

BGF Equities Uranium Sector Analysis

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Spot Price Revival is Boosting the Uranium Stocks Russian and Chinese Buying Highlight the Strategic Value of Uranium

Investment Perspective: We have seen uranium shares surge by > 150% over the last six months based on a spot uranium price that has risen 65% from the cycle low. Good money has been made. The news flow over next 12 months will be all about commitments to project development and financing of mines. Investors need to decide what will be the most likely success stories, both technically and financially. Simple process routes, management ability and jurisdictional locations will be key determinants of success with the early movers capable of taking advantage of the expected tightening of the supply and demand equation in 2013.

Expect a Price Range of US\$60-80/lb in 2011

- A sustainable price range for 2011 is US\$60-80/lb, which is the level needed to encourage the supply response the nuclear industry is looking for.
- Below that level there will be a reluctance to make supply available as debt finance will be too difficult and equity funding will be scarce.
- Rises above US\$80/lb will be destabilizing as speculators will start to dominate the market again and this will spook financiers, whilst encouraging projects of dubious long term merit.

Look Beyond Official Forecast of Supply and Demand

- Simple observation of projected supply and demand charts doesn't tell the full story. Look into the market dynamics more circumspectly. Consider possible disruptions to supply e.g. terrorist activity in Niger, Russian influences in Central Asia and uranium as an economic weapon, technical issues with mine delivery. Just in time delivery doesn't make sense in the nuclear sector. Inventory levels need to be maintained to account for supply risk.

Chinese Buying is Creating Competition

- Chinese activity in the nuclear fuel market is creating anxiety amongst other nuclear powered countries who have allowed three years of falling uranium prices to breed complacency. There is competition for supply which is underpinning the price, both in spot and long term contracts.

Chinese Demand is Uranium Supply Constrained

- Officially, China wants 5% of power to come from nuclear sources by 2020, but there has been discussion of increasing this to 7% in the next plan. This would lift the target from 80 GW to 112 GW and require another 7,000 tpa of U₃O₈. Consider current mine supply is only 60,000 tpa now. The only obstacle to increasing nuclear power's role in China is availability of uranium.

Russian See the Strategic Value

- Russians are becoming more aggressive in the uranium space, securing control of Uranium One, bidding U\$10/lb with the takeover bid for Mantra Resources, seeking to gain control of Berkley Resources ahead of a deal with Koreans and providing finance for mine developments. Chinese and Russians are competing for dominating strategic positions.

BGF Preferred Uranium Stocks

A-Cap Resources	For re-rating on release of DFS in 2011, very large resource, favorable jurisdiction, metallurgical progress
Peninsula Energy	Advanced ISL project with early production, low operating and capital costs, strong funding options
Extract Resources	Best new uranium discovery, will be one of the best mines in the world, in excellent jurisdiction in Namibia
UraniumSA	New discovery of ISL project, excellent logistics, excellent jurisdiction in Sth Australia, management integrity

2010 - The Year That Uranium Bounced Back

- The uranium spot market rebounded strongly in the second half of 2010, three years after peaking at \$136/lb.
 - the low was \$40/lb in June, a decline of 70% from the historical high of US\$136/lb
 - it closed 2010 at the year's high of US\$62/lb, an increase of 55%
 - subsequent to 31 December, it has risen another \$3/lb to hit US\$65/lb
 - the spot price has risen to match the long term price for the first time in 3 years
 - the price rise has coincided with an aggressive increase in spot sales volumes
- The turnaround in the market coincided with the entry of Chinese buyers into the market, at a seasonally quiet time of the year
- Recognition of Chinese buying, to build inventories, stimulated strong speculative activity that accelerated as the year progressed
- Uranium company share prices gapped up in June and July, then they went quiet for a few months before gathering pace again towards the close of 2010.
- Some analysts are of the opinion that uranium supply and balance is in equilibrium at present and can't see any urgency, but consider the following;
 - China is seeking to build strategic stockpiles and it realises it has to buy now rather than pursue a "just in time" approach. It has effectively shifted the demand curve forward in time
 - competition is building between Russia and China to secure long term uranium supplies, looking at 10-20 year time frames
 - speculators have renewed confidence in the uranium spot market knowing that the Chinese buying will provide a floor, and they are prepared to front-run real buyers
 - at the same time countries such as India, Russia, France and South Korea are being forced to move more aggressively on long term supplies of uranium
 - unless new mines are brought on stream rapidly over the next two years there will be a serious shortage of supply when the conversion of weapons grade to power grade deal expires (US-Russia HEU deal) 24 Mlb p.a. (10,890 tpa U₃O₈)
 - prices need to be in the order of US\$65/lb to encourage a supply response

Ux U3O8 Price - Two Year History



Source: The Ux Consulting Company, LLC <http://www.uxc.com/>

China - The Elephant in the Room

- ☺ As with every other commodity needed for an industrialising nation, the entry of China into the market is having a major impact. There is nothing unusual here. The only curiosity was that it took China so long to make a move.
- ☺ China is addressing its long term supply needs in three ways;
 - it is acquiring stakes in uranium exploration and development companies
 - it is negotiating joint ventures or making outright acquisitions of projects in Africa, Australia and Central Asia in particular
 - it is buying uranium in the open market and contracting long term
- ☺ China does have considerable uranium resources itself, but to date all of the production has come from small mines generally not more than 300 tpa U_3O_8 . Potential exists to modernise and expand the domestic industry, given time
 - Domestic production was only 1.8 Mlb (820 t) in 2008, and is estimated to be 2.2 Mlb (1,000 t) in 2010.
- ☺ China is expected to need 150,000 to 180,000 tonnes between now and 2020
 - this is approximately 15-18,000 tpa U_3O_8 on average
 - World mine production is in the order of 60,000 tpa, so it will conceivably want 25% of current supply
- ☺ There are currently 13 reactors operating in China producing 10,212 MWe
 - There are 26 reactors under construction with a combined capacity of 26,600 MWe, and many more are in the planning stage
 - Each 1000 MWe reactor requires a first fill of approx. 500 t, and consumes annually 200-250 tpa
 - The approved target by 2020 is 40 GWe but this is expected to be lifted to 80 GWe. There have been reports that a figure of 112 GWe is being considered. Though not official, this would still only supply 7% of China's power needs compared to nuclear's 2% share now.
- ☺ China has expressed interest in building nuclear reactors for other countries, much like the Russians, and they would need to secure uranium supplies to support this strategy
- ☺ During 2009, China was active in the spot market, securing about 12 Mlbs. It placed greater emphasis on long-term contracts in 2010, negotiating more recently the following contracts with the three largest uranium producers;
 - AREVA and CGNPC - 20,000 t U_3O_8 over 10 years, worth \$3.5bn or US\$80/lb
 - Cameco and CNEIUC - 29 Mlbs (10,435 t) through to 2025
 - Kazatomprom and CNNC - 24,200 t (62.9 Mlb) by 2020
- ☺ Expect China to "over-contract" to account for the risk of one or more of its contracts falling through for operational or political reasons, and to give itself "working capital" to trade in the open market.

Spot, Long Term and Futures Markets

- As the UX chart on page two demonstrates, we have just closed a four year period in which there was a sizeable divergence between the Spot Price and the Long Term Price.
- Stock market investors and speculators focus on the Spot Price, but companies have been planning projects based on the Long Term Price. Expectation of both groups are now aligned for the first time in four years.
- Note the following about the **Spot Market** activity in 2010;
 - spot uranium activity was well above average with approx. 250 transactions at an average of 184,000 lbs U₃O₈ each
 - average lead time to delivery was within three months, which contrasts to a six month lead time in 2005. The explanation for this is the lack of the sellers' interest in fixing low prices for any extended period
 - volatility in the spot market was very low in the first six months with most weekly movements being \$1.00 or less. The weekly movements were much greater in the second half of the year as buyers chased the price higher.
 - buying participants in the spot market in 2010 have been;
 - traders and other 45%
 - utilities about 40%
 - producers 15%
 - selling participants have been;
 - traders/other 73%
 - producers 27%
 - utilities - essential zero
- Market depth has increased with commodity style brokers entering the business. The main ones are Evolution Markets, ICAP Energy, MF Global and Tullett Prebon
- A lead to the spot price can be gauged via the **Fund Implied Price**. This is a calculation of the implied price of uranium inventories being held by the Uranium Participation Corp (UPC) investment fund.
- Futures Contract Activity is steadily increasing
 - at the end of 2007, seven months after uranium futures trading commenced on the CME/NYMEX futures market, the open interest was 696 contracts. It grew to 2,577 at the end of 2008, and 3,395 at the end of 2009, but it has exploded in 2010. At June it was 9,753 contracts and at the end of the year it was over 15,000.
- The **Long-Term Market** also experienced a surge in activity in 2010.
 - medium term contracts focus on delivery within five years, while long term contracts are usually have 10 year terms.

World Uranium Supply and Leading Mines

World Uranium Production (tonnes)				
	2007	2008	2009	%
Australia	8,611	8,430	7,982	16%
Brazil	299	330	345	1%
Canada	9,476	9,000	10,173	20%
China (est)	712	769	750	1%
Czech Republic	306	263	258	1%
France	4	5	8	0%
Germany	41	0	0	0%
India (est)	270	271	290	1%
Kazakhstan	6,637	8,521	14,020	28%
Malawi	0	0	104	0%
Namibia	2,879	4,366	4,626	9%
Niger	3,135	3,032	3,243	6%
Pakistan (est)	45	45	50	0%
Romania (est)	77	77	75	0%
Russia	3,413	3,521	3,564	7%
South Africa	539	655	563	1%
Ukraine (est)	846	800	840	2%
USA	1,654	1,430	1,453	3%
Uzbekistan	2,320	2,338	2,429	5%
Total World	41,264	43,853	50,773	100%
Tonnes t U ₃ O ₈	48,683	51,716	59,875	
% of World Demand	64%	68%	76%	

Source: World Nuclear Organisation

Leading Uranium Producers		
	Tonnes	%
Areva	8,623	17%
Cameco	8,000	16%
Rio Tinto (incl. ERA)	7,963	16%
KazAtomprom	7,467	15%
ARMZ	4,624	9%
BHP	2,955	6%
Navoi	2,429	5%
Uranium One	1,368	3%
Paladin	1,210	2%
GA/Heathgate	583	1%
Other	5,550	11%
Total	50,772	100%

Source: World Nuclear Organisation

Method of Production 2009	
Style of Mine	% Contribution
Conventional mining	57%
In Situ Leach (ISL)	36%
By-product	7%
Total	100%

Source: World Nuclear Organisation

Largest Uranium Mines - Top 15					
Mine	Country	Owner	Type	Production	% of World
McArthur River	Canada	Cameco	underground	7,339 t	14.5%
Ranger	Australia	ERA	open pit	4,444 t	8.8%
Rossing	Namibia	Rio Tinto	open pit	3,520 t	6.9%
Kraznokamensk	Russia	ARZM	underground	3,004 t	5.9%
Olympic Dam	Australia	BHP	underground	2,955 t	5.8%
Tortkuduk	Kazakhstan	Areva/KazAtomrom	ISL	2,272 t	4.5%
Arlit	Niger	Areva/Onarem	open pit	1,808 t	3.6%
Rabbit Lake	Canada	Cameco	underground	1,447 t	2.8%
Akouta	Niger	Areva/Onarem	underground	1,435 t	2.8%
Budenovskoye 2	Kazakhstan	KazAtomprom	ISL	1,415 t	2.8%
McClellan Lake	Canada	Cameco	open pit	1,388 t	2.7%
Langer Heinrich	Namibia	Paladin	open pit	1,108 t	2.2%
Central Mynkuduk	Kazakhstan	KazAtomprom	ISL	1,104 t	2.2%
Akdala	Kazakhstan	Uranium One	ISL	1,039 t	2.0%
Karamuran	Kazakhstan	KazAtomprom	ISL	1,011 t	2.0%
Total Top 15				35,289 t	70%

Source: World Nuclear Organisation

World Nuclear Power Reactors Nov 2010 and Uranium Requirements

	NUCLEAR ELECTRICITY GENERATION		REACTORS OPERABLE 1 Nov 2010		REACTORS UNDER CONSTRUCTION 1 Nov 2010		REACTORS PLANNED Nov 2010		REACTORS PROPOSED Nov 2010		URANIUM REQUIRED 2010
	billion kWh	% e	No.	Mwe	No.	Mwe	No.	Mwe	No	Mwe	tonnes U
Argentina	7.6	7	2	935	1	745	2	773	1	740	123
Armenia	2.3	45	1	376	0	0	1	1060			55
Bangladesh	0	0	0	0	0	0	0	0	2	2000	0
Belarus	0	0	0	0	0	0	2	2000	2	2000	0
Belgium	45	51.7	7	5943	0	0	0	0	0	0	1052
Brazil	12.2	3	2	1901	1	1405	0	0	4	4000	311
Bulgaria	14.2	35.9	2	1906	0	0	2	1900	0	0	272
Canada	85.3	14.8	18	12679	2	1600	4	4400	3	3800	1675
China	65.7	1.9	13	10234	23	25900	39	44270	120	120000	2875
Czech Republic	25.7	33.8	6	3686	0	0	2	2400	1	1200	678
Egypt	0	0	0	0	0	0	1	1000	1	1000	0
Finland	22.6	32.9	4	2721	1	1700	0	0	2	3000	1149
France	391.7	75.2	58	63236	1	1720	1	1720	1	1720	10153
Germany	127.7	26.1	17	20339	0	0	0	0	0	0	3453
Hungary	14.3	43	4	1880	0	0	0	0	2	2200	295
India	14.8	2.2	19	4183	4	2720	20	17100	40	49000	908
Indonesia	0	0	0	0	0	0	2	2000	4	4000	0
Iran	0	0	0	0	1	1000	2	2000	1	300	148
Israel	0	0	0	0	0	0	0	0	1	1200	0
Italy	0	0	0	0	0	0	0	0	10	17000	0
Japan	263.1	28.9	55	47348	2	2756	12	16538	1	1300	8003
Jordan	0	0	0	0	0	0	1	1000			0
Kazakhstan	0	0	0	0	0	0	2	600	2	600	0
Korea DPR North	0	0	0	0	0	0	0	0	1	950	0
Korea RO South	141.1	34.8	20	17716	6	7000	6	8400	0	0	3804
Lithuania	10	76.2	0	0	0	0	0	0	1	1700	0
Malaysia	0	0	0	0	0	0	0	0	1	1200	0
Mexico	10.1	4.8	2	1310	0	0	0	0	2	2000	253
Netherlands	4	3.7	1	485	0	0	0	0	1	1000	107
Pakistan	2.6	2.7	2	400	1	300	2	600	2	2000	68
Poland	0	0	0	0	0	0	6	6000	0	0	0
Romania	10.8	20.6	2	1310	0	0	2	1310	1	655	175
Russia	152.8	17.8	32	23084	10	8960	14	16000	30	28000	4135
Slovakia	13.1	53.5	4	1760	2	880	0	0	1	1200	269
Slovenia	5.5	37.9	1	696	0	0	0	0	1	1000	145
South Africa	11.6	4.8	2	1800	0	0	0	0	6	9600	321
Spain	50.6	17.5	8	7448	0	0	0	0	0	0	1458
Sweden	50	34.7	10	9399	0	0	0	0	0	0	1537
Switzerland	26.3	39.5	5	3252	0	0	0	0	3	4000	557
Thailand	0	0	0	0	0	0	2	2000	5	5000	0
Turkey	0	0	0	0	0	0	4	4800	4	5600	0
Ukraine	77.9	48.6	15	13168	0	0	2	1900	20	27000	2031
UAE	0	0	0	0	0	0	4	5600	10	14400	0
United Kingdom	62.9	17.9	19	10962	0	0	0	6680	9	12000	2235
USA	798.7	20.2	104	101229	1	1218	9	11622	22	32000	19538
Vietnam	0	0	0	0	0	0	2	2000	12	13000	0
WORLD**	2560	14	441	376,313	58	60,604	148	163,713	331	376,425	68,646
	billion kWh	% e	No.	MWe	No.	Mwe	No.	MWe	No.	MWe	tonnes U

Sources: Reactor data: WNA to 1/11/10. IAEA – for nuclear electricity production & percentage of electricity (% e) 3/5/10. WNA: Global Nuclear Fuel Market (reference scenario) – for U

Operating = Connected to the grid;

Building/Construction = first concrete for reactor poured, or major refurbishment under way;

Planned = Approvals, funding or major commitment in place, mostly expected in operation within 8-10 years;

Proposed = Specific program on site proposals, expected operation mostly within 15 years.

New plants coming on line are balanced by old plants being retired. Over 1996-2009, 43 reactors were retired as 49 started operation. There are no firm projections for retirements over the period covered by this Table, but WNA Estimates that at least 60 of those now operating will close by 2030, most being small plants. The 2009 WNA Market Report reference case has 143 reactors closing by 2030.

TWh = Terawatt-hours (billion kilowatt-hours). MWe = Megawatt (electrical as distinct from thermal), kWh = kilowatt-hour.

68,646 tU = 80,954 t U₃O₈

** The world total includes 6 reactors operating on Taiwan with a combined capacity of 4927 MWe, which generated a total of 39.9 billion kWh in 2009 (accounting for 20.7% of Taiwan's total electricity generation). Taiwan has two reactors under construction with a combined capacity of 2700 MWe, and one proposed, 1350 MWe. U demand of 863t is expected in 2010.

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