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Uranium Market Outlook

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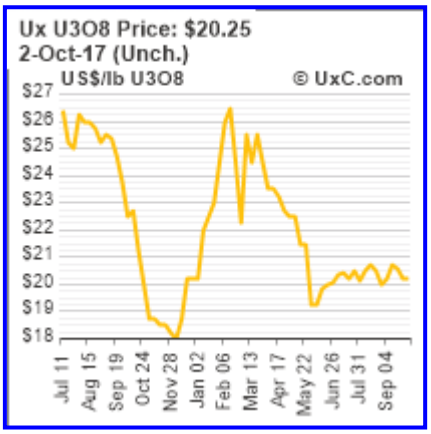

► Recovery of U3O8 price further postponed

After having touched a low of $ 18.75/lb by the end of November 2016, a recovery to an interim high of $ 26.00/lb on February 6, 2017, this fed optimism of professional market watchers, supported by positive comments.

This fuelled a strong recovery of uranium share prices in the last quarter of 2016, with many companies going up by 30% plus.

However, the recovery was interrupted dramatically by a new correction to a current U3O8 price level of around $ 20.00/lb.

OVERVIEW of U3O8 PRICES

	Spot		Long-term		Spot	Long-term
2017						
October 2	20.25		30.50	**Year-end 2016**	**20.25**	**30.00**
September 27	20.25		31.50	Year-end 2015	34.25	44.00
August 28	20.00		32.00	**May 31, 2015 (year high)**	**39.50**	50.00
July 31	20.15		32.00	Year-end 2014	35.50	49.00
June 26	20.10		32.50	**May 14, 2014 (year low)**	**28.25**	49.00
May 29	19.25		32.50	Year-end 2013	34.50	50.00
May 1	22.50		33.00	Year-end 2012	43.50	56.50
March 27	24.50		33.99	Year-end 2011	61.75	64.00
February 28	22.25		32.50			
February 6 (high)	**26.00**		32.50	Pre-Fukushima accident		
January 31	24.50		32.50	March 11, 2011	67.75	73.00
January 9	22.00		30.00			
2016						
December 26	20.25		30.00			
December 14	18.75		30.00			
November 28	**18.00**	*	33.00			
October 31	18.75		35.50			
September 26	23.75		38.00			
August 29	25.25		38.00			
July 25	25.00		40.50			
June 27	27.00		40.50			
June 20	26.15		41.00			
May 30	27.25		41.00			
April 25	27.50		43.50			
March 28	29.15		43.50			
February 29	33.50		44.00			
January 31	34.75		44.00			

* ***spot price 12***- year low

Referring to my July/August 2017 Market Outlook, this means that all uranium producers and advanced development companies are not only facing operational cash flow deficits, but are also faced with doubts by official entities on the insecure outlook for the uranium industry in the foreseeable future until 2020.

Originally, anticipating that after the Fukushima nuclear accident on March 13, 2011, at which time the uranium spot prices and long-term price were $ 67.75 and $ 73.00, respectively, it was expected in general that it would take three to five years for the uranium price to recover.

As a result, particularly in the first few years development activities were ongoing and economically viable feasibility studies published based on an average U3O8 price level in the range of $ 50 - $ 65, fuelled by the expected strong growth of the number of new built nuclear reactors in particular in emerging countries, led by China (see overview).

Top 10 operable world power reactors *(September 1, 2017)*

Country	Reactors operable	Nuclear electricity generation 2016		Reactors under construction	Reactors planned	Uranium required 2017
		TWh	*% e*	*Mwe gross*	*Mwe gross*	*tonnes U*
USA	99	805.3	19.7	4	14	18,996
France *	58	384.0	72.3	1	-	9,502
China	37	210.5	3.6	20	40	8,289
Russia	35	179.7	17.1	7	26	5,380
India	22	35.0	3.4	6	19	843
South Korea	24	154.2	30.3	3	2	4,730
Canada	19	97.4	15.6	-	2	1,592
United Kingdom	15	65.1	20.4	-	11	1,772
Ukraine	15	81.0	52.3	-	2	1,944
Germany	8	80.1	13.1	-	-	1,480
Sweden	8	60.6	40.0	-	-	1,188
Belgium	7	41.3	51.7	-	-	9,87
Top 10 total	347	2,194.2	339.5	41	116	55,716
**Japan ** **	5	9.5	9.4	NA	NA	NA
World total	447	2,490.0	10.6	58	160	65,014
Top 10 total in % World total	**74**			70	72	86

* The share of France may be reduced by one-third to 50% by 2025 to the benefit of renewable energy generating, phasing out approximately 18 nuclear reactors

** Japan has currently 42 reactors operable and potentially able to restart, and 24 of these are in the process of restart approvals. The first 2 restarted in August and October 2015 with 3 more since then

► Call for US government to revitalize its nuclear industry

The **US government** should hold a "structured conversation with the country's nuclear industry" on ways to restore and develop the sector, according to an assay from Mark Hibbs, senior fellow of the Carnegie Endowment for International Peace's nuclear programs.

Thereby, he is not only referring to America's nuclear power plant construction industry staggering or even in decline, but also to pressure from loss of know-how and high costs. US nuclear power plant vendors are now challenged by Chinese and Russian exporters, whose governments' view nuclear energy in strategic, not commercial terms.

Through strategic penetration, with both China and Russia having signed memorandums of understanding and other bilateral agreements with potential customer countries, these agreements will provide these two countries Access to strategic decision making in these countries concerning technology, energy and foreign policy for decades to come.

During the last 20 years, while China and Russia built dozens of reactors at home, leading Western vendors virtually stopped constructing new units.

Hibbs warns the USA could “lose its leadership in international nuclear governance” in the face of a future shift towards newcomers and away from established nuclear technology-owning countries and recommends that the Trump administration should discuss with the US nuclear industry what steps the government should take “to enhance US nuclear exports and encourage a level international playing field for ongoing nuclear equipment, material and technology, especially to risk-bearing destinations.

►Nuclear power in China

As of September 2017, **China** has 37 nuclear reactors with a capacity of 32.4GWe operating, compared to worldwide number of 447 reactors. The country has 20 reactors under construction. In addition, 40 reactors are planned, including some of the world’s most advanced, to give an almost doubling of nuclear capacity to 58 GWe by 2020-21, then up to 120 to 150 GWe by 2030.

China’s policy is to have a closed nuclear fuel cycle and to become largely self-sufficient in reactor design and construction, as well as other aspects of the fuel cycle, but is making full use of western technology dawn from France, Canada and Russia, while adapting and improving it.

The State Council’s Energy Development Strategy Plan 2014-2020 said that China’s efforts should be focused on promoting the use of large pressured water reactors (including the AP 1000 and CMP 1400 designs), high temperature gas-cooled reactors (HTSs) and fast reactors. It also said that research should be conducted to “improve the nuclear fuel cycle system, including reprocessing of used fuel”.

In **China**’s 13th Five Year Plan from 2016, 6 to 8 nuclear reactors are to be approved each year. Non-fossil primary energy provision should reach 15% by 2020 and 20% by 2030 (from 9.8% in 2013). At that time China intends its peak of CO2 emissions to occur.

► **Including environmental protection, vigorous development of nuclear power is required.**

Coal’s share of primary energy in China was down to 64.4% in 2015 from 72.5% in 2007. The action plan aim was 62% in 2020. After 21.5 GWe of coal capacity was added in the first half of 2016, in September the NEA issued a notice halting all construction and approval for coal plants in 28 provinces until their overcapacity is reduced.

► IEA says policy change is needed to raise nuclear capacity

The **International Atomic Agency** (**IEA**) says clear and consistent policy support is needed if nuclear power is to significantly expand its contribution to the global transition to clean energy sources.

Policies are required to address uncertainties in investing in new nuclear power plants and to avoid the premature closure of existing reactors, the Paris based agency sys in its annual report, Energy Technology Perspective 2017.

The **IEA**’s main scenario – the 2 Degree Scenario (2DS), set by the Paris Climate Change Agreement – demonstrates the actions needed in the energy sector to limit the rise in global temperatures to no more than 2°C.

The IEA says the report "highlights that decisive policy actions and market signals will be needed to drive technological development and benefit from higher electrification around the world. Investments in stronger and smarter infrastructure, including transmission capacity, storage capacity and demand side management technologies are necessary to build an efficient, low-carbon, integrated, flexible and robust energy system."

Current government policies are not enough to achieve long-term global climate goals, the IEA says. Of the 26 technologies it assessed, only three "remain 'on track' to meet climate objectives". Substantial progress has been made in technology areas that have received clear policy support.
"Policies to support energy technology innovation at all stages, from research to full deployment, will be critical to reap [the] energy security, environmental and economic benefits of energy system transformations," the IEA says.

The report notes that 10 GWe of new nuclear generating capacity was added in 2016 - the highest level since 1990. Construction of a further 3.2 GWe of capacity was started last year. This is down from 8.8 GWe in 2015, and average 8.5 GWe over the past decade. However, the IEA says annual capacity additions of 20 GWe are needed to meet the 2DS targets. It warns that the premature closure of operational reactors remains a "major threat" to meeting those targets. Up to 50 GWe could be lost by 2025, it suggests.

"Without action to address these reductions due to non-technical factors, the capacity will more likely be 70 GWe to 90 GWe short of the 2025 2DS target, unless annual grid connections double compared with the 2016 rate."

The agency recommends governments "provide clear and consistent policy support for existing and new capacity that includes nuclear power in clean energy incentive schemes and that encourages its development in addition to other clean forms of energy."

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.

► Paris Climate Agreement confirms essential contribution of nuclear energy to limit global warming

With 195 countries having adopted the first-ever universal climate agreement which sets out a global action plan to put the world on track to avoid dangerous climate changes by limiting global warming to 1.5C, due to enter into force in 2020, executing the plan is in conflict with a variety of national directives in many countries to cut CO2 emission through the transmission of electricity generating from fossil fuels to renewable energy and the Paris climate agreement also recognizing the essential contribution of nuclear energy as the only large-scale alternative to replace fossil fuels.

In other words, it will not be possible to change the current mix of energy sources of major industrial countries, applying both to the United States and Europe, in particular Germany, and emerging countries, led by China, India and Russia, with most of these countries heavily dependent on coal energy as the dirtiest energy provider.

In this respect, it is noteworthy that the Kyoto Protocol in 2009, which targets a 20% cut in CO2 emission by 2020, did not result in any improvement to date and the situation actually worsened due to the rise of worldwide industrial output, with the United States and China the biggest climate contaminators.

On the side line of the Paris Agreement it is good to learn that nuclear energy remains an essential component in the action plan, thereby recognizing that in the Western world the share of nuclear energy is approximately 30% of total world consumption and approximately 11% worldwide. With China and India representing only 2.6% and 3.5% respectively, these countries have ambitious plans to multiply the share of nuclear energy in total energy consumption. In addition, a growing number of emerging countries have planned construction of nuclear plants to diversify their pallet of energy providers.

In this respect, it is noteworthy in memory of Tsjernobyl in 1996 due to human failure and strengthened by the Fukushima disaster in March 2011, these two disasters have fed out-dated views on the safety and environmental impact of nuclear reactors, thereby not recognizing that today's third generation of nuclear reactors meets the highest possible safety requirements and also the disposal of nuclear waste fully secured under governmental supervision.

European Union, 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 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.
The board is focused on CO2 emission reduction only, not the means of achieving that, and allows more consideration for cost-effectiveness.

The centrepiece is a binding 40% reduction in domestic greenhouse gas emissions by 2030 (compared with a 1990 baseline) which will require strong commitments from the 27 EU member states.

MARKET VALUATION OF THE WORLD'S LISTED URANIUM PRODUCERS
(in US$ million)

Country focus	Company Name		30 Sept 2017	Year-end 2016	Year-end 2015	Year-end 2011	Year-end 2010	Change % 2017 / 2010
Canada	Cameco		3,816	4,112	4,865	7,306	15,866	-76
United States	Uranium Energy	1)	215	132	105	253	421	-49
	Energy Fuels	2)	114	109	134	167	158	-28
	Ur-Energy	3)	84	76	138	96	303	-72
	Peninsula Energy	4)	66	75	85	122	158	-58
Australia	ERA (68% Rio Tinto)		226	164	136	663	2,165	-90
Namibia	Paladin Energy	5)	67	111	300	1,118	3,649	-98
	Total		**4,588**	**667**	**898**	**2,419**	**6,854**	-33

1) ISR production commencement in November 2010; no production since 2014
2) acquired in May 2012 all of Denison Mines' US uranium assets in exchange for 425.44 million shares valued at Cdn$ 81 million; premium of 37%; including takeover of Uranerz completed on June 19, 2015
3) ISR production commenced 1n August 2013
4) first ISR production commenced in December 2015
5) listing suspended since 9 June 2017; CNNG Overseas Uranium Holding of China decided on 21 August 2017 not to exercise a a potential option to acquire Paladin's 75% interest in the Langer Heinrich Mine and retains a 25% interest; convening period for administration extended to 29 September 2017

World's top-10 listed uranium exploration/development companies focused on traditional countries (by market valuation)

	Trade symbol		Share price 30/9/2017	Country focus	Market valuation (US$ million)
NexGen Energy	TSX.V	NXE	C$ 2.77	Canada	750
Denison Mines	TSX	DML	C$ 0.58	Canada	259
Fission Uranium	TSX	FCU	C$ 0.64	Canada	248
UEX	TSX	UEX	C$ 0.19	Canada	48
Toro Energy	ASX	TOE	A$ 0.03	Australia	47
Boss Resources *	ASX	BOE	A$ 0.04	Australia	33
Vimy Resources	ASX	VMY	A$ 0.11	Australia	31
Laramide Resources	TSX	LAM	C$ 0.28	Australia/USA	92
Western Uranium	OTC	WSTRF	US$ 0.89	USA	17
Kivalliq Energy	TSX.V	KIV	C$ 0.08	Canada	16
Total market capitalization					**1,541**

* *also gold assets in Burkina Faso and nickel/copper assets in Sweden*

World's top-10 listed uranium exploration/development companies focused on emerging countries (by market valuation)

	Trade symbol		Share price 30/9/2017	Country focus	Market valuation (US$ million)
Berkeley Energia	ASX	BKY	A$ 0.81	Spain	161
GoviEx	TSX.V	GXU	C$ 0.20	Niger/other African countries	50
Deep Yellow	ASX	DYL	A$ 0.21	Namibia	31
A-Cap Resources	ASX	ACB	A$ 0.06	Botswana	41
Westwater Resources *	NASDAQ	WWR	US$ 1.44	Turkey/USA	36
Bannerman Resources	ASX	BMN	A$ 0.03	Namibia	20
Plateau Uranium	TSX.V	PLU	C$ 0.30	Peru	14
Forsys Metals	TSX	FSY	C$ 0.13	Sweden/Namibia	15
Aura Energy	ASX	AEE	A$ 0.03	Mauretania	19
Blue Sky Uranium	TSX.V	BSK	C$ 0.14	Argentina	8
Total market capitalization					**395**

* *also lithium exploration in Nevada and Utah, US*