

Industry Note

Equity Research

November 20, 2018

Metals & Minerals

Uranium Weekly - Record spot volume driven by all buying groups

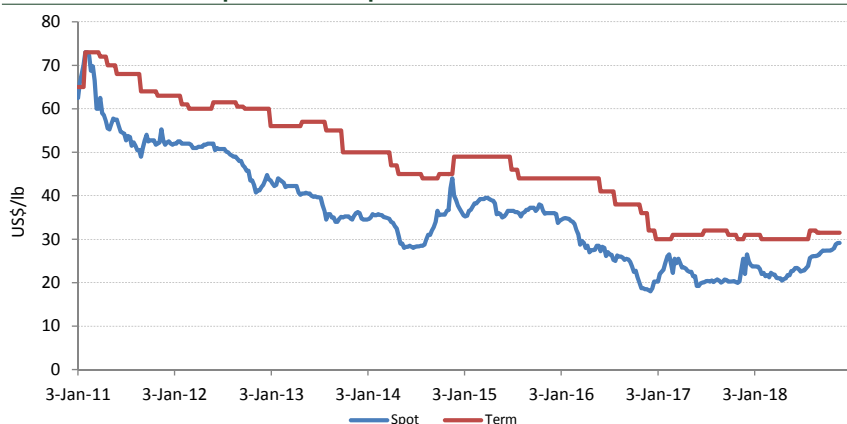
Ux Consulting's (UxC) spot uranium price indicator increased \$0.05/lb this week to \$29.15/lb (+0.2%). At 81.7mm lbs, spot market volume in 2018 has far surpassed the previous record of 55.8mm lbs set in 2011. There has been continued higher activity in the spot market over the past several weeks and more than 400 transactions have been completed year-to-date (previous full-year record in 2011 was 366). According to UxC, all buying groups have increased purchases over 2017, with utilities buying 50% more, producer purchases almost doubling and financial players/speculators returning to the market for significant volume.

Producer purchasing a significant factor in driving volume higher. As at Q3/18, Cameco indicated that it has purchased 2.9mm lbs of uranium both off-market and via RFPs in the spot market. Management indicated that it would likely purchase another 1-3mm lbs prior to the end of 2018. We estimate that Cameco has purchased ~2.0 million lbs in the spot market since July; UxC is reporting this week that market participants are expecting additional buying interest from a "non-US producer" in the near-term. Cameco will continue to be a large buyer in the uranium market in 2019. Management is currently forecasting that it will need to purchase 10-12mm lbs next year.

Year-to-date, >58 million pounds has been transacted in the term uranium market under 24 transactions. Last year at this time, term volume totalled 69 million pounds. U.S. utilities remain notably quiet in the term market - we expect that this will remain the case until the Section 232 investigation is concluded and utilities have a sense of what the playing field will be (e.g. purchasing quotas or tariffs). UxC reported that six non-U.S. utilities are active in the term market.

Uranium market to remain in a slight deficit through 2020 - We expect that the spot uranium price will continue trending higher, which should eventually lead to higher term prices. The progress could be slow, in our view, given a number of factors, including the presence of available inventory, the continued supply of uranium into the market via enrichment underfeeding, and, perhaps most importantly, uncertainty created by the Section 232 investigation in the United States. Our uranium price forecast for 2018/2019/2020/2021 is US\$24.94/lb, US\$32.50/lb, US\$40/lb, and US\$45/lb, respectively.

Exhibit 1. Uranium spot and term prices



Source: UxC; TD Securities Inc.

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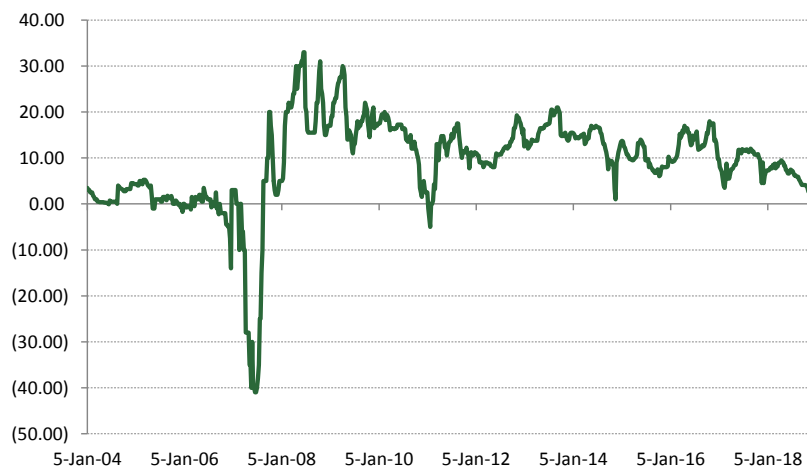
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Exhibit 2. TD's Cameco spot market uranium purchase tracker

Est. Week of RFP	Volume (lbs U3O8)	Spot Price (US\$/lb)	
		Start of Week	End of Week
27-Aug	500,000	26.30	26.46
27-Sep-18	1,000,000	27.22	27.38
22-Oct-18	500,000	27.75	27.89
Total	2,000,000		

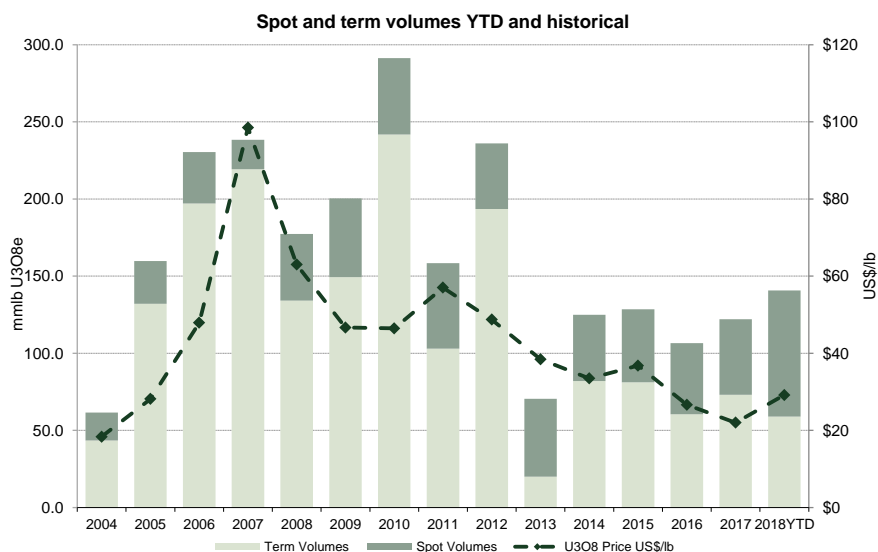
Source: UxC; Cameco; TD Securities estimates

Exhibit 3. Term price premium to spot price (US\$/lb)



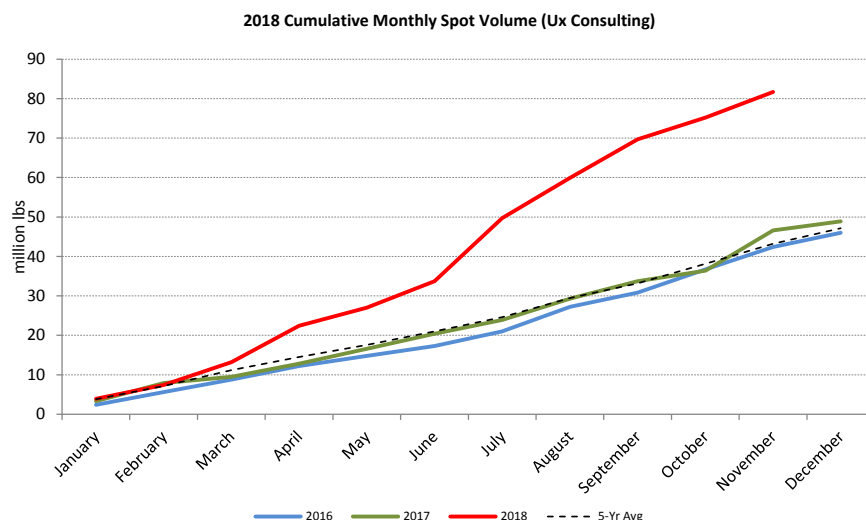
Source: Ux Consulting, TD Securities Inc.

Exhibit 4. Annual spot plus term uranium market volumes



Source: Ux Consulting; TD Securities Inc.

Exhibit 5. Cumulative monthly spot market volume



*2018 spot volumes includes the impact of the Yellowcake IPO

Source: Ux Consulting; TD Securities estimates

Industry News:

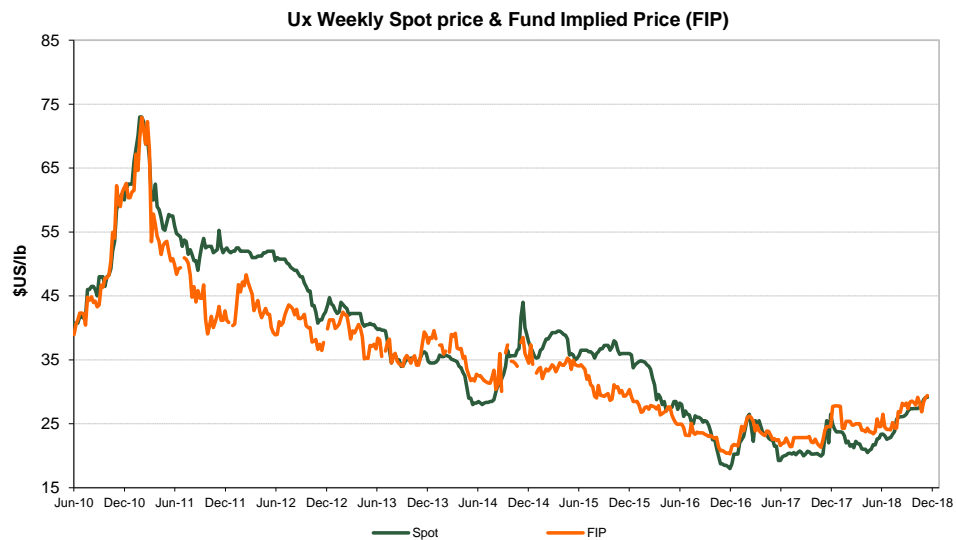
France delays energy bill; expected to cut nuclear reliance by 2035 - France's government has once again delayed the release of the country's long-awaited long-term energy strategy (PPE). On November 15, government spokesman Benjamin Griveaux told France Inter Radio that the PPE, which was originally slated for release in October, has been delayed yet again because the government wanted to first complete another bill regarding financing legislation for railway, road, and infrastructure projects. The PPE is expected to set a schedule for the shutdowns of French nuclear power plants over the next two decades. The PPE is now expected to be published by the end of this month. In other news, French Environment Minister Francois de Rugy told the press on November 18 that France will seek to reduce its share of electricity produced by nuclear power to 50% by 2035. The government has sought to cut its nuclear reliance to 50%, but a deadline for this goal has remained unclear. De Rugy told CNews, that 2035 is "the deadline we're working with" in formulating the country's long-term energy strategy. Minister de Rugy also questioned the viability of constructing new EPRs in France. "What's the future of the nuclear sector? Does it involve EPRs? That's an open question today, as the technological reliability, safety and competitiveness of EPRs has not yet been proven," he said. (Source: Ux Weekly)

Spain's draft energy transition law leaves out nuclear phase-out plan - Montel reported November 14 that Spain's government has excluded any reference to a proposed phase-out of nuclear reactors in a draft version of its energy transition law. Spanish Member of Parliament Juan Lopez de Uralde said, "One of the elements worrying us is that the current draft [bill] doesn't establish any date for nuclear and coal-fired plants [phaseouts]." However, Uralde – a former director for anti-nuclear activist group Greenpeace – said that the decision to leave out nuclear shutdowns was preliminary and subject to change. "We are in a very early stage yet. [We] have the first draft, this is not the time to set any red line," said Uralde. Spain's new socialist government took over in June, vowing to accelerate the shutdown of the country's 7.1 GWe nuclear fleet. Spain's Energy Secretary Jose Dominguez said that while the new energy bill excludes nuclear plant shutdown dates, the government does not plan to extend any reactor lifespans beyond their current 40-year limits. The country's oldest reactor is over 37 years old, so shutdowns prompted by the country's

40-year lifespan limit are set to begin in 2021 with the last reactor retiring in 2028 under the currently proposed policy. Noting the potential for some lifespan extensions, Secretary Gutierrez told Euractiv, "It will probably take us beyond 2030 but we will not reach 2040. Before 2040, we will have closed [the nuclear fleet]." The country's draft energy transition bill includes a target to source 70% of electricity generation from renewables by 2030 increasing to 100% renewable generation by 2050. A UBS study noted that the 70% figure by 2030 would "imply" an eight-year lifespan extension for Spain's operating reactors. Furthermore, while not contained in the draft bill, the government said it would close nine coal-fired power plants for 5.5 GWe by 2020 with another 4 GWe retired by 2025. Going forward, the cabinet will need to gain support from the left-wing Podemos party and conservative Basque and Catalan groups to formalize the energy transition bill into law. (Source: Ux Weekly)

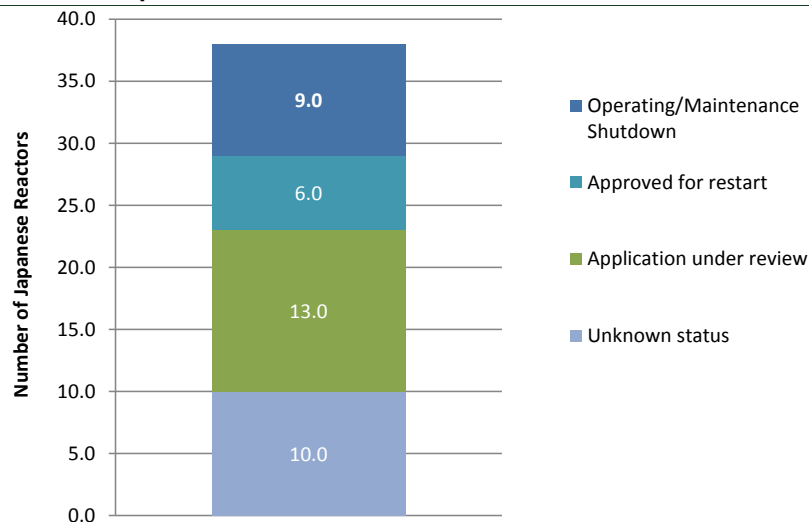
NEI publishes "Nuclear Costs in Context" document - The Nuclear Energy Institute (NEI) has published a paper titled "Nuclear Costs in Context" that describes the cost drivers for nuclear-derived electricity generation, the economic pressures facing nuclear plants, and the impacts of premature shutdowns of the U.S. fleet in 2017. Regarding costs, in 2017, the NEI showed that average total generating cost for nuclear energy was \$33.50 per MWh, including capital, fuel, and operating costs, which is 3.3% lower than in 2016 and more than 19% below a peak reported in 2012. The 19% reduction in total generating costs since 2012 are due to a 40.8% reduction in capital expenditures, a 17.2% reduction in fuel, and an 8.7% reduction in operations. Prior to the 2012 peak, nuclear generating costs had increased steadily over the previous decade, for various reasons. The NEI report found that capital costs decreased to \$5.34 billion in 2017 from \$5.50 billion in 2016, compared to the peak of \$9.02 billion in 2012. Following capital investments by the nuclear industry, 86 of the 99 operating U.S. reactors have received 20-year license renewals and 92 of the nation's operating reactors have been approved for uprates that have added more than 7,900 MWe. Operations costs have declined 9.8% from their recent peak in 2011 to \$20.43 in 2017. However, these costs have increased overall since 2002's \$19.25. NEI said that the increase in operations costs was not driven by a single category and noted that they have largely remained flat over the past decade. Regarding fuel costs, the report shows fuel expenditures by U.S. reactor operators experienced a relatively rapid increase from 2009 to 2013, which it attributed to an escalation in uranium prices that peaked in 2008. "Since uranium is purchased far in advance of refueling and resides in the reactor for four to six years, the effect of this commodity price spike persisted for a long time after the price increase actually occurred. Recent drop in uranium spot prices have caused utilities to move toward shorter fuel purchase cycles," said the NEI. However, NEI said a combination of policy and economic factors are shutting several U.S. reactors prematurely. Premature shutdowns of U.S. nuclear plants for mechanical, market, or policy decisions have eliminated seven reactors with a combined 5,299 MWe in capacity. Furthermore, NEI counts 12 reactors with announced retirements for total capacity of 11,238 MWe. NEI found that smaller, single-unit plants like Kewaunee, Vermont Yankee, Fort Calhoun, and Oyster Creek were a little more costly at about \$43 per MWh, whereas the larger, multi-unit sites were less costly to run at approximately \$31 per MWh. Yet, NEI argues that the electricity provided by the smaller prematurely retired reactors will likely be replaced with combined cycle gas-fired capacity at a levelized cost of \$48 per MWh. NEI concluded that additional reactors will face the prospect of early closure unless policies that value the benefits of nuclear energy are put in place. (Source: Ux Weekly)

Exhibit 6. Fund Implied Uranium Price (FIP) and Spot Uranium Price



Source: Ux Consulting; TD Securities estimates

Exhibit 7. Japanese Reactor Status



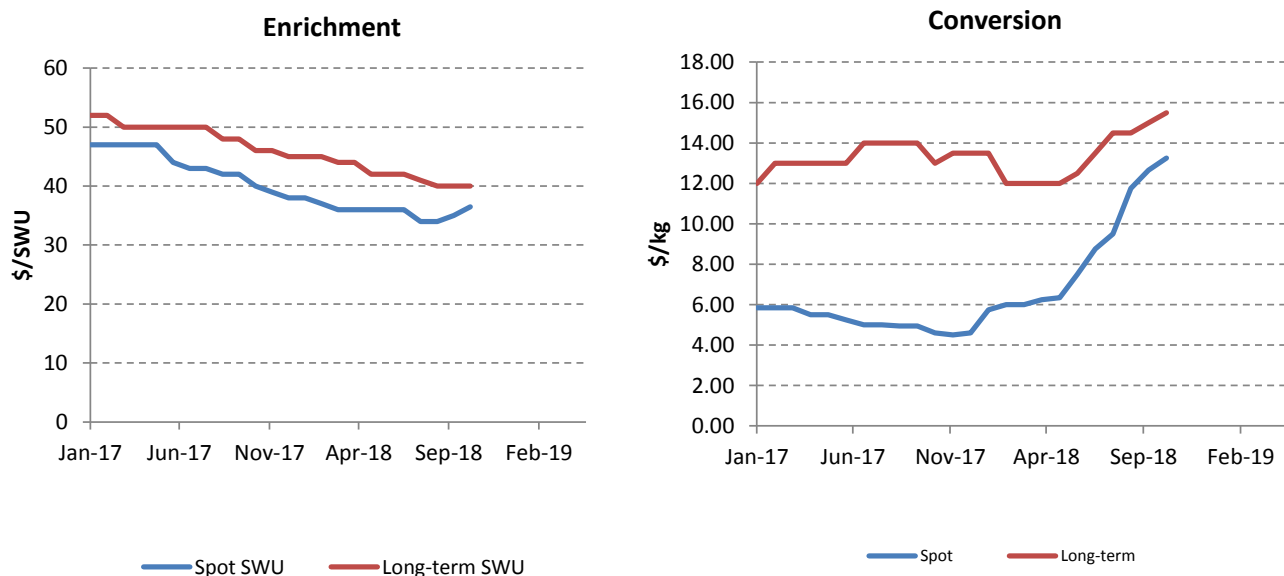
Source: Ux Consulting, Trade Tech, TD Securities Inc.

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Exhibit 8. Monthly SWU and Conversion pricing



Source: Ux Consulting; TD Securities estimates

Exhibit 9. TD Securities uranium supply/demand model

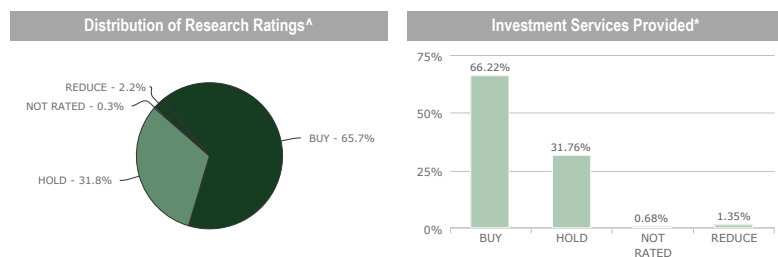
	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E
Mine Supply - Western World (mm lbs U3O8)													
Total Mine Supply - Western World	86	90	93	85	106	103	103	82	86	90	95	106	108
Net Eastern Mine Supply (lbs U3O8)	55	59	60	60	57	62	54	53	56	56	56	56	57
Total World Mine Supply (mmlb U3O8)	141	150	153	145	163	165	157	136	142	146	151	162	165
YoY % change	0.9%	5.9%	2.4%	-5.3%	12.2%	1.1%	-4.5%	-13.7%	5.0%	2.7%	3.5%	7.1%	1.8%
Secondary Supply													
Global underfeeding and tails re-enrichment*	5	5	15	20	20	18	19	18	16	15	15	15	15
Mixed Oxide Fuel (MOX)*	8	10	8	8	4	4.7	5	5	5	6	6	6	6
US government sales (DOE Proposed)*	5	5	8	8	7.3	4.2	3.1	1.6	0.0	0.0	0.0	0.0	0.0
Additional Russian secondary supply*	24	24	24	5	1.9	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other (commercial inventories)				4	8	7	7	7	7	7	7	7	7
Total Secondary Supply (mmlb)	42	43	55	45	42	36	34	31	28	28	28	28	28
Total Supply	183	193	208	190	205	200	191	167	171	175	180	191	194
Total World Demand													
Total World Nuclear Generating Capacity (MWe) *					345,333	351,251	358,799	369,682	374,838	379,949	382,842	383,809	385,821
Uranium requirements per MWe					464	474	470	470	470	470	470	470	470
Uranium demand (mmlb)					160	167	169	174	176	179	180	180	181
First Core Requirement (2 year lead)					-	-	-	-	-	-	-	-	-
Total World Demand (mmlbs U3O8)	155	155	170	155	160	167	169	174	176	179	180	180	181
YoY % change	-6.1%	0.0%	9.7%	-8.8%	3.4%	3.9%	1.2%	3.0%	1.4%	1.4%	0.8%	0.3%	0.5%
Supply / Demand Balance (mmlb)	28	38	38	35	44	34	22	-7	-5	-4	0	10	12
Historical Spot Uranium Price (US\$/lb U3O8)	\$57.08	\$48.73	\$38.57	\$33.60	\$36.89	\$26.57	\$22.12	\$24.94	\$32.50	\$40.00	\$45.00	\$45.00	\$55.00

* Source: World Nuclear Association - Nuclear Fuel Report 2017-2035

Note - TD LT price assumption starts in 2023; a flat US\$55/lb price is assumed for 2023 and beyond.

Source: Ux Consulting, Bloomberg, TD Securities Inc.

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Current as of: November 20, 2018

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