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Uranium Market Outlook

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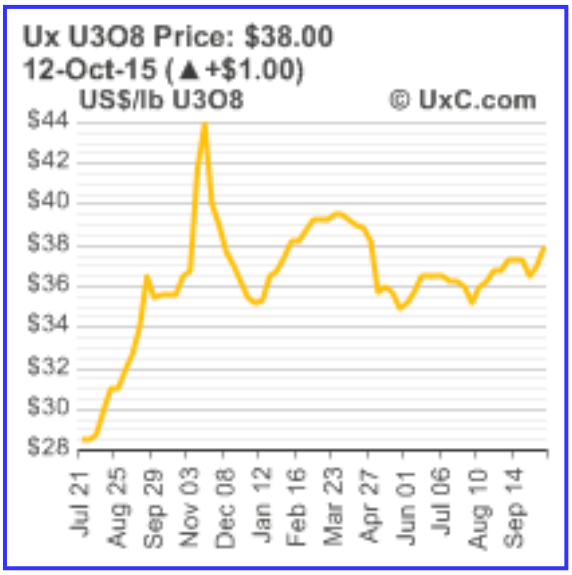
Having been traded between a small range of $ 36-$37/lb since June 2015, after an 11% drop from $ 39.50/lb on the end of March to $ 35.00/lb on the end of May, particularly due to a delay in the first nuclear reactor restart in Japan, the second week of October 2015 the U3O8 price reached a level of $ 38/lb again.

With the investment sentiment to improve further thanks to a strong growth of nuclear reactors worldwide, with China, India and Russia the key drivers, a uranium price level below the pre-Fukushima price level of US$ 65-70 before March 11, 2011 is not supporting long-term production growth for uranium. As a result, this will change the supply/demand balance, which is still over-supported in the near term with still a fair amount of excess inventory being around, but selling drying up.



In this respect, it is noteworthy that China is continuing to grow its stake in the international nuclear industry y not only having announced the country's plan to spend $ 100 billion on raising its domestic nuclear power capacity from 20.3 GW in 2014 to 58 W by 2020 through 25 reactors under construction and 43 reactors planned by 2030, but also by looking to increase its nuclear share internationally.

In May of this year, China National Nuclear (NNC) and China General Nuclear Power Group (CGN) announced plans to obtain stakes in French integrated nuclear company Areva.

Kazakhstan overtakes **Australia** as the leading supplier to US nuclear power plants last year.

In the first week of October 2015 it was announced that according to a report from the US Energy Information Administration, in 2014, 23% of the uranium purchased by US reactor owners and operators came from Kazakhstan, while 20% came from Australia and 18% came from Canada.

Kazakhstan, having been the world's top uranium producer since 2009, producing 23,227 tonnes last year (38% of the world total), took the top spot because its average uranium prices have been lower than those of other major US suppliers for the last two years – they averaged $ 44.47/lb in 2014 compared with the overall weighted price of $ 46.65 elsewhere.

World Nuclear Association urges global nuclear industry growth to 25% share of world electricity production by 2050

At the World Nuclear Association (WNA) Annual Symposium held in the second week of September, Angela Rising, director general of the WNA, said that the global nuclear industry should aim to achieve a 25% share of world electricity production by 2050. To do that it will need to add 1,000 giga watts of new generation capacity. Achieving this target, political and regulatory barriers are to overcome and the industry to find more ways to reduce its own costs, Rising said.

The goal is to focus on the Association's New Harmony initiative with the industry capable of adding 50 GWe of capacity in 2015-2020, 125 GWe in 2020-2025 and 825 GWe in 2025-2050.

No material impact from Fukushima disaster in March 2011 on future nuclear power demand

Country	Nuclear generating 2014 (billion kWh)	in % total consumption	Operable reactors	Under construction	Planned	Proposed	Uranium required 2015 (in tonnes U)
July 31, 2015							
China	**123.8**	**2.4**	**26**	**25**	**43**	**136**	**8.161**
India	**33.2**	**3.5**	**21**	**6**	**22**	**35**	**1.579**
Russia	**169.1**	**18.6**	**34**	**9**	**31**	**18**	**4.206**
USA	**798.6**	**19.5**	**99**	**5**	**5**	**17**	**18.692**
European Union	**807.4**	**NA**	**125**	**2**	**10**	**11**	**19.223**
of which 71% applies to:							
France	*418.0*	*76.9*	*58*	*1*	*1*	*1*	*9.230*
UK	*57.9*	*17.2*	*16*	*-*	*4*	*7*	*1.738*
Germany	*91.8*	*15.8*	*8*	*-*	*-*	*-*	*1.889*
Subtotal	**1.932.1**		**305**	**47**	**111**	**217**	**51.861**
World total	**2.411.0**	**11.5e**	**436**	**67**	**166**	**322**	**66.883**
Top-5 in % world total :	**80**		**70**	**70**	**67**	**68**	**78**

source: WNA

United Nations change report calls for World action on carbon emissions and leaves nuclear power as the only mature source

The report requires the global share of low-carbon options for electricity supply – nuclear power, renewable, bio-energy and carbon capture and storage (CCS) from fossil fuels collectively to increase from current levels of 30% to reach 80% by 2050, hence effective quadrupling them. The report notes that particularly mitigation technology from the mix would lead to substantially increased costs.

However, CCS is unproven and its economic practicality is simply a hope, bio-energy to replace fossil fuels raises questions of scale, wind and solar renewable are well-proven along with their intrinsic limitations **leaving nuclear power as the only mature viable clean and cost-effective alternative for fossil fuels (oil, gas, coal) providing power and demand regardless of weather or time of day**.

Europe, profiling itself as a leader in promoting action on climate change but does not act accordingly

In March 2007, the European Council endorsed the European Commission's Strategic Energy Review and agreed on a unilateral cut of 20% in EU greenhouse gas emissions by 2020, relative to the 1990 levels.

The European Council also set a target of meeting 20% of EU energy needs from renewals by 2020, leaving individual countries to decide their own policies in such a way as to allow nuclear power as part of their energy mix to be taken into consideration in allocating individual country targets for renewables.

The Council noted the European Commission's assessment of the contribution of nuclear energy in meeting the growing concerns about safety of energy supply and CO2-emitting energy source.
The 2008 policy was set "20-20-20" – 20% reduction in CO2 emissions, 20% of electricity from renewable and 20% improvement in energy efficiency by 2020.

The European Commission's 2030 Policy Framework for Climate and Energy in January 2014 moved away from major reliance on renewables to achieve emission reduction targets and allows scope for nuclear power to play a larger role.
It is focused on CO2 emission reduction, not the means of achieving that, and allows more consideration for cost-effectiveness.

The centerpiece is a binding 40% reduction in domestic greenhouse gas emissions by 2030 (compared with a 1990 baseline) which will require strong commitments from the 28 EU member states.

European energy targets are not realistic

With Western Europe for approximately 30% dependent on the import of Russian gas, the energy targets of the EU with the primary focus on renewable, in conjunction with Germany having phased out nuclear energy, are not realistic and as such not achievable.

This view is emphasized by the European Council having set a target of meeting 20% of EU energy needs from renewals by 2020, individual countries *have* been left the decision on their own policies in such a way as to allow nuclear power as part of their energy mix to be taken into consideration in allocating individual country targets for renewables.

In this respect, it is striking to see that major European countries have totally different views on the energy mix to follow.

While **France** with a share of 75% represents by far the highest share of nuclear energy as part of the mix (which it wants to bring back to 50%), **Germany** has decided to fully phase out nuclear power, which after already having shut of its originally 17 old plants, is now around 18% of total electricity.

More than half of Germany's electricity is generated from coal which is subsident by some € 2.5 billion (US$ 3.3 billion) each year (no subsidies), while the combined subsidies from wind and solar plants totals some € 5 billion per year.

The decision to shut all its nuclear plants will cause dramatic economic and environmental problems. Despite the massive investment in renewable energy, this will create an extra 300 million tons of CO2, by 2020 due to increased use of fossil fuels. That will virtually cancel out the 335 million tons of CO2 savings required under the terms of the European Commission's 2011 Energy Efficiency Directive.

Energiewende will affect future consumer prices and competitiveness of industry

In September 2011, a study from KfW Banken Gruppe said that about € 25 billion per year will be required to meet the government's Energiewende nuclear phase-out goals. It puts the total investment at approximately € 250 billion by 2020. This includes up to € 10 billion on fossil fuel plants, € 144 billion on renewable plants and as much as € 29 billion on 3,600 km of high-voltage transmission lines.
These costs come for the account of German tax payers.

Taken these costs into account, which will have a negative impact on future end consumer prices and having a material impact on the competitiveness of the German industry in Europe, in particular compared to France, the Energiewende faces a growing resistance.

Also to be considered is the dependence on supply from Russian gas and intended shale gas drilling in Germany, having been shelved for the next seven years.

►European Union nuclear trade body calls for 100 new reactors by 2050

The nuclear trade body for the EU, **Foratom**, has stated the target after submitting a position paper for the European Commission, which expects at least 14 EU Member States to be operating nuclear power plants (NPPs) in 2050. A revised version of the Illustrative Program for Nuclear Energy, known as PINC, is intended to be published by the end of this year.

When built, new NPPs have many advantages in the electricity market:

- Designed to operate for a long time (60 to even 80 years, subject to national safety regulator's approval) Relatively low fuel and other operating costs can be centrally and flexibly attached and
- Provide predictable output

While the financial crisis, the Fukushima accident and the tensions in Ukraine have all had impact on the energy sector as a whole, as well as on the nuclear sector, nevertheless, global interest in nuclear power is growing and there are currently more nuclear power plants under construction around the world than there have ever been. These total 67 reactors, led by China (26), Russia (9) and India (6).

Nuclear energy by the Intergovernmental Panel on Climate Change confirmed as "an effective greenhouse gas mitigation option to be underlined in the PINC" contributes to all three objectives of U energy policy. These are security of supply, decarburization of the electricity sector and competitive power prices.

The European Commission acknowledges in its Policy Framework for Climate and Energy in the period from 2020 to 2030, published in January 2014, that nuclear energy contributes to a competitive, secure and sustainable energy system in the European Union, according to Foratom with the EC to be asked to apply a technology neutral approach which will facilitate investment in all low-carbon technologies including nuclear, and provide a stable regulatory and investment framework.

The EU should facilitate nuclear development projects by providing a stable regulatory and investment framework given the importance of nuclear power for achieving the EU's climate action goals.
Confidence needs to be built among equity investors in nuclear power projects to maintain Europe's leadership role in nuclear technology and innovation, according to Foratom.

Expected to have high competitive and sustainability advantages, advanced nuclear reactor technology, including Generation IV, should be provided with adequate funding for development ad demonstration at EU level, taking into account the EU potential in terms of human and financial resources, according to Foratom.

Nuclear Power in China *(WNA Update October 2015)*

Most of mainland China's electricity is produced from fossil fuels, predominantly from coal. Two large hydro projects are recent additions: Two large hydro projects are recent additions: Three Georges of 18.2 GWe and Yellow River of 15.8GWe.
In 2012 gross electricity generation was 4,994 TWh (not including Hong Kong) on IEA figures, this being 3,785 TWh from coal, 872 TWh from hydro, 1487 TWh from non-hydro renewables, 97 TWh from nuclear and 86 TWh from gas.

Nuclear power contributed 2.4% of the total production in 2014 – 123.8 billion KWh according to the IAEA.

Mainland China has 27 nuclear power reactors in operation, 24 under construction. Additional 43 reactors are planned, including some of the world's most advanced, to give more than a three-fold increase in nuclear capacity to at least 58 GWe by 2020-2021, then some 150 GWe by 2030 and much more by 2050.

The impetus for increasing nuclear power share in China is increasingly due to air pollution from coal-fired plants.
The State Council expected CNY 2.37 billion (US$ 380 billion) to be spent on conservation and on emission cuts in the 5 years through 2015. In August 2013 it said that China should reduce its carbon emissions by 40-45% by 2020 from 2005 levels and would aim to boost renewable energy to 15% of its total primary energy consumption by 2020.

In 2012 China was the world's largest source of carbon emissions and its increment that year comprised about 70% of world total increase.

In March 2014, the Premier said the government was "declaring war on pollution and would accelerate closing coal-fired power stations". This was followed by his announcement that China intended about 20% of its primary energy consumption to be from non-fossil fuels by 2030, at which time it intended its peak of CO_2 emissions to occur.

More broadly, the share of China's non-fossil fuels in the total primary energy mix should increase from 9.8% in 2013 to 15% in 2020, while coal's share shrinks from 67% to 62% according to the plan.
Installed generating capacity of hydro, wind and solar power is expected to reach 350 GWe, 20 GWe and 100 GWe, respectively.

The State Council published the Energy Development Strategy Action Plan in November 2014. The plan aims to cut China's reliance on coal and promote the use of clean energy, confirming the target of 58 GWe nuclear in 2020, with 30 GWe more under construction.
The plan calls for the "timely launch" of new nuclear power plants on the east coast and for feasibility studies for the construction of inland plants. It says that efforts should be focused on promoting the use of large pressurized water reactors (including the AP 1000 and CAP 1400 designs), high temperature gas-cooled reactors (HTRs) and fast reactors. It also says that research should be conducted to improve the nuclear fuel cycle system, including reprocessing of used fuel.

Moves to build nuclear power commenced in 1970 and about 2005 the industry moved into a rapid development phase. Technology has been drawn from France, Canada and Russia, with local development based largely on French element (Areva).
The latest technology acquisition has been from the USA (via Westinghouse, owned by Japan's Toshiba) and France.

The State Nuclear Power Technology Corp. has made Westinghouse AP1000 the main basis of technology development in the immediate future, particularly evident in the local development of CAP1400 based on it.
By around 2040, PWR's are expected to level off at 200 GWe and fast reactors progressively increase from 2020 to at least 200 GWe by 2050 and 1,400 GWe by 2100.

The February 2015 edition of the BP Energy Outlook 2035 projects that by 2035 China becomes the world's largest energy importer, overtaking Europe, as import dependence rises from 15% to 23%. China's energy production rises by 37% while consumption grows by 60%.

China's fossil fuel output continues to rise with increases in natural gas (+ 200%) and coal (+ 19%) more than offsetting declines in oil (- 3%).

China's emissions increase by 37% and by 2035 will account for 30% of world total, with per capita emissions surpassing the OECD by 2035.

Market comments to overviews of worldwide uranium companies:

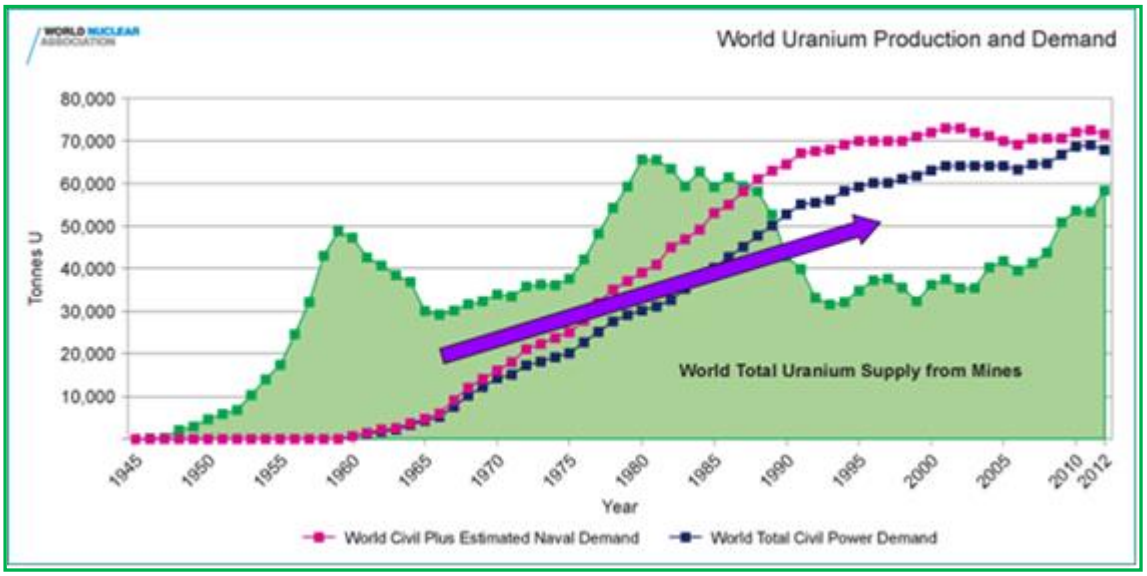
(as per the end of September 2015)

To the overview of the Peer Group of the world's top-20 listed uranium companies shows that besides AREVA of France, as an integrated nuclear/uranium company, only 10 companies have an investment quality rated valuation above US$ 100 million, including **5 companies focused on Canada** (Cameco, Denison Mines, Fission Uranium, NexGen Energy and UEX), **3 companies focused on the USA** (Energy Fuels, Peninsula Energy, Uranium Energy), **1 company focused on Australia** (ERA) and **1 company focused on Namibia** (Paladin Energy).

It is striking to see that in regards to **Canada**, two companies focused on the Athabasca Basin are still in an exploration/development stage, and potential production not to be expected before 2020 (Denison Mines and Fission Uranium). These companies are valued significantly higher than companies representing the new generation of ISR producers focused on the **United States**, including Uranium Energy, Ur-Energy and Uranerz (taken over by Energy Fuels), to be followed by Peninsula Energy.

With the badly received proposed merger between Denison Mines and Fission Uranium terminated, both companies, in my view, are still overvalued (see my Investment Alert reports of July and October).

Referring to my monthly updated overview of exploration/development companies focused on the Athabasca Basin, it is striking to see that next to Fission Uranium and NexGen Energy of all explorers inspired by Fission Uranium's PLS discovery in June 2011. of the other 21 juniors included, 17 of these companies have a current market valuation of less than Cdn$ 6 million (US$ 4.5 million), of which 13 companies show a market capitalization lower than Cdn$ 3 million (US$ 2.2 million). Facing a lack of funding opportunities these companies may not be able to survive.



Top-10 uranium producing countries 2014

	Production in tonnes U	in % world supply
Kazakhstan	23.127	41
Canada	9.134	16
Australia	5.001	9
Niger	4.057	7
Namibia	3.255	6
Russia	2.990	5
Uzbekistan (est)	2.400	4
USA	1.919	3
China (est)	1.500	3
Ukraine (est)	926	2
Other	1.908	3
Total world production tU	**56.217**	100
Total world production U3O8	66.297	
Top-10 in % of world demand		85

source: WNA

Mining method	Tonnes U	%
Underground & open-pit (except Olympic Dam)	23,679	42
In situ leach (ISL	28,467	51
By-product **x**	4.107	7

***x** considering Olympic Dam as a by-product rather than in underground category*

Source: WNA

Largest producing companies 2014

Company	Production in tonnes U	in % world supply
Kazatomprom	13.801	25
Cameco	8.956	16
ARMZ - Uranium One	6.944	12
Areva	6.496	12
BHP Billiton	3.351	6
CNNC & CGN	2.684	5
Navoi	2.400	4
Paladin Energy	2.316	4
Rio Tinto	2.296	4
Other	6.940	12
Total	**56.184**	100

source: WNA

Top-15 producing uranium mines in 2014

Mine	Country	Main owner	Type	Production t/U	% of world
McArthur River	Canada	Cameco (69.8%)	underground	7.356	20
Tortkuduk (est)	Kazakhstan	Katco JV / Areva	ISL	4.322	12
Olympic Dam	Australia	BHP Billiton	by-product/underground	3.351	9
SOMAIR	Niger	Areva (63.6%)	open pit	2.331	6
Budenovskoye 2	Kazahstan	Karatau JV/Kazatomprom - Uranium One	ISL	2.084	6
South Inkai	Kazakhstan	Betpak Dala JV / Uranium One	ISL	2.002	6
Priargunsky	Russia	ARMZ	underground	1.970	5
Langer Heinrich	Namibia	Paladin Energy	open pit	1.947	5
Inkai	Kazakhstan	Inkai JV / Cameco	ISL	1.922	5
Central Mynkuduk	Kazakhstan	Ken Dala JSC / Kazatomprom	ISL	1.790	5
Rabbit Lake	Canada	Cameco	underground	1.602	4
Budenovskoye 1, 3 & 4	Kazakhstan	Akbastau JV / Kazatomprom -	ISL	1.594	4
COMINAK	Niger	Areva (34%)	underground	1.501	4
Rossing	Namibia	Rio Tinto (69%)	open pit	1.308	4
Southern Moinkum & Khanzhugan	Kazakhstan	Mining Co Taukent/Kazatomprom	ISL	1.174	3
Total Top 15				**36.254**	**98**

source: WNA

New mines to reach substantial production

Mine	Country	Owner		Production	2015 Production estimate
Four Mile	Australia	Quasar		since April 2014	1.7 million pounds U3O8
Cigar Lake	Canada	Cameco 50% - Areva 37%	*	since October 2014	6 - 8 million pounds U3O8
		Indemnita 8% - TEPCO 5%)			
Khiagda	Russia	ARMZ	**	since 2010	50 tonnes U8

* to expand to 18 million pounds by 2018

** to expand to 1,000 tones by 2018