.2	14.4	40.0
2002	52.7	1.5	13.4	5.7	32.2	6.2	46.5	8.6	41.4
2003	56.6	0.6	10.5	8.3	37.2	10.2	46.4	8.2	46.7
2004	64.1	0	13.2	12.2	38.7	12.3	51.8	9.2	53.3
2005	65.7	W	10.4	W	39.4	11.0	54.7	6.9	58.8
2006	66.5	0	13.9	12.6	40.0	10.8	55.7	6.3	59.4
2007	51.0	0	9.8	7.6	33.5	4.0	47.0	6.6	43.7
2008	53.4	0.6	9.4	6.3	37.2	7.7	45.6	8.7	42.8
2009	49.8	W	11.1	W	36.8	7.1	42.8	8.1	41.0
2010	46.6	0.4	11.7	1.9	32.6	3.7	42.9	8.2	37.9
2011	54.8	0.6	14.8	1.1	38.4	5.2	49.6	12.0	42.3
2012	57.5	W	11.5	W	37.6	9.8	47.7	8.1	48.9
2013	57.4	W	12.8	W	37.4	9.5	47.9	11.3	46.1
2014	53.3	W	17.1	W	34.4	3.3	50.0	14.5	38.8
2015	56.5	W	13.9	W	38.2	3.4	53.1	11.3	43.2
2016	50.6	W	7.9	W	39.5	5.4	45.2	10.6	37.0

<sup>---</sup> Not applicable. W = Data withheld to avoid disclosure of individual company data. NA = Not available.

Notes: "Other U.S. Suppliers" are U.S. converters, enrichers, and fabricators. Totals may not equal sum of components because of independent rounding.

 $Sources: U.S.\ Energy\ Information\ Administration: 1994-2002-Uranium\ Industry\ Annual,\ Tables\ 10,\ 11\ and\ 16.\ 2003-16-Form\ EIA-858,\ "Uranium\ Marketing\ Annual\ Survey".$ 

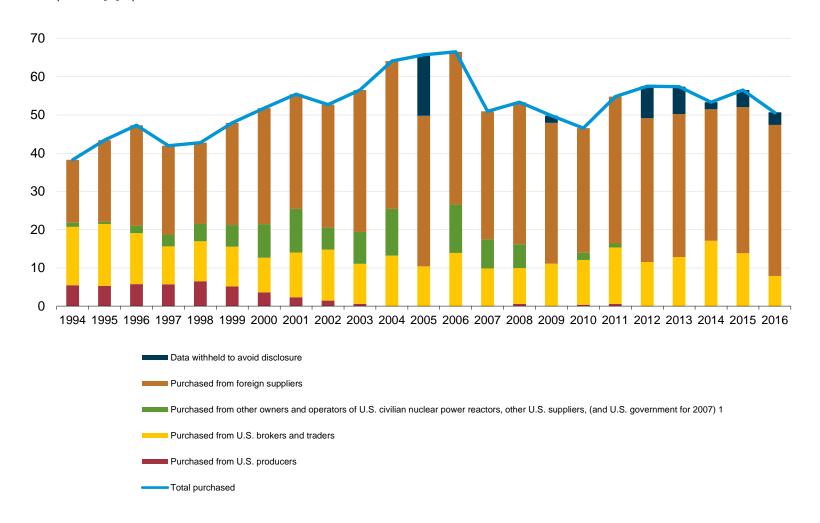
<sup>&</sup>lt;sup>1</sup> Includes purchases between owners and operators of U.S. civilian nuclear power reactors along with purchases from other U.S. suppliers which are U.S. converters, enrichers, and fabricators.

<sup>&</sup>lt;sup>2</sup> Spot Contract: A one-time delivery (usually) of the entire contract to occur within one year of contract execution (signed date).

<sup>&</sup>lt;sup>3</sup> Short, Medium, and Long-Term Contracts: One or more deliveries to occur after a year following contract execution (signed date).

Figure S1. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016 deliveries

million pounds U<sub>3</sub>O<sub>8</sub> equivalent



<sup>&</sup>lt;sup>1</sup> Includes purchases between owners and operators of U.S. civilian nuclear power reactors along with purchases from other U.S. suppliers which are U.S. converters, enrichers, and fabricators. Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual reports. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Table S1b. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016

Delivery year	Total purchased (weighted- average price)	Purchased from U.S. producers	Purchased from U.S. brokers and traders	Purchased from other owners and operators of U.S. civilian nuclear power reactors, other U.S. suppliers, (and U.S. government for 2007) <sup>1</sup>	Purchased from	U.Sorigin uranium (weighted- average price)	Foreign-origin uranium (weighted- average price)	Spot contracts <sup>2</sup> (weighted- average price)	Short, medium, and long-term contracts <sup>3</sup> (weighted- average price)
1994	10.40	13.72	9.34	8.04	10.43	12.08	9.97	9.01	NA
1995	11.25	14.84	9.83	12.52	11.40	14.20	10.84	10.30	NA
1996	14.12	14.20	13.36	14.98	14.45	14.62	14.02	14.22	NA
1997	12.88	13.60	12.31	W	12.91	13.36	12.78	11.61	NA
1998	12.14	13.61	11.95	W	11.97	13.37	11.90	10.56	NA
1999	11.63	13.93	11.54	W	11.47	12.24	11.47	9.52	NA
2000	11.04	14.81	11.28	10.45	10.65	11.52	10.88	8.54	11.70
2001	10.15	13.26	10.44	9.98	9.86	10.50	10.05	7.92	10.96
2002	10.36	13.03	10.21	W	10.37	10.89	10.29	9.29	10.58
2003	10.81	14.17	11.05	10.16	10.82	10.81	10.81	10.10	10.94
2004	12.61		12.08	11.30	13.15	11.87	12.76	14.77	12.24
2005	14.36	W	13.76	W	14.70	15.11	14.21	20.04	13.70
2006	18.61		20.49	W	18.62	17.85	18.75	39.48	16.38
2007	32.78		34.10	W	32.36	28.89	33.05	88.25	24.45
2008	45.88	75.16	39.62	W	48.49	59.55	43.47	66.95	41.59
2009	45.86	W	41.88	W	46.68	48.92	45.35	46.45	45.74
2010	49.29	47.13	44.98	42.24	51.30	45.25	49.64	43.99	50.43
2011	55.64	58.12	53.29	52.50	56.60	52.12	55.98	54.69	55.90
2012	54.99	W	54.44	W	54.40	59.44	54.07	51.04	55.65
2013	51.99	W	50.44	W	51.93	56.37	51.13	43.83	54.00
2014	46.16	W	42.90	W	47.62	48.11	46.03	36.64	49.73
2015	44.13	52.35	44.67	W	44.66	43.86	44.14	36.80	46.04
2016	42.43	48.86	50.56	W	44.85	43.92	42.26	29.62	46.11

<sup>---</sup> Not applicable. W = Data withheld to avoid disclosure of individual company data. NA = Not available.

Notes: "Other U.S. Suppliers" are U.S. converters, enrichers, and fabricators. Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

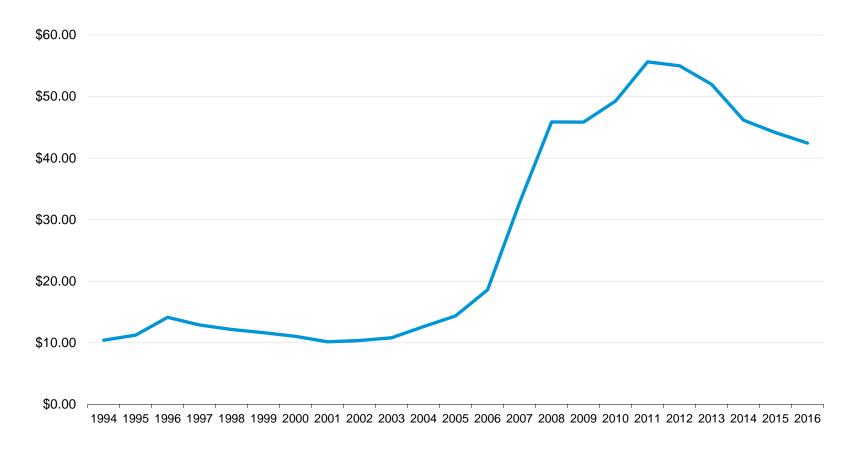
Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual, Tables 10, 11 and 16. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

<sup>&</sup>lt;sup>1</sup> Includes purchases between owners and operators of U.S. civilian nuclear power reactors along with purchases from other U.S. suppliers which are U.S. converters, enrichers, and fabricators.

 $<sup>^2</sup>$  Spot Contract: A one-time delivery (usually) of the entire contract to occur within one year of contract execution (signed date).

<sup>&</sup>lt;sup>3</sup> Short, Medium, and Long-Term Contracts: One or more deliveries to occur after a year following contract execution (signed date).

Figure S2. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016 deliveries



Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual reports. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Table S2. Uranium feed deliveries, enrichment services, and uranium loaded by owners and operators of U.S. civilian nuclear power reactors, 1994-2016

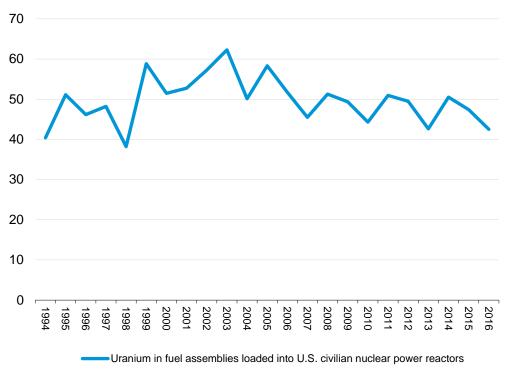
	Million pounds U	J₃O <sub>8</sub> equivalent	Million			
Year	Feed deliveries by owners and operators of U.S. civilian nuclear power reactors	Uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors	U.Sorigin enrichment services purchased	Foreign-origin enrichment services purchased	Total purchased enrichment services	Average price (US\$ per SWU)
1994	37.6	40.4	7.5	1.7	9.2	-
1995	44.3	51.1	6.7	2.8	9.5	-
1996	49.1	46.2	8.0	3.2	11.2	
1997	40.3	48.2	6.0	2.9	8.9	
1998	40.6	38.2	5.7	4.4	10.1	-
1999	43.9	58.8	4.6	5.4	10.0	-
2000	47.8	51.5	5.2	6.6	11.8	-
2001	47.3	52.7	1.3	9.1	10.4	-
2002	54.7	57.2	1.7	9.8	11.5	-
2003	49.3	62.3	1.7	10.3	12.0	-
2004	53.4	50.1	1.4	10.4	11.8	-
2005	52.9	58.3	1.1	10.3	11.4	-
2006	56.6	51.7	1.6	11.8	13.4	106.57
2007	49.0	45.5	1.5	12.7	14.2	114.58
2008	43.4	51.3	1.9	10.7	12.6	121.33
2009	51.9	49.4	4.1	13.1	17.2	130.78
2010	45.5	44.3	2.3	11.5	13.8	136.14
2011	51.3	50.9	2.4	12.4	14.8	136.12
2012	52.1	49.5	3.3	12.3	15.6	141.36
2013	47.4	42.6	3.9	8.5	12.3	142.22
2014	41.9	50.5	3.8	9.2	12.9	140.75
2015	41.4	47.4	4.1	8.8	12.9	136.88
2016	43.1	42.5	4.8	9.5	14.3	131.00

<sup>- =</sup> No data reported.

Notes: Totals may not equal sum of components because of independent rounding. Average prices are not adjusted for inflation. Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual, Tables 22, 23, 25, and 27. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Figure S3. Uranium loaded into U.S. civilian nuclear power reactors, 1994-2016

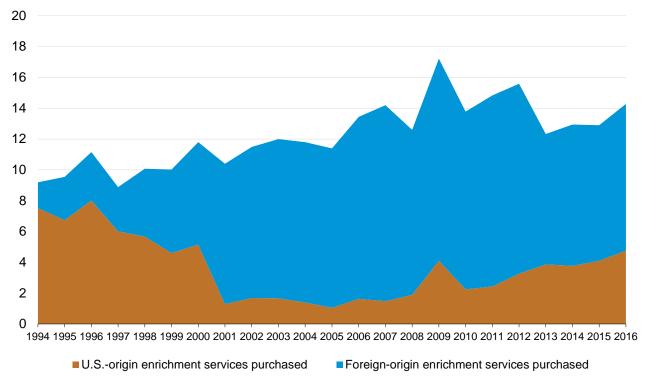
million pounds U<sub>3</sub>O<sub>8</sub> equivalent



Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual reports. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Figure S4. Uranium enrichment services purchased by owners and operators of U.S. civilian nuclear power reactors, 1994-2016

million separative work units (SWU)



Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual reports. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Table S3a. Foreign purchases, foreign sales, and uranium inventories owned by U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors, 1994-2016

million pounds U<sub>3</sub>O<sub>8</sub> equivalent

Delivery year	Foreign purchases by U.S. suppliers	Foreign purchases by owners and operators of U.S. civilian nuclear power reactors	Total foreign purchases	U.S. broker and trader purchases from foreign suppliers	Foreign sales	U.S. supplier owned uranium inventories	Owners and operators of U.S. civilian nuclear power reactors owned uranium inventories	Total commercial uranium inventories
1994	21.1	15.5	36.6	22.3	17.7	21.5	65.4	86.9
1995	20.2	21.1	41.3	18.3	9.8	13.7	58.7	72.5
1996	21.7	23.7	45.4	17.8	11.5	13.9	66.1	80.0
1997	20.4	22.5	43.0	15.7	17.0	40.4	65.9	106.2
1998	22.6	21.1	43.7	21.7	15.1	70.7	65.8	136.5
1999	21.0	26.6	47.6	19.2	8.5	68.8	58.3	127.1
2000	17.4	27.5	44.9	15.8	13.6	56.5	54.8	111.3
2001	18.7	28.0	46.7	18.3	11.7	48.1	55.6	103.8
2002	22.7	30.0	52.7	18.6	15.4	48.7	53.5	102.1
2003	18.2	34.9	53.0	15.8	13.2	39.9	45.6	85.5
2004	30.2	35.9	66.1	26.4	13.2	37.5	57.7	95.2
2005	27.0	38.5	65.5	24.0	20.5	29.1	64.7	93.8
2006	26.1	38.7	64.8	24.0	18.7	29.1	77.5	106.6
2007	21.6	32.5	54.1	18.9	14.8	31.2	81.2	112.4
2008	24.1	32.9	57.1	21.3	17.2	27.0	83.0	110.0
2009	26.7	32.2	58.9	26.8	23.5	26.8	84.8	111.5
2010	25.0	30.4	55.3	24.7	23.1	24.7	86.5	111.3
2011	19.3	35.1	54.4	19.6	16.7	22.3	89.8	112.1
2012	20.2	36.0	56.2	20.2	18.0	23.3	97.6	120.9
2013	23.2	34.1	57.3	W	18.9	21.3	113.1	134.4
2014	24.2	34.4	58.6	W	20.0	18.7	114.0	135.5
2015	27.2	36.9	64.1	26.1	25.7	14.3	121.1	135.5
2016	22.1	28.5	50.7	22.1	17.2	15.3	128.6	143.9

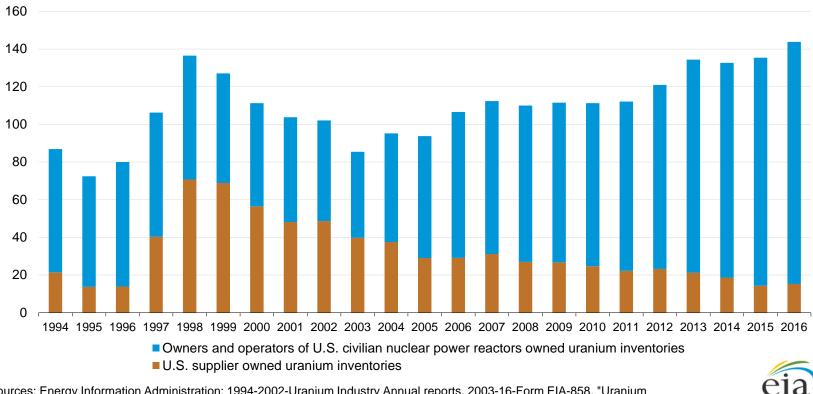
W = Data withheld to avoid disclosure of individual company data.

Notes: Totals may not equal sum of components because of independent rounding. Foreign purchase: A uranium purchase of foreign-origin uranium from a firm located outside the United States. Foreign sale: A uranium sale to a firm located outside the United States.

Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual, Tables 28, 29, 30 and 31. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Figure S5. Total commercial uranium inventories of U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors, 1994-2016

million pounds U<sub>3</sub>O<sub>8</sub> equivalent



Sources: Energy Information Administration: 1994-2002-Uranium Industry Annual reports. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey" .

Table S3b. Weighted-average price of foreign purchases and foreign sales by U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors, 1994-2016

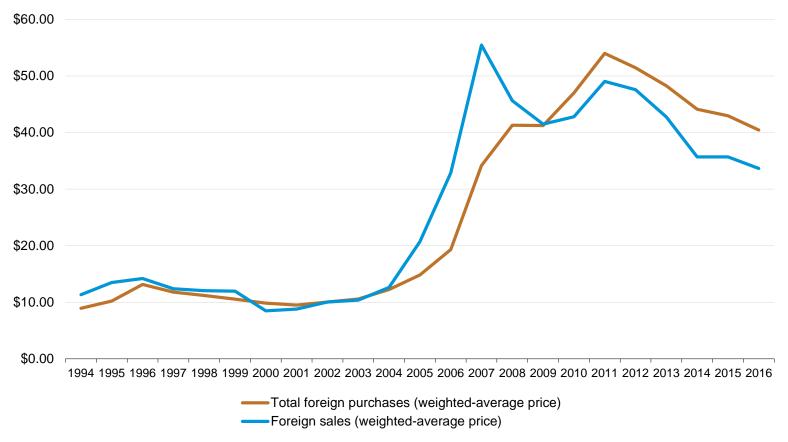
Delivery year	Foreign purchases by U.S. suppliers	Foreign purchases by owners and operators of U.S. civilian nuclear power reactors	Total foreign purchases (weighted-average price)		
1994	7.78	10.53	8.95	7.87	11.34
1995	8.96	11.39	10.20	9.02	13.48
1996	11.78	14.41	13.15	11.78	14.20
1997	10.61	12.89	11.81	10.71	12.39
1998	10.50	11.96	11.19	10.77	12.05
1999	9.42	11.45	10.55	9.60	11.97
2000	8.45	10.68	9.84	8.61	8.48
2001	8.98	9.87	9.51	8.87	8.79
2002	9.65	10.37	10.05	9.59	10.04
2003	10.19	10.79	10.59	10.19	10.39
2004	11.21	13.13	12.25	11.15	12.63
2005	15.11	14.63	14.83	15.68	20.70
2006	20.28	18.66	19.31	21.61	32.87
2007	36.59	32.58	34.18	39.88	55.47
2008	33.30	47.46	41.30	35.39	45.62
2009	34.80	46.55	41.23	34.88	41.48
2010	41.30	51.69	47.01	41.23	42.78
2011	48.80	56.87	54.00	49.27	49.05
2012	46.80	54.08	51.44	47.08	47.57
2013	43.25	51.64	48.24	W	42.75
2014	39.13	47.62	44.11	W	35.69
2015	40.68	44.70	42.96	40.77	35.69
2016	36.03	44.08	40.45	36.09	33.66

W = Data withheld to avoid disclosure of individual company data.

Notes: Totals may not equal sum of components because of independent rounding. Foreign purchase: A uranium purchase of foreign-origin uranium from a firm located outside the United States. Foreign sale: A uranium sale to a firm located outside the United States. Weighted-average prices are not adjusted for inflation.

Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual, Tables 28, 29, 30 and 31. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Figure S6. Weighted-average price of foreign purchases and foreign sales of uranium, 1994-2016



Sources: U.S. Energy Information Administration: 1994-2002-Uranium Industry Annual reports. 2003-16-Form EIA-858, "Uranium Marketing Annual Survey".

Table 1. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by supplier and delivery year, 2012-16

thousand pounds U<sub>3</sub>O<sub>8</sub> equivalent; dollars per pound U<sub>3</sub>O<sub>8</sub> equivalent

Deliveries	2012	2013	2014	2015	2016
Purchased from U.S. producers					
Purchases of U.Sorigin and foreign-					
origin uranium	W	W	W	1,455	2,169
Weighted-average price	W	W	W	52.35	48.86
Purchased from U.S. brokers and traders					
Purchases of U.Sorigin and foreign-					
origin uranium	11,545	12,835	17,111	13,852	7,862
Weighted-average price	54.44	50.44	42.90	44.67	50.56
Purchased from other owners and operator	s of U.S. civilian nucle	ar power reactors			
Purchases	0	0	0	W	W
Weighted-average price	<del></del>			W	W
Purchased from other U.S. suppliers					
Purchases of U.Sorigin and foreign-					
origin uranium	W	W	W	W	W
Weighted-average price	W	W	W	W	W
Purchased from foreign suppliers					
Purchases of U.Sorigin and foreign-					
origin uranium	37,624	37,405	34,404	38,184	39,469
Weighted-average price	54.40	51.93	47.62	44.66	44.85
Total purchased by owners and operators o	f U.S. civilian nuclear	power reactors			
Purchases of U.Sorigin and foreign-					
origin uranium	57,520	57,403	53,349	56,524	50,595
Weighted-average price	54.99	51.99	46.16	44.13	42.43

W = Data withheld to avoid disclosure of individual company data.

Notes: "Other U.S. Suppliers" are U.S. converters, enrichers, and fabricators. Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

<sup>-- =</sup> Not applicable.

Figure 1. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by supplier and delivery year, 2012-16

thousand pounds U<sub>3</sub>O<sub>8</sub> equivalent

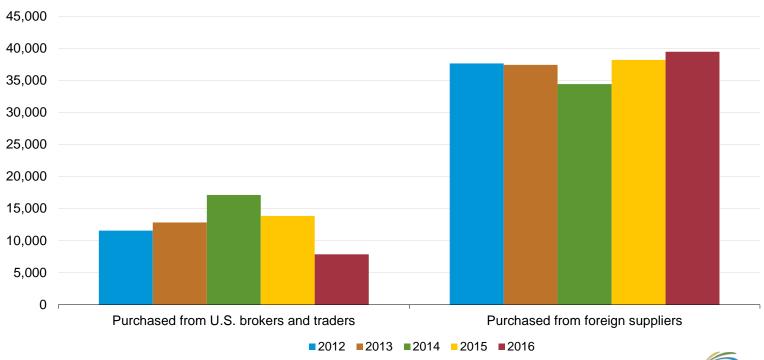




Figure 2. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors by supplier and delivery year, 2012-16

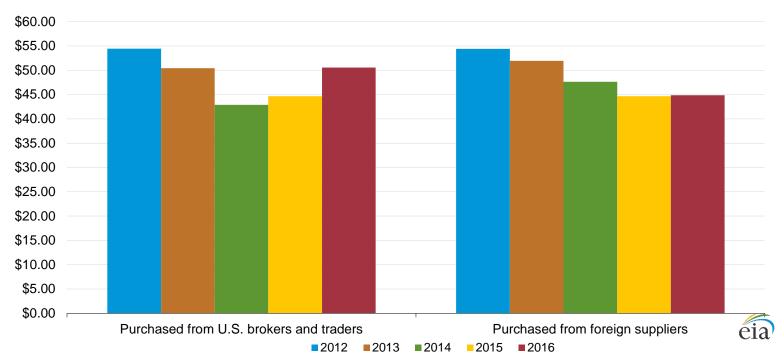


Table 2. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16

thousand pounds U308 equivalent; dollars per pound U308 equivalent

Deliveries	2012	2013	2014	2015	2016
U.Sorigin uranium					
Purchases	9,807	9,484	3,316	3,419	5,424
Weighted-average price	59.44	56.37	48.11	43.86	43.92
Foreign-origin uranium					
Purchases	47,713	47,919	50,033	53,106	45,171
Weighted-average price	54.07	51.13	46.03	44.14	42.26
Total					
Purchases	57,520	57,403	53,349	56,524	50,595
Weighted-average price	54.99	51.99	46.16	44.13	42.43

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

Figure 3. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16

thousand pounds U<sub>3</sub>O<sub>8</sub> equivalent

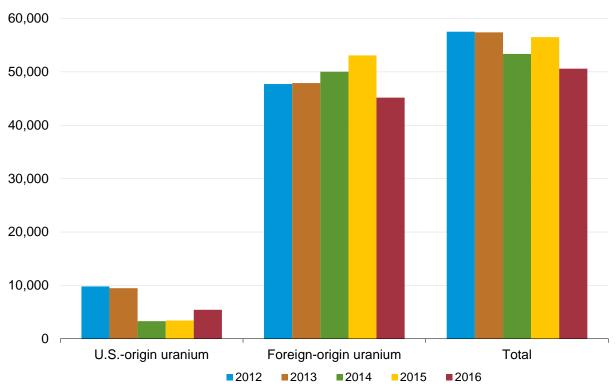


Figure 4. Weighted-average price of uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16

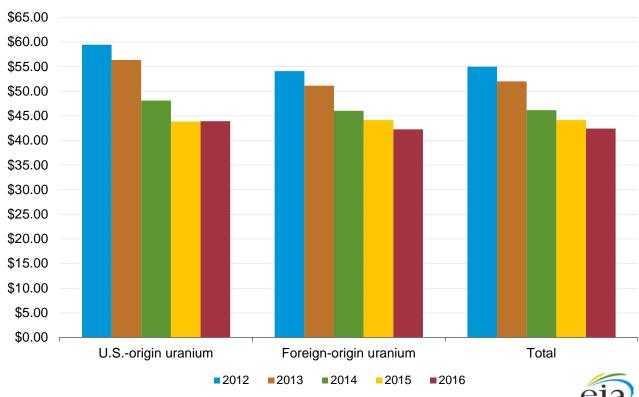


Table 3. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin country and delivery year, 2012-16

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

	Deliveries in 2012		Deliveries in 2013		Deliveries in 2014		Deliveries in 2015		Deliveries in 2016	
Origin country	Purchases	Weighted- average price								
Australia	6,724	51.17	10,741	49.92	10,511	48.03	9,678	44.16	8,963	43.05
Brazil	W	W	W	W	W	W	0		W	W
Bulgaria	0		0		0		W	W	W	W
Canada	13,584	56.75	7,808	52.61	9,789	45.87	16,876	45.84	11,119	43.22
China	W	W	W	W	W	W	0		W	W
Czech Republic	0		W	W	W	W	W	W	W	W
Germany	0		W	W	0		0		W	W
Hungary	0		W	W	0		0		0	
Kazakhstan	6,234	51.69	6,454	46.73	12,032	44.47	10,723	42.82	10,806	39.91
Malawi	W	W	1,277	59.89	1,514	44.94	W	W	519	41.38
Namibia	5,986	54.56	5,677	49.78	4,603	45.54	3,456	48.57	1,993	44.30
Niger	2,133	50.45	1,666	51.26	1,316	42.86	922	39.74	1,032	44.12
Portugal	0		W	W	0		0		0	
Russia	7,643	54.40	10,580	53.73	6,859	45.65	9,063	40.87	6,539	43.85
South Africa	1,243	56.45	186	46.72	938	43.71	826	37.64	1,169	43.75
Ukraine	W	W	0		W	W	0		W	W
United Kingdom	0		0		W	W	0		0	
Uzbekistan	2,576	52.80	3,064	50.02	1,779	46.84	1,040	47.90	2,030	39.18
unknown	0		W	W	W	W	W	W	W	W
Foreign Total	47,713	54.07	47,919	51.13	50,033	46.03	53,106	44.14	45,171	42.26
United States	9,807	59.44	9,484	56.37	3,316	48.11	3,419	43.86	5,424	43.92
<b>Total Purchases</b>	57,520	54.99	57,403	51.99	53,349	46.16	56,524	44.13	50,595	42.43
		C								

W = Data withheld to avoid disclosure of individual company data. -- = Not applicable.

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation. Source: U.S. Energy Information Administration: Form EIA-858 "Uranium Marketing Annual Survey" (2012-16).

Figure 5. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by selected origin country and delivery year, 2012-16

thousand pounds U<sub>3</sub>O<sub>8</sub> equivalent

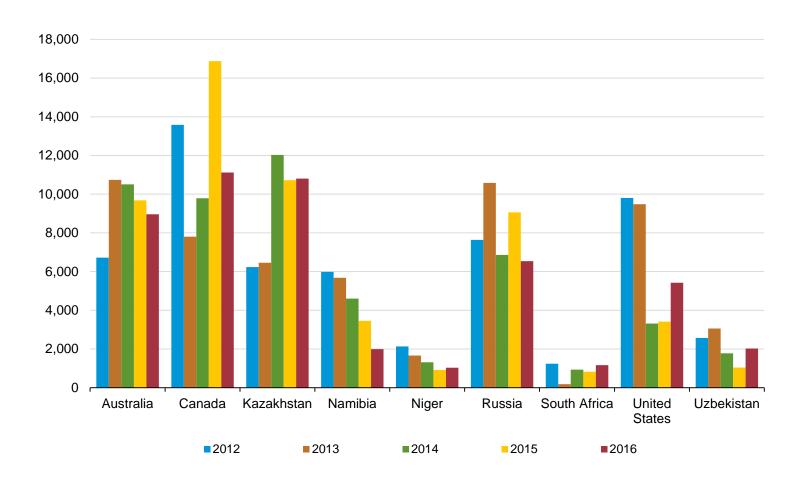


Table 4. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin and material type, 2016 deliveries

thousand pounds U308 equivalent; dollars per pound U308 equivalent

	Uranium				
Deliveries	concentrate	Natural UF <sub>6</sub>	Enriched UF <sub>6</sub>	Enriched UF6	Total
U.Sorigin uranium					
Purchases	2,454	W	W	2,970	5,424
Weighted-average price	44.71	W	W	43.15	43.92
Foreign-origin uranium					
Purchases	24,975	W	W	20,195	45,171
Weighted-average price	40.44	W	W	44.72	42.26
Total					
Purchases	27,430	14,628	8,537	23,165	50,595
Weighted-average price	40.82	44.91	43.88	44.53	42.43

W = Data withheld to avoid disclosure of individual company data.

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation. Natural UF $_6$  is uranium hexafluoride. The natural UF $_6$  and enriched UF $_6$  quantity represents only the U $_3$ O $_8$  equivalent uranium-component quantity specified in the contract for each delivery of natural UF $_6$  and enriched UF $_6$ . The natural UF $_6$  and enriched UF $_6$  weighted-average price represent only the U $_3$ O $_8$  equivalent uranium-component price specified in the contract for each delivery of natural UF $_6$  and enriched UF $_6$ , and does not include the conversion service and enrichment service components.

Figure 6. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by material type, 2016 deliveries

thousand pounds U<sub>3</sub>O<sub>8</sub> equivalent

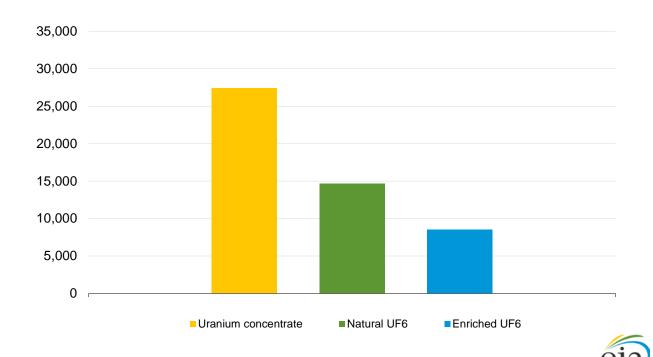


Table 5. Average price and quantity for uranium purchased by owners and operators of U.S. civilian nuclear power reactors by pricing mechanisms and delivery year, 2015-16

dollars per pound U308 equivalent; thousand pounds U308 equivalent

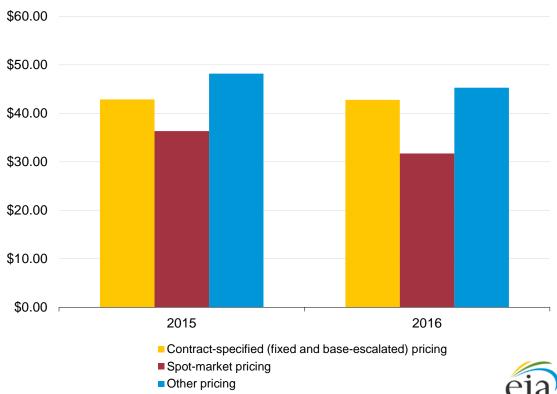
	Domestic p	ourchases 1	Foreign purchases <sup>2</sup>		Total purchases			
Pricing mechanisms	2015	2016	2015	2016	2015	2016		
Contract-specified (fixed and base-escalated) pricing								
Weighted-average price	40.34	39.82	44.93	47.09	42.88	42.78		
Quantity with reported price	13,862	13,917	17,241	14,439	31,104	30,344		
Spot-market pricing								
Weighted-average price	38.22	26.08	35.94	34.61	36.36	31.73		
Quantity with reported price	876	871	3,881	3,064	4,756	4,448		
Other pricing								
Weighted-average price	53.59	52.67	46.74	42.52	48.19	45.30		
Quantity with reported price	3,931	3,524	14,666	9,335	18,597	12,858		
All pricing mechanisms								
Weighted-average price	43.03	41.64	44.70	44.08	44.13	42.43		
Quantity with reported price	18,669	18,312	35,788	26,837	54,457	47,650		
Total quantity	19,612	18,797	36,912	28,512	56,524	50,595		

<sup>&</sup>lt;sup>1</sup> A uranium purchase of both U.S.-origin uranium or from a firm located in the United States.

Notes: Totals may not equal sum of components because of independent rounding or a unique procurement method using multiple or unknown sources. Weighted-average prices are not adjusted for inflation.

 $<sup>^{2}</sup>$  A uranium purchase of foreign-origin uranium from a firm located outside of the United States.

Figure 7. Average price for uranium purchased by owners and operators of U.S. civilian nuclear power reactors by pricing mechanisms and delivery year, 2015-16



# Table 6a. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors ranked by price and distributed by quantity, 2014-16 deliveries

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

	Deliveries in 2014	Deliveries in 2015 Deliveries in 2016					
Quantity distribution <sup>1</sup>	Quantity with reported price	Weighted- average price	Quantity with reported price	Weighted- average price	Quantity with reported price	Weighted- average price	
First	6,665	30.26	6,807	29.68	5,956	21.64	
Second	6,665	35.11	6,807	36.03	5,956	28.18	
Third	6,665	39.29	6,807	38.63	5,956	34.60	
Fourth	6,665	43.36	6,807	41.80	5,956	39.41	
Fifth	6,665	46.74	6,807	44.63	5,956	42.82	
Sixth	6,665	50.65	6,807	47.84	5,956	47.59	
Seventh	6,665	55.49	6,807	52.69	5,956	54.68	
Eighth	6,665	68.37	6,807	61.70	5,956	70.52	
Total	53,323	46.16	54,457	44.13	47,650	42.43	

<sup>&</sup>lt;sup>1</sup> Distribution divides total quantity of uranium delivered (with a price) into eight distributions by price (sorted from lowest to highest) and provides the quantity-weighted average price for each distribution.

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

# Table 6b. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors ranked by price and distributed by purchaser, 2014-16 deliveries

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

		Deliv	eries in 2014	Deliveries in 2015				Deliveries in 2016	
Distribution of purchasers	Number of purchasers	Quantity with reported price	Weighted- average price	Number of purchasers	Quantity with reported price	Weighted- average price	Number of purchasers	Quantity with reported price	Weighted- average price
First	8	11,681	37.64	8	11,864	39.35	7	9,736	34.43
Second	7	8,493	42.68	7	22,481	43.16	7	7,195	39.70
Third	7	21,805	48.04	7	10,889	46.47	7	20,508	42.87
Fourth	7	11,344	53.91	7	9,222	49.86	6	10,212	51.10
Total	29	53,323	46.16	29	54,457	44.13	27	47,650	42.43

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

# Table 7. Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by contract type and material type, 2016 deliveries

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

		Spot Contracts <sup>1</sup>	Long-	Term Contracts <sup>2</sup>	Total		
Material Type	Quantity with reported price	Weighted- average price	Quantity with reported price	Weighted- average price	Quantity with reported price	Weighted- average price	
U <sub>3</sub> O <sub>8</sub>	7,822	31.07	19,595	44.71	27,417	40.82	
Natural UF <sub>6</sub>	W	w	W	W	14,367	44.91	
Enriched UF <sub>6</sub>	W	W	W	W	5,866	43.88	
Total	10,636	29.62	37,014	46.11	47,650	42.43	

<sup>&</sup>lt;sup>1</sup> A one-time delivery (usually) of the entire contract to occur within one year of contract execution (signed date).

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.  $UF_6$  is uranium hexafluoride. The natural  $UF_6$  and enriched  $UF_6$  quantity represents only the  $U_3O_8$  equivalent uranium-component quantity specified in the contract for each delivery of natural  $UF_6$  and enriched  $UF_6$ . The natural  $UF_6$  and enriched  $UF_6$  weighted-average price represent only the  $U_3O_8$  equivalent uranium-component price specified in the contract for each delivery of natural  $UF_6$  and enriched  $UF_6$ , and does not include the conversion service and enrichment service components.

<sup>&</sup>lt;sup>2</sup> One or more deliveries to occur after a year following contract execution (signed date).

### Table 8. Contracts signed in 2016 by owners and operators of U.S. civilian nuclear power reactors by contract type

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

Purchase contract type (Signed in 2016)	Quantity of deliveries received in 2016	Weighted-average price	Number of purchase contracts for deliveries in 2016
Spot	6,280	24.59	45
Long-term	2,385	25.94	5
Total	8,665	24.86	50

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

## Table 9. Contracted purchases of uranium by owners and operators of U.S. civilian nuclear power reactors, signed in 2015, by delivery year, 2017-26

thousand pounds U3O8 equivalent

Year of delivery	Minimum	Maximum
2017	4,617	4,959
2018	5,196	5,952
2019	3,819	4,290
2020	2,940	3,446
2021	1,750	2,318
2022	836	994
2023	1,347	2,483
2024	w	2,063
2025	w	W
2026	0	W
Total	21,942	28,172

W = Data withheld to avoid disclosure of individual company data.

Note: Totals may not equal sum of components because of independent rounding.

Source: U.S. Energy Information Administration, Form EIA-858  $\,$ 

"Uranium Marketing Annual Survey" (2016).

Figure 8. Contracted purchases of uranium by owners and operators of U.S. civilian nuclear power reactors, signed in in 2015, by delivery year, 2017-22

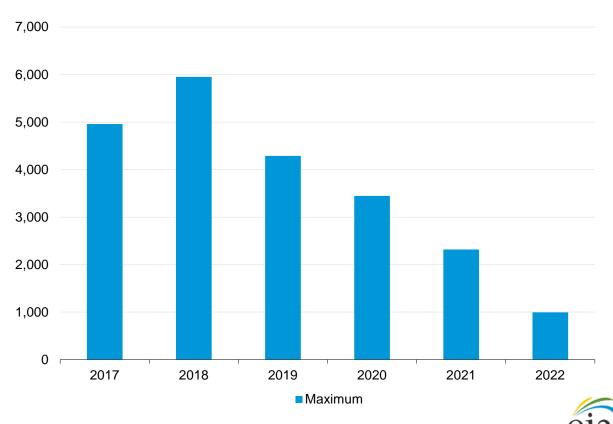


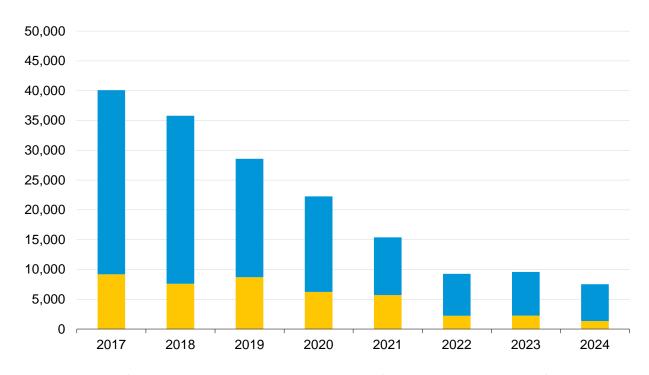
Table 10. Contracted purchases of uranium from suppliers by owners and operators of U.S. civilian nuclear power reactors, in effect at the end of 2016, by delivery year, 2017-26

	Contracted pur U.S. sup		Contracted pur foreign su		Contracted purchases from all suppliers	
Year of delivery	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
2017	7,931	9,182	28,906	30,911	36,837	40,093
2018	7,081	7,619	25,678	28,180	32,759	35,799
2019	7,903	8,694	17,735	19,880	25,638	28,574
2020	4,429	6,234	13,637	16,040	18,066	22,274
2021	3,915	5,691	8,675	9,710	12,590	15,401
2022	1,718	2,238	6,554	7,037	8,272	9,274
2023	1,741	2,267	5,859	7,319	7,600	9,586
2024	W	1,352	W	6,178	W	7,530
2025	W	1,642	W	3,428	W	5,069
2026	0	0	W	1,153	W	1,153
Total	36,885	44,917	115,231	129,836	152,115	174,753

W = Data withheld to avoid disclosure of individual company data.

Note: Totals may not equal sum of components because of independent rounding.

Figure 9. Maximum contracted purchases of uranium from suppliers by owners and operators of U.S. civilian nuclear power reactors, in effect at the end of 2015, by delivery year, 2017-24



■ Contracted purchases from foreign suppliers ■ Contracted purchases from U.S. suppliers



Table 11. Unfilled uranium market requirements of owners and operators of U.S. civilian nuclear power reactors, 2016-26

	As of Dece	ember 31, 2015	As of Dece	mber 31, 2016
Year	Annual	Cumulative	Annual	Cumulative
2016	3,152	3,152	<del>-</del>	<b></b>
2017	4,656	7,807	3,290	3,290
2018	9,943	17,750	6,255	9,544
2019	12,204	29,954	8,330	17,874
2020	21,404	51,358	10,662	28,536
2021	35,154	86,513	18,895	47,430
2022	41,497	128,010	32,171	79,601
2023	40,790	168,799	33,634	113,235
2024	47,313	216,112	38,125	151,360
2025	42,750	258,862	41,243	192,603
2026	-		40,691	233,294

<sup>- =</sup> No data reported. -- = Not applicable.

Note: Totals may not equal sum of components because of independent rounding. Source: U.S. Energy Information Administration, Form EIA-858 "Uranium Marketing Annual Survey" (2015-16).

Figure 10. Annual unfilled uranium market requirements of owners and operators of U.S. civilian nuclear power reactors, as of 12/31/2015 and 12/31/2016

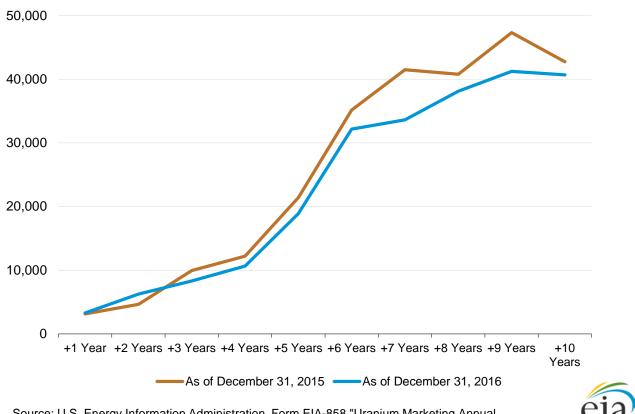


Table 12. Maximum anticipated uranium market requirements of owners and operators of U.S. civilian nuclear power reactors, 2017-26, as of December 31, 2016

Year	Maximum under purchase contracts	Unfilled market requirements	Maximum anticipated market requirements	Enrichment feed deliveries
2017	40,093	3,290	43,383	45,591
2018	35,799	6,255	42,053	47,193
2019	28,574	8,330	36,904	44,489
2020	22,274	10,662	32,936	47,127
2021	15,401	18,895	34,295	46,208
2022	9,274	32,171	41,445	46,690
2023	9,586	33,634	43,219	44,110
2024	7,530	38,125	45,655	48,108
2025	5,069	41,243	46,312	45,514
2026	1,153	40,691	41,844	42,228
Total	174,753	233,294	408,047	457,259

Note: Totals may not equal sum of components because of independent rounding.

Figure 11. Maximum anticipated uranium market requirements of owners and operators of U.S. civilian nuclear power reactors, 2016-25, as of December 31, 2015

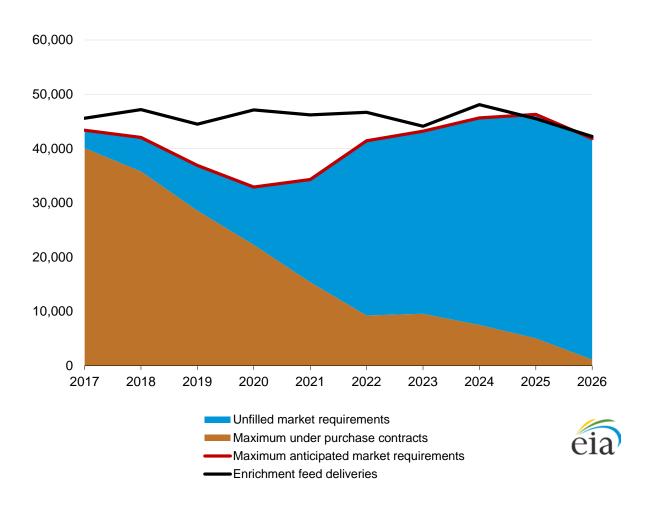


Table 13. Deliveries of uranium feed by owners and operators of U.S. civilian nuclear power reactors by enrichment country and delivery year, 2014-16

		Feed deliveri	es in 2014		Feed deliveri	ies in 2015		Feed deliveri	es in 2016
Enrichment country	U.S origin	Foreign- origin	Total	U.S origin	Foreign- origin	Total	U.S origin	Foreign- origin	Total
China	W	W	W	0	W	w	0	0	_
France	0	3,055	3,055	W	W	3,299	W	W	2,555
Germany	W	W	2140	W	W	W	W	W	W
Netherlands	0	3,115	3,115	W	W	4,180	666	2,832	3,498
Russia	0	W	W	0	2089	2089	W	W	3,974
United Kingdom	W	W	2,975	W	W	3,460	0	W	W
Europe <sup>1</sup>	W	W	6,750	0	8297	8,297	721	7,773	8,494
unknown <sup>2</sup>	0	0	0	0	W	W	0	0	<u>-</u>
Foreign total	826	21,248	22,074	1,056	22,437	23,493	2,334	18,106	20,440
United States	1,893	17,961	19,854	1,485	16,407	17,892	2,463	20,207	22,670
Total	2,719	39,209	41,928	2,541	38,844	41,385	4,798	38,313	43,110

W = Data withheld to avoid disclosure of individual company data.

Note: Totals may not equal sum of components because of independent rounding.

<sup>&</sup>lt;sup>1</sup> Specific country in Europe was not reported.

<sup>&</sup>lt;sup>2</sup> Specific country was not reported.

Figure 12. Deliveries of uranium feed for U.S. and foreign enrichment by owners and operators of U.S. civilian nuclear power reactors by delivery year, 2014-16

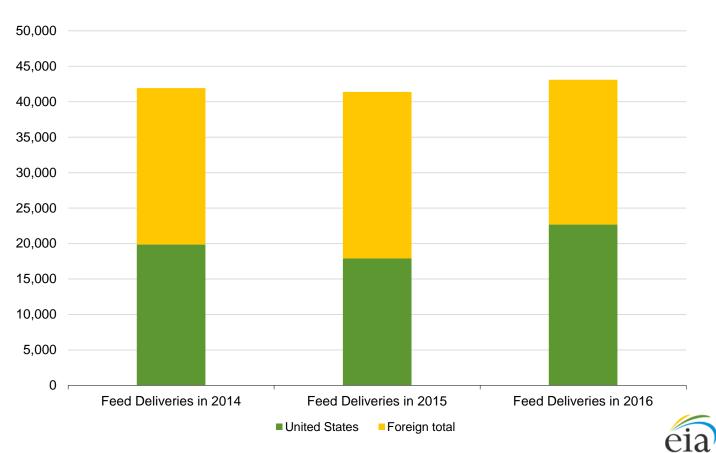


Table 14. Deliveries of uranium feed for enrichment by owners and operators of U.S. civilian nuclear power reactors by origin country and delivery year, 2014-16

		Deliv	eries in 2014		Deliver	ies in 2015		Deliver	ies in 2016
Origin country of feed	U.S. enrichment	Foreign enrichment	Total	U.S. enrichment	Foreign enrichment	Total	U.S. enrichment	Foreign enrichment	Total
Australia	910	4,467	5,377	1,673	3,797	5,470	6,524	3,098	9,622
Brazil	0	W	W	0	W	w	W	W	W
Canada	5,424	4,315	9,738	6,212	9,698	15,910	6,635	6,912	13,546
China	0	W	w	0	W	w	0	0	0
Czech Republic	0	0	0	0	W	w	W	W	W
Kazakhstan	W	W	3,868	3,490	4,173	7,662	2,658	5,027	7,685
Malawi	W	W	745	W	W	347	W	W	W
Namibia	1,143	1,798	2,941	963	1,588	2,551	1,033	698	1,731
Niger	W	W	1,322	0	W	w	W	W	W
Portugal	0	0	0	0	0	0	0	0	0
Russia	8,313	4,174	12,486	4,019	1,490	5,509	W	W	4,163
South Africa	109	322	431	W	W	445	W	W	296
Ukraine	0	W	w	0	0	0	0	0	0
United Kingdom	W	0	W	0	0	0	0	0	0
Uzbekistan	W	W	823	W	W	108	W	W	581
unknown	0	0	0	0	W	w	W	W	W
Foreign total	17,961	21,248	39,209	16,407	22,437	38,844	20,207	18,106	38,313
United States	1,893	826	2,719	1,485	1,056	2,541	2,463	2,334	4,798
Total	19,854	22,074	41,928	17,892	23,493	41,385	22,670	20,440	43,110

W = Data withheld to avoid disclosure of individual company data.

Note: Totals may not equal sum of components because of independent rounding.

Figure 13. Deliveries of uranium feed for enrichment by owners and operators of U.S. civilian nuclear power reactors by selected origin country of feed and delivery year, 2014-16

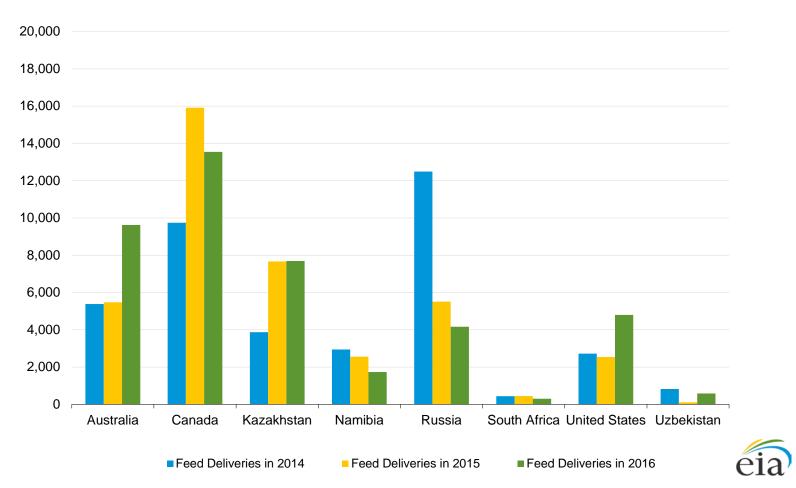


Table 15. Shipments of uranium feed by owners and operators of U.S. civilian nuclear power reactors to domestic and foreign enrichment suppliers, 2016-25

	Amount	of feed to be shipped	Change :	from 2015 to 2016
	As of	As of		
Year of shipment	December 31, 2015	December 31, 2016	Annual	Cumulative
2017	43,576	45,591	2,015	2,015
2018	41,579	47,193	5,614	7,629
2019	40,326	44,489	4,163	11,792
2020	45,243	47,127	1,884	13,676
2021	47,024	46,208	-816	12,860
2022	47,139	46,690	-449	12,411
2023	45,242	44,110	-1,132	11,279
2024	51,712	48,108	-3,604	7,675
2025	45,224	45,514	290	7,965
2026	-	42,228		

<sup>- =</sup> No data reported. -- = Not applicable.

Note: Totals may not equal sum of components because of independent rounding.

Figure 14. Shipments of uranium feed by owners and operators of U.S. civilian nuclear power reactors to domestic and foreign enrichment suppliers, 2017-25

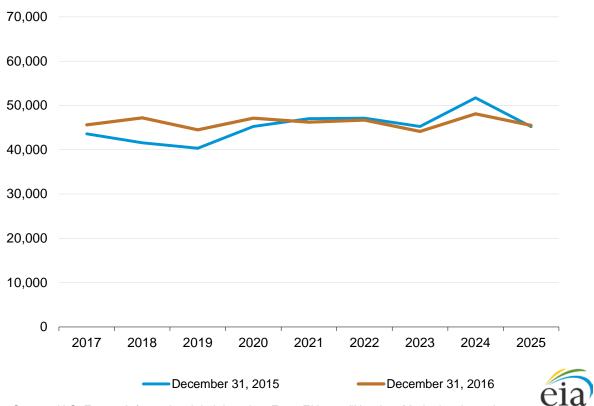


Table 16. Purchases of enrichment services by owners and operators of U.S. civilian nuclear power reactors by origin country and year, 2012-16

thousand separative work units (SWU)

Country of enrichment service (SWU-

origin)	2012	2013	2014	2015	2016
China	W	W	636	W	W
France	0	0	0	0	0
Germany	1,075	753	1,005	1,281	1,636
Netherlands	1,496	2,112	1,801	2,385	2,546
Russia	6,560	2,491	3,083	2,234	3,188
United Kingdom	2,648	2,674	2,435	2,522	1,003
Europe <sup>1</sup>	W	0	W	0	W
Other <sup>2</sup>	W	W	W	W	501
Foreign total	12,330	8,464	9,165	8,769	9,524
United States	3,261	3,867	3,773	4,146	4,756
Total	15,590	12,331	12,939	12,914	14,280
Average price (US\$ per SWU)	141.36	142.22	140.75	136.88	131.00

W = Data withheld to avoid disclosure of individual company data.

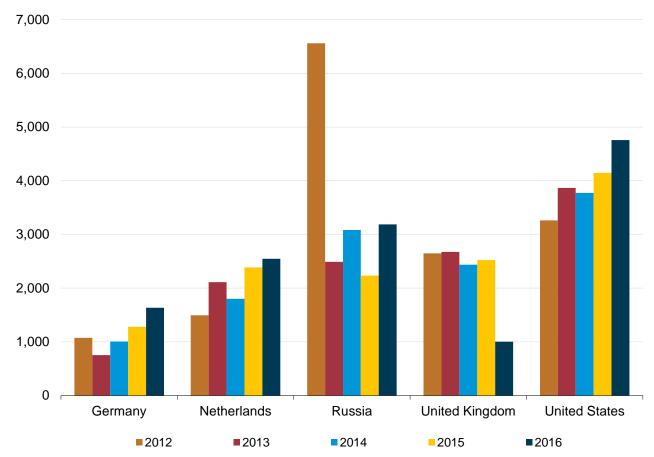
Notes: Totals may not equal sum of components because of independent rounding. Average prices are not adjusted for inflation.

<sup>&</sup>lt;sup>1</sup> Specific country in Europe was not reported.

<sup>&</sup>lt;sup>2</sup> Specific country was not reported.

Figure 15. Purchases of enrichment services by owners and operators of U.S. civilian nuclear power reactors by selected origin country and year, 2012-16

thousand separative work units (SWU)



### Table 17. Purchases of enrichment services by owners and operators of U.S. civilian nuclear power reactors by contract type in delivery year, 2016

thousand separative work units (SWU)

Enrichment service contract		Foreign	
type	U.S. enrichment	enrichment	Total
Spot	W	W	116
Long-term	W	W	14,164
Total	4,756	9,524	14,280

W = Data withheld to avoid disclosure of individual company data.

Note: Totals may not equal sum of components because of independent rounding. Source: U.S. Energy Information Administration, Form EIA-858 "Uranium Marketing Annual Survey" (2016).

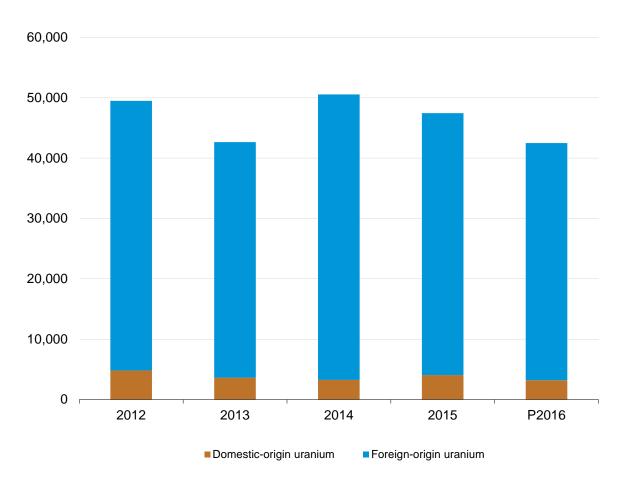
Table 18. Uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors by year, 2012-16

Origin of uranium	2012	2013	2014	2015	P2016
Domestic-origin uranium	4,825	3,643	3,251	4,050	3,204
Foreign-origin uranium	44,657	39,000	47,281	43,381	39,291
Total	49,483	42,642	50,532	47,431	42,495

P = Preliminary data. Final 2015 fuel assembly data reported in the 2016 survey.

Notes: Includes only unirradiated uranium in new fuel assemblies loaded into reactors during the year. Does not include uranium removed from reactors that subsequently will be reloaded. Totals may not equal sum of components because of independent rounding.

Figure 16. Uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors by year, 2012-16



P = Preliminary data. Final 2014 fuel assembly data reported in the 2015 survey. Source: U.S. Energy Information Administration, Form EIA-858 "Uranium Marketing Annual Survey" (2013-16).

Table 19. Foreign purchases of uranium by U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors by delivery year, 2012-16

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

Deliveries	2012	2013	2014	2015	2016
U.S. suppliers					
Foreign purchases	20,196	23,233	23,684	27,233	22,138
Weighted-average price	46.80	43.25	39.22	40.68	36.03
Owners and operators of U.S. civilian	nuclear power reactors				
Foreign purchases	36,037	34,195	32,863	37,001	28,512
Weighted-average price	54.08	51.67	47.51	44.67	44.08
Total					
Foreign purchases	56,233	57,428	56,547	64,234	50,650
Weighted-average price	51.44	48.27	44.03	42.95	40.45

Notes: Totals may not equal sum of components because of independent rounding. Foreign Purchase: A uranium purchase of foreign-origin uranium from a firm located outside of the United States. Weighted-average prices are not adjusted for inflation.

Figure 17. Foreign purchases of uranium by U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors by delivery year, 2012-16

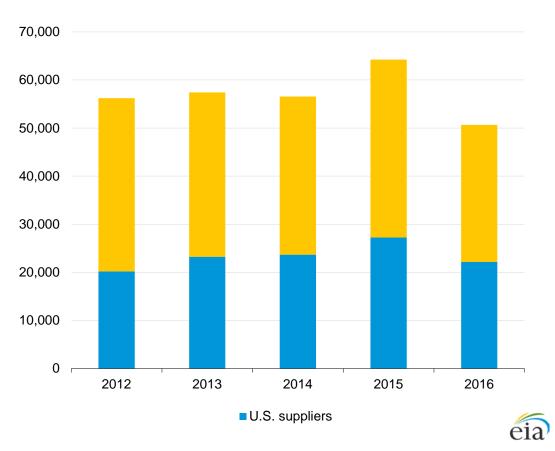


Table 20. U.S. broker and trader purchases of uranium by origin, supplier, and delivery year, 2012-16

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

Deliveries	2012	2013	2014	2015	2016
Received U.Sorigin uranium					
Purchases	1,194	W	410	2,702	3,266
Weighted-average price	51.78	W	33.55	35.04	26.31
Received foreign-origin uranium					
Purchases	24,606	W	28,743	33,014	34,046
Weighted-average price	47.75	W	38.42	39.58	32.71
Total received by U.S. brokers and traders					
Purchases	25,800	30,191	29,153	35,716	37,312
Weighted-average price	47.94	42.95	38.35	39.24	32.11
Received from foreign suppliers					
Purchases	20,243	W	W	26,069	22,088
Weighted-average price	47.08	W	W	41	36.09

W = Data withheld to avoid disclosure of

individual company data.

Notes: Totals may not equal sum of components because of independent rounding. Weighted-average prices are not adjusted for inflation.

Figure 18. U.S. broker and trader purchases of uranium by delivery year, 2012-16

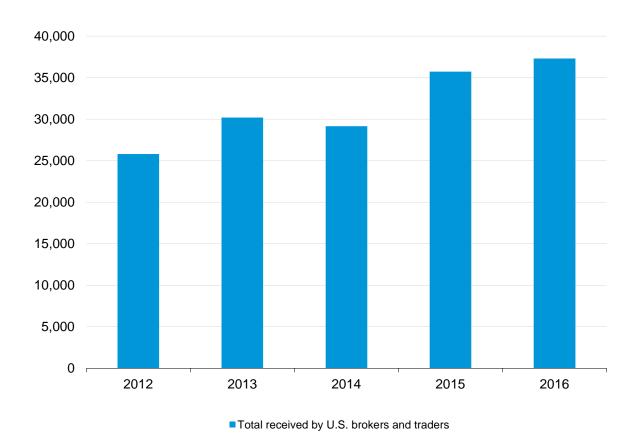


Table 21. Foreign sales of uranium from U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16

thousand pounds U3O8 equivalent; dollars per pound U3O8 equivalent

Deliveries to foreign suppliers and utilities	2012	2013	2014	2015	2016
U.Sorigin uranium					
Foreign sales	4,798	4,148	4,210	4,258	3,142
Weighted-average price	47.53	43.10	32.91	37.85	25.99
Foreign-origin uranium					
Foreign sales	13,185	14,717	15,794	21,465	14,034
Weighted-average price	47.58	42.66	36.43	39.58	35.38
Total sent:					
Foreign sales	17,982	18,864	20,004	25,723	17,176
Weighted-average price	47.57	42.75	35.69	39.29	33.66
From owners and operators of U.S. civilian nuclear	power reactors, U	.S. producers, a	nd other U.S. sı	uppliers	
Foreign sales	3,699	4,177	4,493	6,022	3,153
Weighted-average price	47.26	44.61	36.45	38.77	30.26
From U.S. brokers and traders					
Foreign sales	14,284	14,687	15,511	19,700	14,023
Weighted-average price	47.65	42.26	35.47	39.45	34.43

Notes: "Other U.S. Suppliers" are U.S. converters, enrichers, and fabricators. Totals may not equal sum of components because of independent rounding. Foreign sale: A uranium sale to a firm located outside the United States. Weighted-average prices are not adjusted for inflation.

Figure 19. Foreign sales of uranium from U.S. suppliers and owners and operators of U.S. civilian nuclear power reactors by origin and delivery year, 2012-16

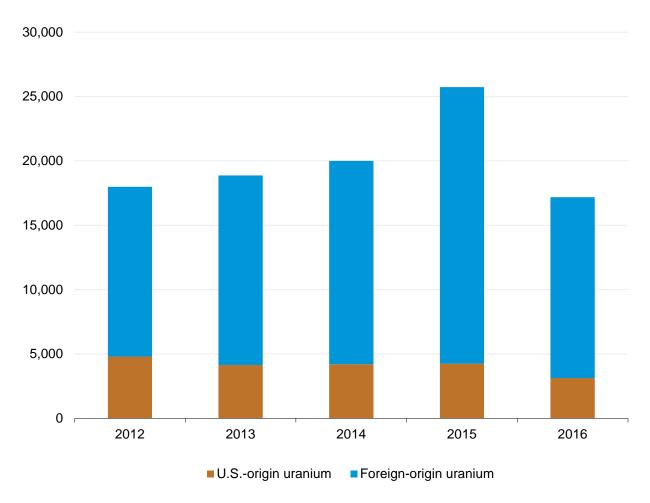


Table 22. Inventories of natural and enriched uranium by material type as of end of year, 2012-16

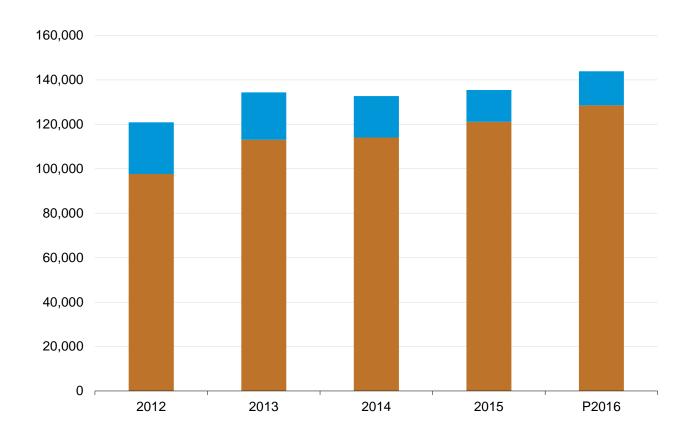
Inventories at the end of the year Type of Uranium Inventory Owned by 2012 2013 2014 2015 P2016 Owners and operators of U.S. civilian nuclear power reactors inventories 97,647 113,077 114,046 121,131 128,554 20,790 Uranium concentrate (U<sub>3</sub>O<sub>8</sub>) 15,963 18,131 19,060 20,635 Natural UF<sub>6</sub> 29,084 38,332 40,803 48,136 54,231 Enriched UF<sub>6</sub> 38,428 40,841 43,382 41,557 43,704 Fabricated fuel (not inserted into a reactor) 14,173 15,773 10,802 10,803 9,829 U.S. supplier inventories 23,289 21,342 18,682 14,340 15,310 W 7,658 6,170 6,289 7,184 Uranium concentrate (U<sub>3</sub>O<sub>8</sub>) Natural UF<sub>6</sub> W W W W W W W W Enriched UF<sub>6</sub> W W 0 Fabricated fuel (not inserted into a reactor) 0 0 0 0 **Total Commercial Inventories** 120,936 134,418 132,728 135,471 143,864

W = Data withheld to avoid disclosure of individual company data.

Note: Totals may not equal sum of components because of independent rounding.

P = Preliminary data. Final 2015 inventory data reported in the 2016 survey.

Figure 20. Commercial inventories of natural and enriched uranium as of end of year, 2012-16

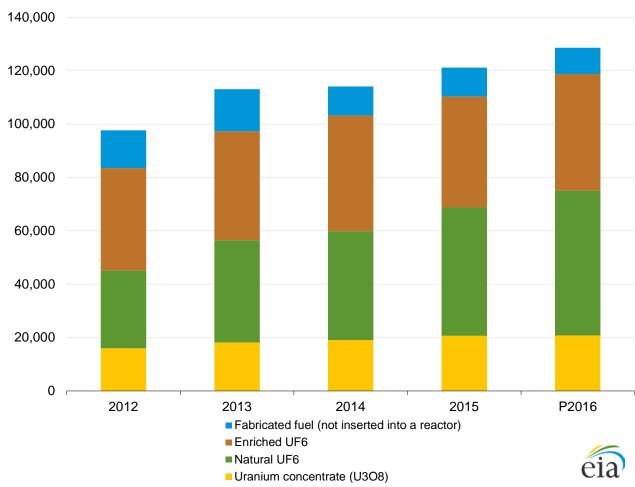


■ Owners and operators of U.S. civilian nuclear power reactors inventories ■ U.S. supplier inventories

P = Preliminary data. Final 2015 inventory data reported in the 2016 survey. Source: U.S. Energy Information Administration, Form EIA-858 "Uranium Marketing Annual Survey" (2013-16).



Figure 21. Owners and operators of U.S. civilian nuclear power reactors inventories by material type as of end of year, 2012-16



P = Preliminary data. Final 2015 inventory data reported in the 2016 survey. Source: U.S. Energy Information Administration, Form EIA-858 "Uranium Marketing Annual Survey" (2013-16).

### Table 23. Inventories of uranium by owner as of end of year, 2012-16

thousand pounds U<sub>3</sub>O<sub>8</sub> equivalent

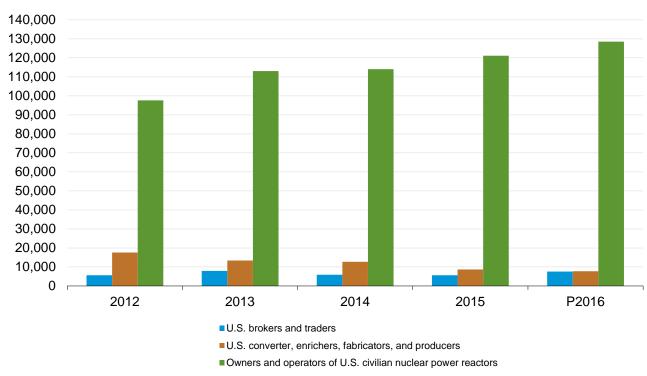
#### Inventories at the End of Year

Owner of uranium inventory	2012	2013	2014	2015	P2016
Owners and operators of U.S. civilian nuclear power reactors	97,647	113,007	114,046	121,131	128,554
U.S. brokers and traders	5,677	7,926	5,916	5,678	7,554
U.S. converter, enrichers, fabricators, and producers	17,611	13,416	12,766	8,662	7,756
Total commercial inventories	120,936	134,418	132,728	135,471	143,864

P = Preliminary data. Final 2015 inventory data reported in the 2016 survey.

Note: Totals may not equal sum of components because of independent rounding.

Figure 22. Commercial inventories of uranium by owner as of end of year, 2012-16



P=Preliminary data. Final 2014 inventory data reported in the 2015 survey. Source: U.S. Energy Information Administration, Form EIA-858 "Uranium Marketing Annual Survey" (2013-16).

Table 24. Uranium sellers to owners and operators of U.S. civilian nuclear power reactors, 2014-16

2014	2015	2016
Advance Uranium Asset Management Ltd.	AREVA / AREVA NC, Inc.	AREVA / AREVA NC, Inc.
AREVA / AREVA NC, Inc.	ARMZ (AtomRedMetZoloto)	ARMZ (AtomRedMetZoloto)
ARMZ (AtomRedMetZoloto)	BHP Billiton Olympic Dam Corporation Pty Ltd	BHP Billiton Olympic Dam Corporation Pty Ltd
BHP Billiton Olympic Dam Corporation Pty Ltd	CAMECO	CAMECO
CAMECO	CGN Global Uranium Limited	CGN Global Uranium Limited
Deutsche Bank	ConverDyn	ConverDyn
Energy Fuels Resources	Deutsche Bank	Deutsche Bank
Energy Resources of Australia Ltd.	Duke Energy Florida, Inc.	Duke Energy Florida, Inc.
Energy USA, Inc.	Energy Fuels Resources	Energy Fuels Resources
tochu Corporation / Itochu International	Energy Resources of Australia Ltd.	Energy Resources of Australia Ltd.
. Aron & Company	Energy USA, Inc.	Energy USA, Inc.
Kazatomprom	Itochu Corporation / Itochu International	Itochu Corporation / Itochu International
Langer Heinrich Uranium Ltd (Paladin Energy)	Kazatomprom	Kazatomprom
Mestena Uranium LLC	Langer Heinrich Uranium Ltd (Paladin Energy)	Langer Heinrich Uranium Ltd (Paladin Energy)
MTM Trading, LLC	Macquarie Bank	Macquarie Bank
Nufcor International Limited	Mitsui & Co.	Mitsui & Co.
NUKEM, Inc.	MTM Trading, LLC	MTM Trading, LLC
NYNCO Trading, Ltd.	Nufcor International Limited	Nufcor International Limited
Paladin Resources Limited / Paladin Energy	NUKEM, Inc.	NUKEM, Inc. / RWE Nukem
PPL Energy Plus LLC	NYNCO Trading, Ltd.	NYNCO Trading, Ltd.
Rio Tinto Uranium Limited	Paladin Resources Limited / Paladin Energy	Paladin Resources Limited / Paladin Energy
Rossing Uranium Limited	Rio Tinto Uranium Limited	Rio Tinto Uranium Limited
SOPAMIN (Société de Patrimoine des Mines du Niger		
"Heritage Society of Mines in Niger")	Rossing Uranium Limited	Rossing Uranium Limited
TENAM Corporation	SOPAMIN (Société de Patrimoine des Mines du Niger "Heritage Society of Mines in Niger")	SOPAMIN (Société de Patrimoine des Mines du Niger "Heritage Society of Mines in Niger")
TENEX (Techsnabexport)	Southern Cross Resources Australia Pty. Ltd.	Southern Cross Resources Australia Pty. Ltd.
Traxys North America, LLC	TENAM Corporation	TENAM Corporation
UG U.S.A., Inc.	TENEX (Techsnabexport)	TENEX (Techsnabexport)
Uranerz Energy Corporation	Traxys North America, LLC	Traxys North America, LLC
Uranium One	UG U.S.A., Inc.	UG U.S.A., Inc.
UrAsia Energy Ltd.	Uranerz Energy Corporation	Uranerz Energy Corporation
URENCO, Inc.	Uranium One	Uranium One
Ur-Energy / Ur-Energy USA Inc	UrAsia Energy Ltd.	UrAsia Energy Ltd.
USEC, Inc. (United States Enrichment Corporation)	URENCO, Inc.	URENCO, Inc.
Westinghouse Electric Company, LLC	Ur-Energy / Ur-Energy USA Inc	Ur-Energy / Ur-Energy USA Inc
	USEC, Inc. (United States Enrichment Corporation)	USEC, Inc. (United States Enrichment Corporation)
	Westinghouse Electric Company, LLC	Westinghouse Electric Company, LLC

Table 25. Enrichment service sellers to owners and operators of U.S. civilian nuclear power reactors, 2014-16

2015	2016
AREVA Enrichment Services, LLC / AREVA NC, Inc.	AREVA Enrichment Services, LLC / AREVA NC, Inc.
CAMECO	CAMECO
CNEIC (China Nuclear Energy Industry Corporation)	CNEIC (China Nuclear Energy Industry Corporation)
Energy Northwest	Energy Northwest
LES, LLC (Louisiana Energy Services)	LES, LLC (Louisiana Energy Services)
TENAM Corporation	TENAM Corporation
TENEX (Techsnabexport Joint Stock Company)	TENEX (Techsnabexport Joint Stock Company)
UG U.S.A., Inc.	UG U.S.A., Inc.
URENCO, Inc.	URENCO, Inc.
URENCO USA, Inc.	URENCO USA, Inc.
USEC, Inc. (United States Enrichment Corporation)	USEC, Inc. (United States Enrichment Corporation)
Westinghouse Electric Company, LLC	Westinghouse Electric Company, LLC
	AREVA Enrichment Services, LLC / AREVA NC, Inc.  CAMECO  CNEIC (China Nuclear Energy Industry Corporation)  Energy Northwest  LES, LLC (Louisiana Energy Services)  TENAM Corporation  TENEX (Techsnabexport Joint Stock Company)  UG U.S.A., Inc.  URENCO, Inc.  URENCO USA, Inc.  USEC, Inc. (United States Enrichment Corporation)