KPMG
cutting through complexity

DECEMBER 2013

COMMODITY INSIGHTS
BULLETIN

Uranium (2Q, 2013 and 3Q, 2013)

Short-term pain – long-term gain

The uranium market is in short-term pain. The current US$35 spot price is below the cost of some current production and provides no incentive for new supply.

This period of short-term pain will likely last for another couple of years. During that time, similar to other commodities, uranium producers and explorers are hunkering down, focusing on cost management and delaying new supply.

The longer-term fundamentals remain strong off the back of nuclear fleet growth in China. The mega trends of population growth and urbanization support increased electricity demand. Nuclear remains a strategic part of the world's energy mix.

Commodity outlook

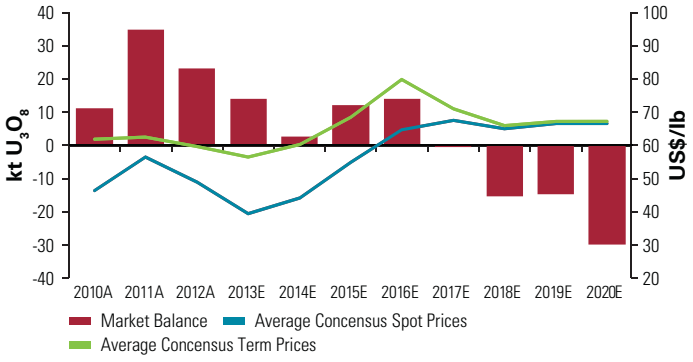
After experiencing 21.7 percent year-over-year decline in 2Q13, Uranium spot prices further experienced a steep year-over-year fall of 27.9 percent in 3Q, 2013 to reach US$34.75 due in part to short-term oversupply in the uranium market due to reduced consumption from Japan in the aftermath of Fukushima. The average long-term uranium prices too declined 12.6 percent year-over-year to reach US$53.0 in 3Q, 2013.[1]

Given the end of the US-Russian HEU agreement in 2013 some uranium producers are increasing their production. This is expected to result in primary uranium production to increase by 2 percent in 2013 to 151.5 million lbs as compared to 2012. However, this production growth, along with reduced consumption from Japan, has resulted in a short-term oversupply of uranium in the market, which has led to a sustained decline in prices in 2013.

Figure 1: Prices of uranium, 3Q, 2001-2012

Source: Bureau of Resources and Energy Economics (BREE), Intierra, Cameco

Figure 2: Market balance vs. prices, 2010– 2020F

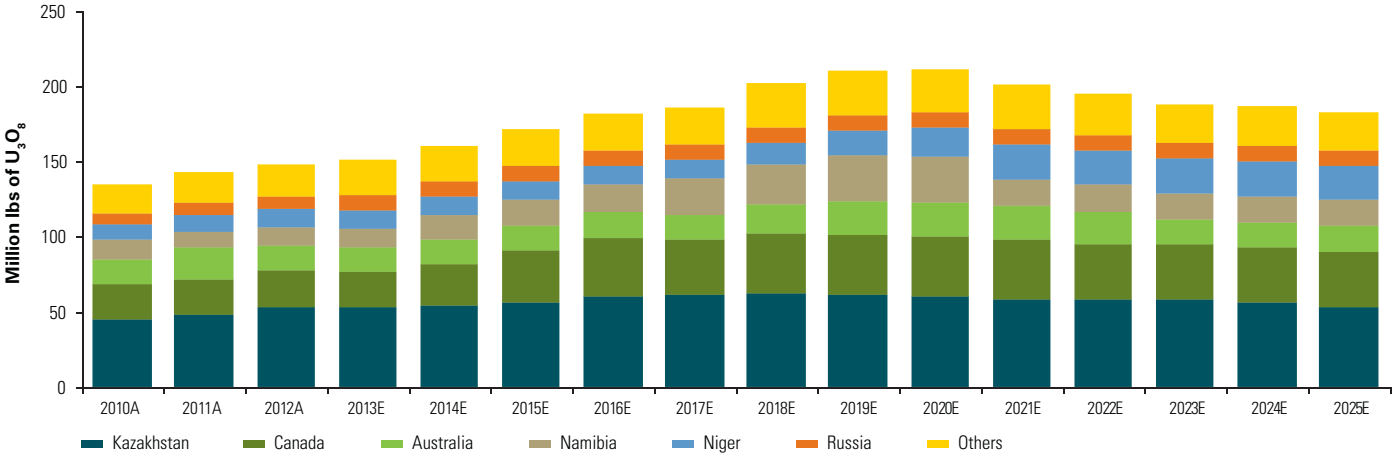


Source: Credit Suisse; Morgan Stanley; BMO Capital Markets; Canaccord Genuity; J.P. Morgan; CIMB Research; CIBC; KPMG analysis

[1] Investors: Spot price history, Cameco, http://www.cameco.com/investors/markets/uranium_price/, accessed 21 October 2013

Supply and demand,[2,3]

Figure 3: Primary uranium supply, 2010– 2025E



Source: BMO Capital Markets

- Primary uranium production is expected to reach 151.5 million lbs in 2013, an increase of 2 percent relative to 2012. Production disruptions at Areva's Somair mine in Niger, following an attack in May 2013, are expected to be compensated by increase in production at other mines around the world.[4]
- Kazakhstan is expected to remain the world's largest producer of uranium. The country is expected to produce about 63.1 million lbs of U_3O_8 in 2018 growing at a CAGR of 3.1 percent from 2013. The growth in Kazakhstan's uranium production is expected to be supported by expansions at existing mines where additional in-situ recovery (ISR) wells could be created and processing mills could be expanded economically.[5]
- Production from Canada is expected to increase from 23.3 million lbs in 2013 to 39.8 million lbs in 2018. This increase is expected due to the Cigar Lake mine, the world's second-largest uranium deposit expecting to start production by 2014 and ramp up to an annual operating capacity of about 16.9 million lbs of U_3O_8 by 2018.[6,7] The McArthur River mine, which is the world's largest high-grade uranium mine, also in Canada, has a projected output of about 18.7 million lbs of U_3O_8 in 2018.[8] Further, Canada also holds a number of uranium deposits that are still being explored and measured.
- African nations are expected to become increasingly important for global uranium markets. Niger and Namibia are expected to become more important and produce about 50 million lbs by 2020. This growth is mainly attributable to production starting at the Imouraren mine in Niger and Husab mine in Namibia.[9,10] These mines, together, are expected to produce about 26.4 million lbs of U_3O_8 a year at full production. State owned enterprises are driving some of this forecast production increase even though the short term market is depressed.
- Looking ahead, the global primary uranium supply is expected to reach 212.5 million lbs by 2020. This growth in production is expected to be supported by increased output from existing uranium-producing countries and the prospects of new suppliers emerging in the global uranium markets. This supply growth is contingent on a number of factors including availability of finance and of course is subject to the threat of mine delays and the burden of uranium regulations.
- World uranium consumption is expected to reach 185.8 million lbs in 2013, an increase of 2.8 percent over 2012. This moderate growth can be attributed to the conditions in Japan's nuclear power industry, delayed start-up of new reactors in Asia and lower nuclear power output from the US where several reactors have been idled or shut down.

  Development in the Japanese nuclear power industry is one of the key short term signals that the uranium market is watching. In June 2013, Japan's Nuclear Regulatory Authority released the policy and requirements for restarting of the nuclear power reactors that were switched off since the Fukushima Daiichi incident of March 2011.[11] As a result, the country's uranium consumption, including buffer inventories, is expected to be about 0.8 million lbs in 2013,

2 "Resources and Energy Quarterly", Bureau of Resources and Energy Economics, Australian Government, September Quarter 2013

3 BMO Capital Markets – Materials – Uranium, August 21, 2013, via Thomson Research/Investext, accessed October 2013

4 Cecilia Jamasmie, "Suicide bombers attack Areva uranium mine in Niger", Mining.com, 23 May 2013

5 "Kazakhstan leads in uranium production", Tengri News, 14 October 2013

6 Cigar Lake, Cameco, http://www.cameco.com/mining/cigar_lake/, accessed 23 October 2013

7 "Cigar Lake start-up delayed until 2014", World nuclear news, 09 September 2013

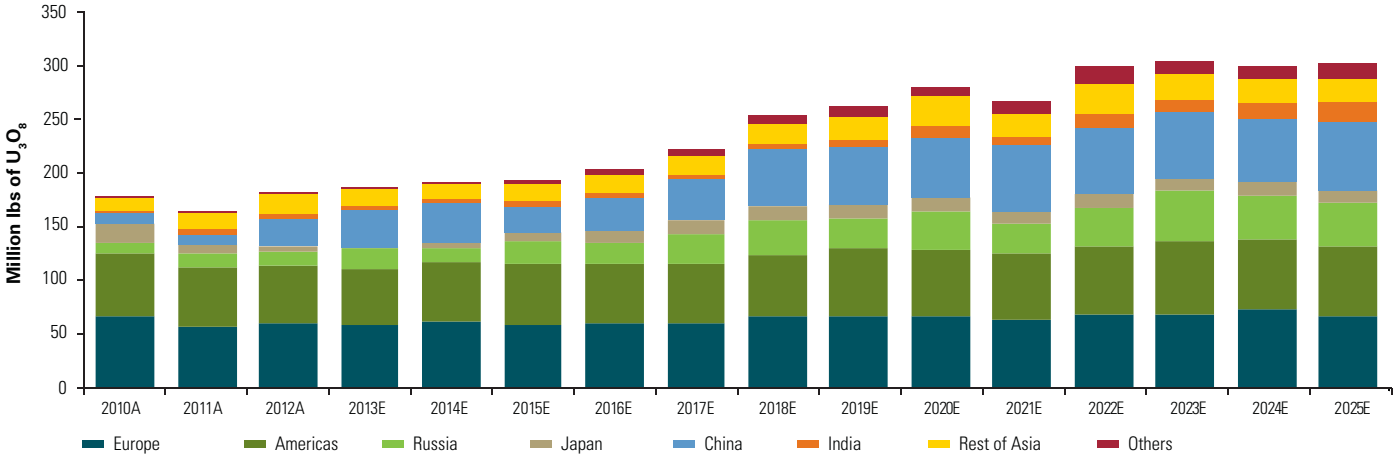
8 McArthur River, Cameco, http://www.cameco.com/mining/mcarthur_river/, accessed 23 October 2013

9 Djibril Saidou, "Areva's Imouraren Uranium Mine to Start Output by Mid-2015", Bloomberg, 8 March 2013

10 "Namibia: Construction of Husab Uranium Mine Progressing Well", allAfrica, 5 August 2013

11 Ida Torres, "Nuclear Regulation Authority finalizes new safety requirements for reactor restarts", JDP, 19 June 2013

Figure 4: Global demand for uranium, 2010– 2025E[12]



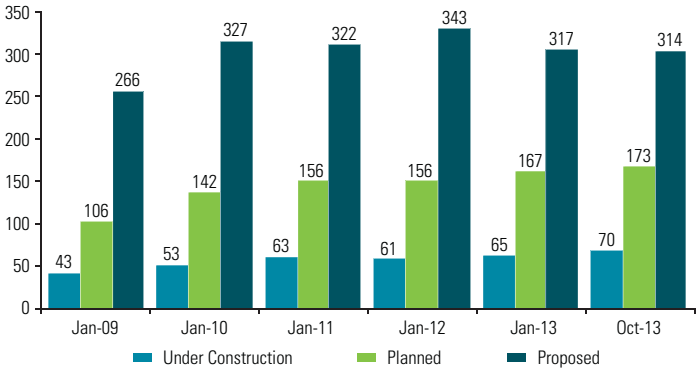
Source: BMO Capital Markets

which is only about 4.6 percent of its pre-Fukushima incident level of 17.3 million lbs in 2010. Consumption is expected to increase to about 4.5 million lbs in 2014 as some reactors are expected to come back online by then. More reactors are expected to be restarted by 2017.

- In 2013, China's uranium consumption is expected to increase by about 35 percent to about 35.8 million lbs as compared to 2012 due to initial fuelling requirements of new reactors. The government's review of its energy policy in 2012 delayed the start-up schedules of 28 nuclear power reactors that are currently under construction. However, these reactors and some of the additional 53 planned reactors are expected to start up, which will propel China's nuclear fuel demand to 53.3 million lbs by 2018. This could boost China's nuclear power generating capacity from an estimated 16 GWe in 2013 to about 53 GWe in 2018.
- Uranium consumption in the Americas is expected to decrease by 1.7 percent to 52.4 million lbs in 2013 due to four reactors permanently shutting down in the US. These include the Vermont Yankee reactor, Wisconsin's Kewaunee reactor, San Onofre in California and Florida's Crystal River.[13] These shutdowns reflect the challenging economics that the nuclear power producers in the US are facing amid tough competition from the emerging cheap gas-based power plants. However, the US gas prices could increase in the medium term if the country becomes an LNG exporter. Also, under the recently implemented climate change action plans to cost carbon emissions, power from fossil fuel-based power plants could become more expensive making nuclear power generation more cost competitive.
- The Middle East is expected to emerge as a significant market for uranium consumption as countries in this region are looking to diversify their energy mix to reduce their dependence on fossil fuels and the rate of their resource depletion. The UAE is currently developing its first nuclear power plant, which is expected to start up by 2017. Three more nuclear power plants are expected to come online by 2020. These reactors will have a total capacity of about 5.6 GWe.[14] Saudi Arabia is also developing plans to build up to 16 nuclear reactors at a cost of about US$100 billion, although the first reactor is not scheduled to come online until 2022.[15]

The number of proposed nuclear reactors has declined to 314 as of October 2013, compared to 317 in January 2013. However, the number of planned and under-construction reactors in October 2013 is higher than January 2013 numbers.[16]

Figure 5: Number of nuclear reactors, January 2009 – October 2013



Source: World Nuclear Association

12 Demand forecast includes buffer inventories

13 Elizabeth Douglass, "First U.S. Nuclear Power Closures in 15 Years Signal Wider Problems for Industry", inside climate news, 24 September 2013

14 Himendra Mohan Kumar, "UAE nuclear watchdog invites comments from public", gulfnews.com, 3 September 2013

15 "Saudi Arabia to have 16 nuclear reactors by 2030", The Times of India, 27 August 2013

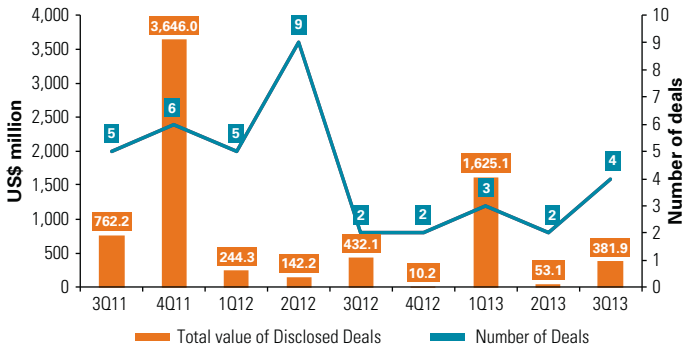
16 World Nuclear Power Reactors & Uranium Requirements, World Nuclear Association, http://world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements/, accessed 22 October 2013

Key developments

Ownership changes

There was limited transaction activity in 2Q, 2013. However, 3Q, 2013 witnessed an increase in M&A activity led by Fission Uranium's US$176.0 million acquisition of Alpha Minerals Inc. The total number of deals increased to four in 3Q, 2013 from two in 2Q, 2013, whereas the total value of deals increased to US$381.9 million in 3Q, 2013 from US$53.1 million in 2Q, 2013.

Figure 6: Major deals in the uranium industry



Source: Mergermarket; KPMG analysis

Table 1: Uranium deals announced in 2Q13 and 3Q13

Date announced	Target	Target nation	Acquirer	Acquirer nation	Status	Value of transaction (US$ million)	Stake (%)
19-Sep-13	Rockgate Capital Corp.	Canada	Denison Mines Corp.	Canada	Announced	25.9	100
18-Sep-13	Alpha Minerals Inc.	Canada	Fission Uranium Corp.	Canada	Announced	176.0	100
20-Aug-13	Newshelf 1114 Proprietary Limited (74% Stake)	South Africa	Sibanye Gold Limited	South Africa	Announced	147.8	74
12-Aug-13	Mega Uranium Ltd. (Lake Maitland uranium project)	Australia	Toro Energy	Australia	Announced	32.2	100
6-June-13	Rockgate Capital Corp.	Canada	Mega Uranium Ltd.	Canada	Announced	24.9	NA
24-May-13	Strathmore Minerals Corp.	Canada	Energy Fuels Inc.	Canada	Completed	28.2	100

Source: Mergermarket

Regulatory updates

During 2Q, 2013 and 3Q, 2013, the regulations were targeted at making nuclear power safer in the wake of the Fukushima nuclear incident of March 2011. Also, licenses and approvals were extended to certain projects.

Table 2: Recent regulations in the uranium industry

Country	Regulation	Description
Japan[17]	New nuclear safety standards	• The Nuclear Regulation Authority of Japan approved the new safety standards for reactors on 19 June 2013. • The essence of these new standards is that they require power companies to take measures to deal with serious accidents such as the one at Fukushima No. 1 nuclear power plant.
US[18]	NRC Tightens Rules for Use of Uranium and Thorium in Manufacturing	• US Federal regulators announced tightened rules surrounding radioactive materials used by manufacturers on 29 May 2013. • The US Nuclear Regulatory Commission (NRC) will now require a license for manufactures and importers of products that contain small amounts of un-enriched uranium and thorium, such as welding rods, decorative glassware and gas lantern mantles.

17 "New nuclear safety standards", The Japan Times, 28 June 2013

18 "NRC Tightens Rules for Use of Uranium and Thorium in Manufacturing", Nuclear Power Industry News, 30 May 2013

Country	Regulation	Description
Slovakia[19]	European Uranium's Slovakia license renewal under review after challenge	• Geology Division of Slovakia's Ministry of Environment had initially renewed European Uranium's license until April 2015. • Acting on an appeal from anti-uranium mining activists, the general prosecutor of Slovakia raised the issue that the license for the 31.75-square-kilometer area was a modified or new license and would require input and approval from stakeholders. European Uranium has filed an appeal against this review.
US[20]	AUC submits license application request to construct and operate the Reno Creek ISR Project	• AUC LLC submitted an application for a new source material license to the U.S. Nuclear Regulatory Commission (NRC) in August 2013. • The requested license would authorize the construction, operation and decommissioning of AUC's proposed in-situ uranium recovery in Campbell county, Wyoming.
Australia[21]	Toro's Wiluna uranium project receives environmental approval	• The Australian government gave environmental approval for Toro Energy's Wiluna uranium project. • The A$269 million project will be sited in central Western Australia and process 2.8 million lbs per annum of ore.
Greenland	Greenland removes a ban on uranium mining	• Greenland's parliament has recently agreed to remove a 25-year-old ban on uranium mining paving the way for future investment in the industry.

Table 3: Recent agreements in the uranium industry

Country	Agreement	Description
India and Canada[22]	Agreement allows the implementation of a nuclear cooperation pact	• Canadian Nuclear Safety Commission and India's Department of Atomic Energy have signed an agreement that will allow the implementation of a nuclear cooperation pact first signed in 2010.
New South Wales and South Australian states, Australia[23]	Encourage exploration and mining of uranium	• The New South Wales and South Australian governments have signed an agreement to encourage mining and exploration along the border of the two states.
Japan and Uzbekistan[24]	Joint uranium development	• Japan Oil, Gas and Metals National Corporation (JOGMEC) and the Navoi Mountain Metallurgy Plant (NMMP) signed an agreement on the joint prospecting of uranium in Uzbekistan on 8 July 2013. • The agreement will expire in five years, until when they will jointly seek Uzbek uranium and evaluate its quality.
South Korea and Hungary[25]	Establish legal and institutional foundations	• The agreement signed on 18 October in Seoul by the two countries' foreign ministers will establish legal and institutional foundations for South Korea to enter Hungary's nuclear power market. • It will also facilitate cooperation in nuclear-related areas amongst the two countries.
South Korea and Finland[25]	Cooperation in nuclear energy	• A bilateral agreement was signed in Helsinki. • The agreement would focus on establishing nuclear safety, nuclear waste treatment and nuclear know-how as areas where the two countries could work together more in future.
Canada and European Union (EU)[26]	Comprehensive Economic and Trade Agreement (CETA)	• This is the first free trade agreement between the EU and a G8 country. • The agreement is expected to remove over 99 percent of tariffs between the two economies and create new market access opportunities for both sides.

19 European Uranium's Slovakia license renewal under review following challenge", via Factiva, accessed 22 October 2013

20 AUC, LLC Reno Creek, In Situ Project, New Source Material License Application – Federal Register Extracts, via Factiva, accessed 22 October 2013

21 Toro's Wiluna uranium project receives environmental approval, via Factiva, accessed 22 October 2013

22 Andrew Mayeda, "Canada Signs Agreement With India on Uranium Sales, Oliver Says", Bloomberg, 8 April 2013

23 "States sign agreement on uranium", abc.net, 12 June 2013

24 "Uzbekistan, Japan ink agreement on joint uranium development", Ferghana.news, 11 July 2013

25 "Korea signs European bilateral", World nuclear news, 23 October 2013

26 "Trade deal opens door to EU investors", World Nuclear News, 22 October 2013

Country	Agreement	Description
Vietnam and US[27]	Section 123 Agreement	• US secretary of state and Vietnam's foreign minister signed a government-to-government Peaceful Uses of Nuclear Energy Agreement known as a Section 123 Agreement. • This will allow the transfer of nuclear energy related materials and components between the two countries.
Canada and Kazakhstan[28]	Nuclear power agreement	• Canada and Kazakhstan are expected to sign a key agreement on the peaceful use of nuclear power before the end of 2013. • The agreement would provide an opportunity to fully implement the previously signed agreement between Kazatomprom and Cameco Corporation.

Cross-section of major uranium projects

Table 4: Cross-section of global uranium projects

Project	Country/Region	Operators	Capex (US$ million)	Initial production	Annual Uranium capacity (Mlbs)
Olympic Dam Copper/ Uranium Mine Expansion	South Australia, Australia	BHP Billiton Ltd	20,000-30,000	On hold	NA
Cigar Lake Uranium Mine	Saskatchewan, Canada	Cameco Corporation	2,200.0	2014	16.4
Etango Uranium Deposit	Namib desert sands, Namibia	Bannerman Resources Limited	870.0[29]	NA	6.0–9.0
Husab Uranium Deposit	Swakopmund, Namibia	Swakop Uranium (Pty) Ltd	1,480.0[30]	2015	15.4
Kvanefjeld Uranium/Rare Earth Project	Nuuk, Greenland	Greenland Minerals and Energy Limited	1,534.6	2016	2.6
Roughrider Uranium Deposit	Saskatchewan, Canada	Rio Tinto plc	567.0	NA	NA
Trekkopje Uranium Mine	Namibia	Areva SA	602.9	NA	NA
Imouraren Uranium mine	Niger	Areva NC	NA	2015	11.0
Four Mile Uranium project	South Australia, Australia	Quasar Resources Pty Ltd	98-110[31]*	NA	5.1
Wiluna Uranium project	Western Australia, Australia	Toro Energy Ltd	269*	2015	1.7
Yeelirrie Uranium deposit	Western Australia, Australia	Cameco Corporation	650*	NA	7.7
Kintyre Uranium deposit	Western Australia, Australia	Cameco Corporation	600*	NA	6.0
Mkuju River Uranium project	Ruvuma, Tanzania	Atomredmetzoloto JSC	NA	NA	7.6

The list is not exhaustive and contains only a limited number of projects.

*Australian$

Source: Company data, BREE, Intierra

[27] "Agreement opens US-Vietnam nuclear trade", World Nuclear News, 10 October 2013

[28] "Kazakhstan, Canada expect to sign Nuclear Power Agreement before end of 2013", Bnews KZ, 22 August 2013

[29] Pre-production capital costs

[30] Capital costs estimated at US$1,480 million, including initial mine fleet, process plant and supporting infrastructure

[31] BREE, Australia quotes the capex as A$98 million in an April 2013 publication and Herbert Smith Freehills quotes the capex as $110 million in its article "Environmental approval for Four Mile uranium project" dated 11 September 2013

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