Uraniumletter INTERNATIONAL

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Uranium equity markets have overreacted to Japanese Fukushima nuclear disaster

With the Fukushima nuclear disaster on March 11, 2011 being fully accounted for by the exceptional combination of the massive earthquake and subsequent tsunami, rather than to separate failing technical safety, the strengthened opposition to nuclear power is not justified on rational grounds.

This is particularly so since in Japan in the case of overheating reactors, the cooling system is based on the use of water in contrast to US and European nuclear plants, where the use of an air-cooling system is a safe alternative and also the third generation of nuclear plants is meeting the highest security requirements.

With regard to the outlook for the nuclear sector, it should be noted that nuclear energy contributes 16% to the world's electricity supply. In Japan the share is 29%, provided by 51 nuclear power plants. Nuclear energy is the most cost effective and environmental friendly large scale alternative for electricity generating and the only viable alternative for fossil fuels. Its important share can not be changed in a material way in the next 20 years, which also counts for leading western countries.

Growing concern over global warming as a result of strongly growing greenhouse gas emissions of CO_2, resulted in the Kyoto Protocol, in 1997, to reduce CO_2 emission by 20% in 2020. This was followed by comparable measures by law in China and Russia.

With worldwide governments failing to follow up on the Kyoto Protocol in an adequate way, being confirmed at the recently held Durban Climate Change Conference, the CO_2 issue represents a many times bigger environmental threat to the climate and human well being than radioactivity related to nuclear energy.

Also noteworthy to know is that while electricity generating in most western countries is already depending materially on nuclear energy, which has a worldwide share of 16%, construction of nuclear plants in China, India and Russia shows a strong growth in order to be less dependent on fossil fuels. In the Western world nuclear energy is shared by a variety of electricity generating sources, with renewable energy including wind and solar energy, only offering small scale alternatives.

With a current world total of 433 operable nuclear plants currently operating, there are 62 new reactors under construction. In addition, 156 units are planned and 343 units are proposed. More than 35% of total future nuclear plants are for account of China raising the share of nuclear energy in its electricity generation from a current 1.8% to 6% by 2020. This compares to China currently for more than 70% being dependent on coal.

With the collapse of uranium share prices, in concert with the U_3O_8 price having dropped from $ 73 before Fukushima to a supportive level above$ 50 per pound in the remainder of 2011, it should be noted that this resistance level is still significantly higher than the $ 40 low of April 2009.

In conclusion, despite the impact of Fukushima, the fundamentals of the uranium sector remain intact and appear poised for both near-term and long-term growth.

Fukushima disaster has only negative impact on Japan's and Western Europe's future electricity supply by nuclear power, representing just 12% of total world supply

► **Japan** needs to import about 84% of its energy requirements. Its first commercial nuclear power reactor began operating in mid 1966 and nuclear energy has been a national strategic priority since 1973

In mid-May 2011, only 17 out of the country's 50 remaining nuclear reactors (apart from Monju and decommissioned/written-off Fukushima Daiichi (1 to 4 total 2,719 MWe), representing 29% of its electricity from nuclear power, were in operation or 35% of the total remaining nuclear generating capacity of 44,396 MWe. 20 units with a combined capacity of 17,705 MWe (40% of total nuclear capacity) were not generating as they had been shut for periodic inspections, while another 2 units (11,700 MWe) have been shut for unplanned inspections or equipment replacement.
Two units at the Hamaoka plant (5% of total nuclear capacity) have been shut down at the government's request to increase their resistance to tsunamis and are likely to restart before the end of 2012.
The other 9 units with a combined capacity of 8,826 MWe (20% of nuclear capacity) shut down during the earthquake/tsunami.

Addressing Kyoto goals by reducing carbon emissions, nuclear power is expected to maintain a big role in Japan's energy requirements.

► **Germany** until March 2011 obtained 26% of its electricity from nuclear energy, using 17 reactors.

A coalition government after the 1998 federal elections had the phasing out of nuclear energy as a feature of its policy. With a new government in 2009, the phase out was cancelled, but then reintroduced following the Fukushima disaster. All reactors should be closed by 2022.

Meanwhile, Germany spends some Euro 2.5 billion per year subsidizing its coal mines to produce 55% of its electricity generating.

► **Italy** has had 4 operating nuclear power reactors but shut the last two down following the Cernobyl accident in 1986. Some 10% of the country's electricity is now from nuclear power – all imported.

The Italian government intended to have 25% of electricity supplied by nuclear power by 2030, but this project was rejected at a referendum in June 2011.

► **Switzerland** has 5 nuclear reactors generating 40% of its electricity. Two large new units were planned. A national vote has confirmed nuclear energy as part of the country's electricity mix.

However, in June 2011, Swiss parliament resolved not to replace any reactors and hence to phase out nuclear power by 2034.

No material impact from Fukushima disaster on future nuclear power demand

COUNTRIES with strongest world nuclear power growth compared to USA

Country	Nuclear electricty generating (billionkWh)	in % total electricity consumption	Operable reactors	Under construction	Planned	Proposed	Uranium required 2011 (in tonnes U)
(as at December 1, 2011)							
China	71.0	1.8	15	26	51	120	4,079
India	20.5	2.9	20	6	17	40	1,305
Russia	159.4	17.1	32	10	14	30	4,912
USA	807.1	19.6	104	1	7	27	18,376
Subtotal	**1,058.0**		**171**	**43**	**89**	**217**	**28,672**
World total			**433**	**62**	**156**	**343**	**62,552**
Top-4 in % world total :	**40**		**39**	**69**	**57**	**63**	**22**

WORLD NUCLEAR ELECTRICITY GENERATION CAPACITY (as at December 1, 2011)

Country	Operating reactors	Mwe net	% total electricity generation	Under construction	Mwe net	Planned *	MWe net	Proposed *	Mwe net	Uranium required 2011 in tonnes *
North America:										
USA	104	101,433	20	1	1,218	7	8,640	27	37,400	18,736
Canada	17	12,044	15	3	2,190	3	3,300	3	3,800	1,845
Asia:										
Japan	51	44,642	29	2	2,756	10	13,772	5	6,760	2,805
South Korea	21	18,785	32	5	5,800	6	8,400	-	-	4,029
Taiwan	6	4,927	19	2	2,700	-	-	1	1,350	810
China	14	11,881	2	26	27,640	51	57,480	120	123,000	4,079
India	20	4,385	3	6	4,600	17	15,000	40	49,000	1,305
Pakistan	3	725	3	1	340	1	340	2	2,000	113
Western Europe:										
France	58	63,130	74	1	1,720	1	1,720	1	1,100	9,254
Germany	9	12,003	28	-	-	-	-	-	-	1,934
UK	18	10,745	16	-	-	4	6,680	9	12,000	2,093
Sweden	10	9,399	38	-	-	-	-	-	-	1,366
Spain	8	7,448	20	-	-	-	-	-	-	1,379
Switzerland	5	3,252	38	-	-	-	-	3	4,000	527
Finland	4	2,741	28	1	1,700	-	-	2	3,000	1,152
Belgium	7	5,943	51	-	-	-	-	-	-	995
Eastern Europe:										
Russia	32	23,084	17	10	8,960	14	16,000	30	28,000	4,912
Ukraine	15	13,168	48	-	-	2	1,900	11	12,000	2,288
Slovakia	4	1,816	52	2	880	-	-	1	1,000	299
Latin America:										
Brazil	2	1,901	3	1	1,405	-	-	4	4,000	318
Argentina	2	935	6	1	745	2	773	1	740	208
Mexico	2	1,600	4	-	-	-	-	2	2,000	285
South Africa	2	1,800	5	-	-	-	-	6	9,600	304
Others	18	11,290		-	-	38	39,020	75	91,405	1,516
Total	433	369,077		62	62,654	156	173,025	343	392,155	62,552

68,971 tU = 81,338 tU3O8 (uranium oxide)

** Future reactors envisaged in specific plans and proposals and expected to be operating by 2030*

Source: World Nuclear Association

Looming Uranium shortage

► For **2011**, global uranium consumption was approximately 175 million pounds, while uranium production is estimated to reach only about 145 million pounds.

► The shortage of 30 million pounds in primary uranium demand is made up from secondary sources, primarily under HEU Agreement between the US and Russia which is set to expand from 2013.

► By **2020**, annual uranium consumption is forecasted to increase by 50 million to approximately 225 million pounds.

Significant additional supply from new mine production, often delayed by operational, political and economic risks, will not only need to keep pace with this demand growth, but it will need to replace current production from depleting mine deposits.

Secondary sources are expected to decrease over the long-term, especially with the expiration of the HEU Agreement.

Most emerging countries not having sufficient domestic uranium supply to fuel their strongly growing construction of reactors, lead by China, India and Russia, have to secure the majority of their required uranium supply by entering into medium-term and long-term contracts with foreign uranium producers and other suppliers.

► Remaining supplies have to be secured through purchaces at the uranium market which will narrow the gap of $ 12 between the current spot price of $ 52.00 and long-term contract price of $ 64 per pound.

From **2013**, after the expiration of the HEU Agreement, in conjunction with the oil price expected to come under further upward pressure, the uranium price has the potential to increase to a level of $ 80 plus.

► All uranium consumed today goes into electricity generating

Uranium demand utility-like in nature and only modestly impacted by economic weakness

► Nuclear power is competitive economically

- High capital costs of $ 4 billion
(2-3 times as high as coal-fired and 5-6 times as high as gas-fired)
are offset by low ongoing fuel, operating and maintenance costs

An average cost of US$ 1.76/kWh for nuclear power compares to:
US$ 2.47/kWh for coal fired and US$ 6.28/kWh for gas fired

- If generated by other fuel sources, it would require:

- Oil : 13.7 million barrels – 1 barrel yields 576 kWh
- Coal : 3.4 million tonnes – 1 tonne yields 2,297 kWh
- Natural gas: 68.5 billion cubic feet – 100 cubic feet yields 12 kWh

- **Amount of electricity generated by a 100-Mwe reactor at 90% capacity factor in one year: 7.9 billion kWh - enough to supply electricity for 740,000 households**
- **Unlike the alternatives, nuclear plans are fairly insensitive to feedstock pricing, as the costs of uranium accounts for less than 10% of the cost of producing electricity**

CHINA

- ► **China** plans to **quadruple its nuclear output by 2020** and to **triple or quadruple output again by 2030**
- ► **China currently produces 12GWe** through nuclear power (14 reactors), which supplies about 1.8% of the country's electricity
- ► **China expects to produce 40 GWe of capacity by 2020** (26 reactors under construction), **200 GWe by 2030** (171 reactors planned or proposed) and **400 GWe by 2050**

The **US** uses 198,400 million tonnes of uranium per year to produce **101 GWe** from its **104 reactors**.
China will need more than **60 million pounds U3O8 per year** by 2030 (based on current uranium requirements).

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

in US$ milion		Year-end 2011	Year-end 2010	Change in %
Canada	Cameco	7,721	15,866	-51
	Denison Mines	479	1,248	-62
Canada/Niger	Areva Resources *	3,051	5,969	-49
Australia	Energy Resources of Australia (68% Rio Tinto)	648	2,165	-70
Namibia	Paladin Energy	1,164	3,649	-68
Kazakhstan	Uranium One	2,026	4,541	-55
United States	Uranium Energy	231	421	-45
Total		15,320	33,859	

* total mining assets calculated at 35% of total assets Areva

MARKET VALUATION OF THE WORLD'S TOP-10 URANIUM DEVELOPMENT/EXPLORATION COMPANIES (in US$ million)

	Country focus	Trading symbol		Market cap. 2011	Year-end 2010	Change in %
Extract Resources	Namibia	EXT	ASX	2,167	2,333	-7
Hathor Exploration	Canada	HAT	TSX.V	576	333	73
Deep Yellow	Namibia	DYL	ASX	149	379	-61
Uranerz	USA	URZ	AMEX	140	278	-50
UEX	Canada	UEX	TSX	131	456	-71
Peninsula Energy	USA	PEN	ASX	94	159	-41
Toro Energy	Australia	TOE	ASX	89	158	-44
Ur-Energy	USA	URE	TSX	88	303	-71
Fission Energy	Canada	FIS	TSX.V	72	74	-3
Total market capitalization				3,506	4,473	

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