

The Global Uranium Outlook 2008/9 a buying opportunity?

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Maximilian Layton
Macquarie Capital (Europe) Limited
+44 20 3037 4273
max.layton@macquarie.com

The Macquarie Group is acting as adviser to Rio Tinto Plc in relation to the proposed acquisition of Rio Tinto Plc by BHP Billiton Plc as announced on 6 February 2008.

In preparing this research, we did not take into account the investment objectives, financial situation and particular needs of the reader. Before making an investment decision on the basis of this research, the reader needs to consider, with or without the assistance of an adviser, whether the advice is appropriate in light of their particular investment needs, objectives and financial circumstances. Please see disclaimer.



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Jim Lennon
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London



Adam Rowley
Executive Director
London



Max Layton
Analyst
London



Jon Butcher
Assoc. Analyst
London



Bonnie Liu
Analyst
Shanghai



Henry Liu
Analyst
Shanghai

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Macquarie Research Commodities

Macquarie Research Commodities

Wednesday 26 June 2007

LME cash price		% Change day on day
Aluminium	158.80	0.0
Copper	228.7	-1.7
Lead	1705.2	0.2
Nickel	1753.9	4.3
Zinc	845.4	-0.7
Zinc	164.0	-3.3

Other prices

	% Change day on day	
Gold (spot)	658.00	0.0
Gold (futures)	15.00	0.0
Platinum (spot)	1280.00	0.0
Platinum (futures)	160.00	0.7
Oil WTI	69.89	0.0
CO2 (ICE WTI)	28.15	0.0
SGX 400 index rate	1.34	0.1
US\$/A\$ exchange rate	0.83	0.2

LME/COMEX futures

	Futures	Change
LME Aluminium	154.00	0.00
Aluminium	17.40	0.00
Nickel	1710.00	0.00
LME Copper	221.00	-1.00
Copper	14.50	-0.00
Lead	1710.00	0.00
Zinc	840.00	0.00
Zinc	164.00	0.00

Analysts

Jim Lennon: jim.lennon@macquarie.com
Adam Rowley: adam.rowley@macquarie.com
Max Layton: max.layton@macquarie.com
Jon Butcher: jon.butcher@macquarie.com
Bonnie Liu: bonnie.liu@macquarie.com
Henry Liu: henry.liu@macquarie.com

Commodities Comment

ILZSS: Zinc market in deficit in April

Base metals

- Most base metals fell on Tuesday in the wake of significantly weaker-than-expected US housing data. Nickel continued its steep descent, dropping by a further 0.9% to \$27,974 (1705.50) in the wake of the soft new-term outlook for global stainless steel demand. Nickel is now 20.5% lower than at its 15 May intraday peak of \$34,200 (2453.50).
- The Chinese Finance Ministry has announced that in order to "curb [China's] export growth and to mitigate the excessive trade surplus," it will remove or reduce its rebates on nearly 2,000 exported products, including metals, on or after 1 July. The 0-11% has rebates on aluminum products (including bars, rods, castings, wires) will be removed. We expect this to have only a minor impact on aluminum product exports because there remains a large export-led differential between primary aluminum and aluminum products. Meanwhile, the 11% rebate on other products (except oil and gas pipes) and the 0-11% rebates on nickel, lead, zinc and tin products will be reduced to 0%.
- **Base commodities and steel**
- **McCluskey's** has reported that the Newcastle coal system has recovered to operating levels between 60% and 70% of targeted capacity. Based on the level of progress, the system could be operating at 80-100% of capacity by around the middle of this week. However, more forecast rain may hinder these plans. Production losses from Newcastle are expected to be about 3m.
- Production at BHP Billiton's Iron Ore Operations had a good week in mid-May. Queensland has resumed only three weeks after a roof fall in mid-May, one week ahead of schedule.
- G. Jiangping, Vice Secretary General of China's Iron & Steel Association (CISA) said that Chinese steel exports of no more than 10% of total output are "a requirement". The government has never said it will make such a policy and there [is] no agreement for steelmakers to put into practice.
- Chinese Economic Observer newspaper reported on Tuesday that major Chinese steelmakers and regulators had agreed to limit steel exports.
- **Commodity futures** - Chinese Commodity Research reported that the general assembly on Thursday and vote in favour of strike action across the country's steel industry. China's Commodity Research reported that the workers' demands for higher pay because it is not their direct employer.

Precious metals

- Gold was up by about \$100 on Tuesday, supported by high oil prices and US dollar depreciation, as it saw bid buying at \$850.50 per 100.

Macquarie Research Commodities

Monday 9 July 2007

Shanghai Futures Exchange		Week on week % change
Cash price	1680.0	0.0
Copper	22,000	0.0
Aluminium	22,000	0.0
Zinc	7,000	0.0
Steel	7,000	0.0
Iron Ore	1,000	0.0
Aluminium	22,000	0.0
Zinc	7,000	0.0
Cash (New York)	158.50	0.0
Aluminium	15.00	0.0
Copper	22.00	0.0
Lead	17.00	0.0
Nickel	17.00	0.0
Zinc	8.00	0.0
Zinc	16.00	0.0

Other prices (from website)

	% change	
Aluminium	0.00	0.0
Lead	200.00	-0.7
Lead	21.00	11.7
Zinc	28.00	3.1
Zinc	127.00	1.4
Zinc	159.00	0.3

Steel prices (from website)

	Market	% change
Cash price	4,900	-0.4
HR coil (mm)	4,700	-0.2
Skilled (mm)	4,900	-0.1
Major Chinese	5,000	-0.3
Hot rolled	500	0.0
Hot rolled	7.00	0.0
Hot rolled	10.00	0.0

Analysts

Bonnie Liu: bonnie.liu@macquarie.com
Henry Liu: henry.liu@macquarie.com

China Commodities Weekly

Strong concentrates import growth fuelling Chinese refined zinc production

- **SHFE copper prices strengthened** over the week following the price surge on the LME. The four month copper contract finished up by 1.9% W/W or \$160.00 (\$201) at \$2,460.00 (US\$ 884) Friday's close. SHFE copper stocks continued to drop last week, due to reduced copper supply from imports after the wave of overbuying in 1407. Reported stocks dropped 7,320 W/W, to 33,000 (+0.2%).
- **SHFE aluminium prices remained flat** last week, despite the surge in copper prices. The three month contract closed at \$1620.00 (\$132.43) on Friday, down by just 0.1% W/W. SHFE registered aluminium stocks increased from by 3,500 W/W to 27,000 (+15.4%).
- We understand that Tongling Smelting group, the second biggest copper smelter in China, with an annual smelting capacity of 500,000tpa, has signed a mid-year copper concentrate supply contract with BHP Billiton with the treatment and refining charges at \$500 and \$400 (M/t basis) with no price participation (S). This contract is in line with other settlements this year between the refiners and smelters and reflects a growing shortage of global concentrate supply against a rapid growth in copper smelting capacity.
- **China's steel production is growing rapidly** - by 22% Y/Y in the first five months - thanks to strong growth in imports, including some from unusual sources such as North Korea, Turkey and Vietnam.
- Major Chinese steel mills have cut their electrolytic prices to avoid price re-instatement - electrolytic prices higher than spot market prices over the past week. The substance of the market was shaken once again by this move. Hot rolled coil was reported to be selling at \$450/ton, down by 2.7% W/W, while cold rolled coil prices fell by another 0.2% to \$260/ton. Other prices also suffered a 0.2% W/W drop to \$255/ton including Y/L.
- Chinese iron ore spot prices were flat last week, after a small price increase in the previous week. Indian iron ore fines were trading at \$104, unchanged from a week earlier and the price for major 60% iron ore fines was \$93, also unchanged.



Lack of genuine market tightness to 2010...window of deficit in 2011-2013

World uranium balance

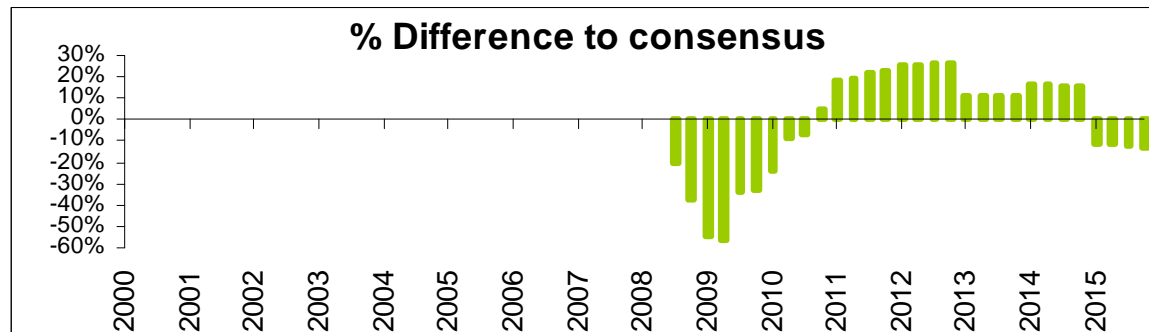
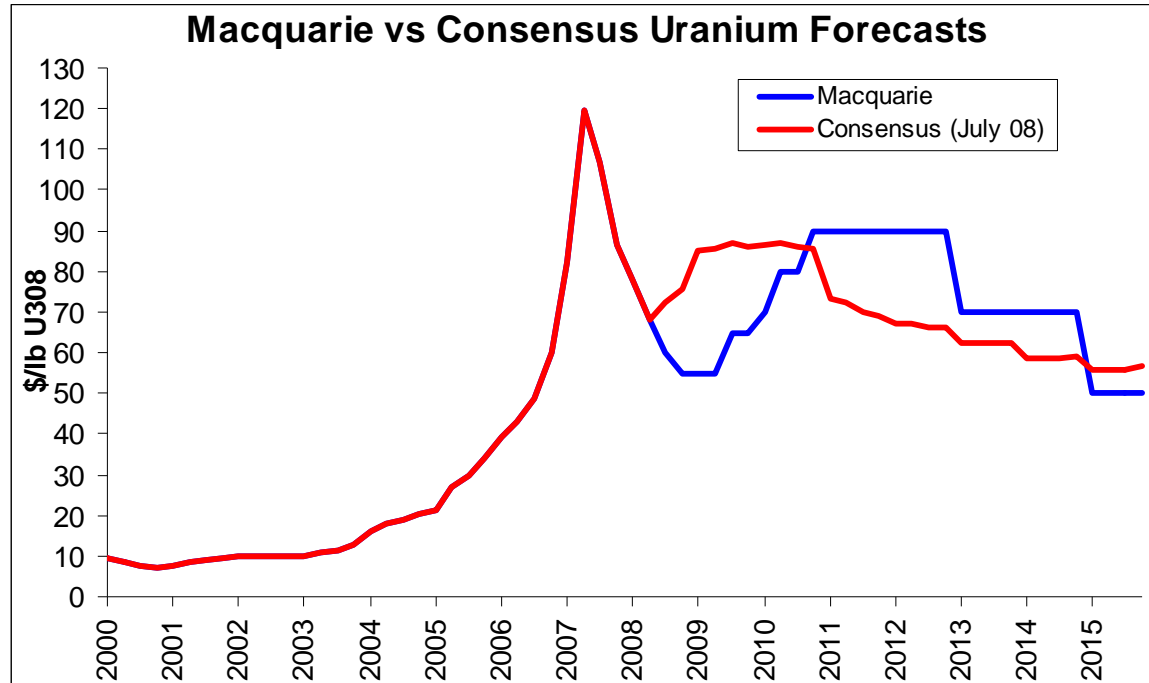
Tonnes U	2008f	2009f	2010f	2011f	2012f	2013f	2014f	2015f	2016f
---Total Primary	45145	50216	54879	59092	65640	70004	76775	82738	84632
---Other Supply	20015	20029	18315	16767	16890	15008	13000	10000	9433
Total Supply	65159	70245	73194	75859	82530	85012	89775	92738	94065
% Change YoY	7.0%	7.8%	4.2%	3.6%	8.8%	3.0%	5.6%	3.3%	1.4%
Total Requirements	65196	69316	72974	76943	85658	88022	89119	86282	91445
% Change YoY	1.5%	6.3%	5.3%	5.4%	11.3%	2.8%	1.2%	-3.2%	6.0%
Balance	541	929	219	-1085	-3129	-3010	656	6456	2621
Balance (incl ETFs in 08/09)	-229	159	219	-1085	-3129	-3010	656	6456	2621
Surplus/deficit (%consumpt)	0%	0%	0%	-1%	-4%	-3%	1%	7%	3%
Spot Price (U308, \$/lb)	65	60	80	90	90	70	70	50	50

Source: Ux Consulting, Macquarie Research, September 2008



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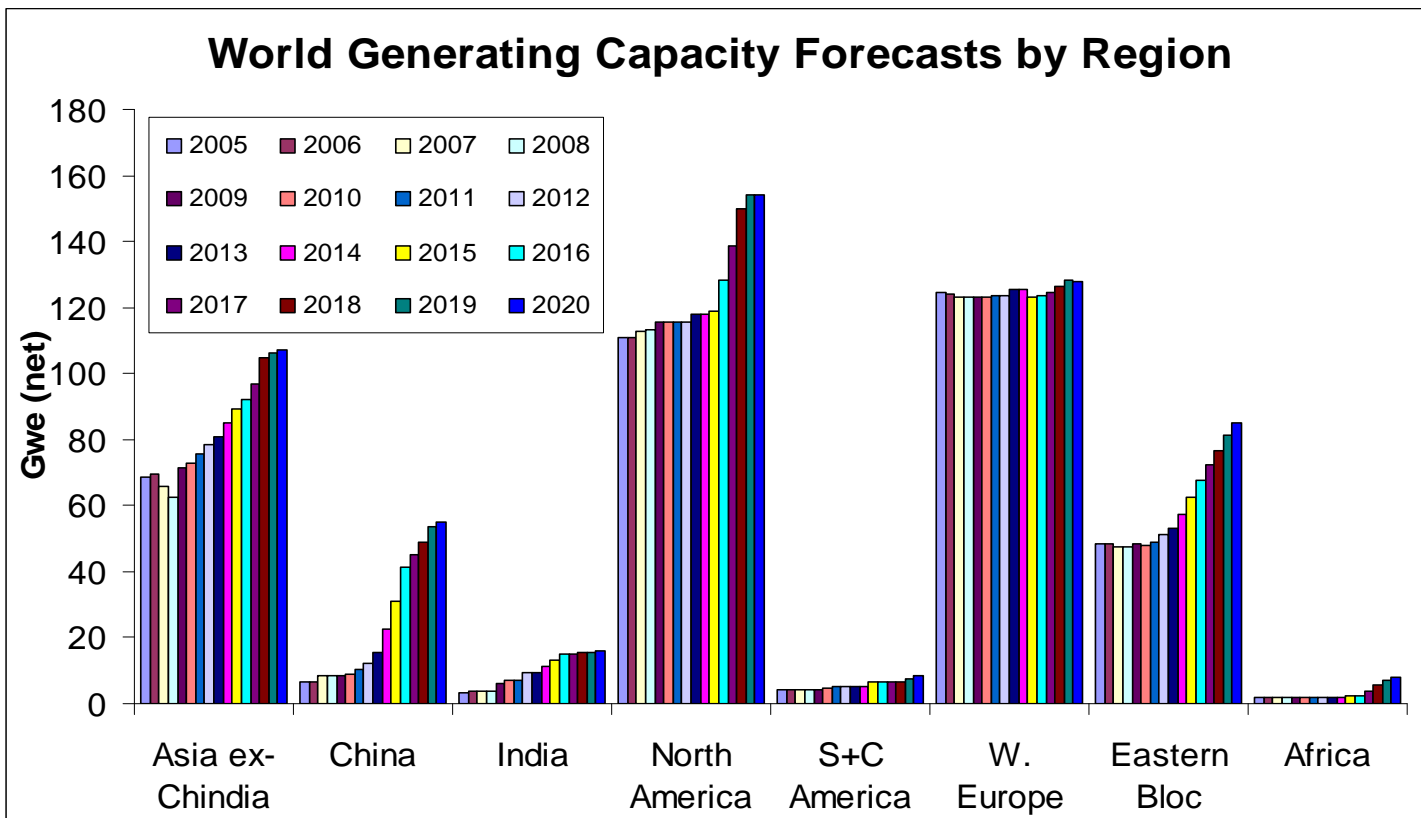
Macquarie spot price forecasts: a differentiated view



Source: Macquarie Research, September 2008



Uranium demand: strong growth in generation capacity from 2014



		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
World	Macquarie	365	379	382	388	398	409	427	446	477	502	534	553	562
World	WNA HC	375	377	382	390	401	410	421	437	454	467	485	500	510
	Diff to WNA High Case-2007	-10	2	0	-2	-3	-1	5	9	23	36	50	53	53

Source: Macquarie Research, Company websites, WNA, September 2008



Forward ordering of uranium for use in initial cores to rise from 2 to 3/4 years

Assumptions for China & Russia

Uranium for core bought...	...for reactors commissioned in	Assumed Lead time	Other Brokers/WNA
2008	2010	2 years	2 years
2009	2011, Half of 2012	2-3 years	2 years
2010	Half of 2012, 2013	2-3 years	2 years
2011	2014	3 years	2 years
2012	2015	3 years	2 years
2013	2016	3 years	2 years
2014	2017	3 years	2 years
2015	2018	3 years	2 years
2016	2019	3 years	2 years

Source: Macquarie Research, WNA, September 2008

Assumptions for US and ROW

Uranium for core bought...	...for reactors commissioned in	Assumed Lead time	Other Brokers/WNA
2008	2010	2 years	2 years
2009	2011, Half of 2012	2-3 years	2 years
2010	Half of 2012, 2013	2-3 years	2 years
2011	2014, Half of 2015	3-4 years	2 years
2012	Half of 2015, 2016	3-4 years	2 years
2013	2017	4 years	2 years
2014	2018	4 years	2 years
2015	2019	4 years	2 years
2016	2020	4 years	2 years

Source: Macquarie Research, WNA, September 2008



Tails assays assumptions

Provider	Enricher tails	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Macquarie	Non-Russian tails	0.250	0.250	0.240	0.240	0.240	0.242	0.244	0.246	0.248	0.250	0.250
Other/WNA	Non-Russian tails	<i>0.244</i>	<i>0.238</i>	<i>0.232</i>	<i>0.226</i>	<i>0.220</i>	<i>0.226</i>	<i>0.232</i>	<i>0.238</i>	<i>0.244</i>	0.250	0.250
Macquarie	Russian tails	0.130	0.130	0.130	0.140	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Other/WNA	Russian tails	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>	<i>0.100</i>

(1) Numbers in italics are estimates only.

Source: Macquarie Research, UxC, WNA, September 2008

- ➔ We model tails assays based on forecast average SWU / average U prices (\$200/SWU+ is assumed post 2011-13), and also with respect to market information gathered on transactional tails assays (Urenco quoted as running at full capacity at 0.25% assay for next few years, discussions with UxC).
- ➔ The forecasts are consistent with what we have found is a general consensus that there will be little spare capacity in the enrichment market to 2012/13, but we readily admit there are significant risks on the up and downside.
- ➔ Now that we have modelled the uranium market we are looking to model the enrichment supply/demand more precisely.



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Resulting uranium forecasts are broad based, bullish, but achievable ('000tU)

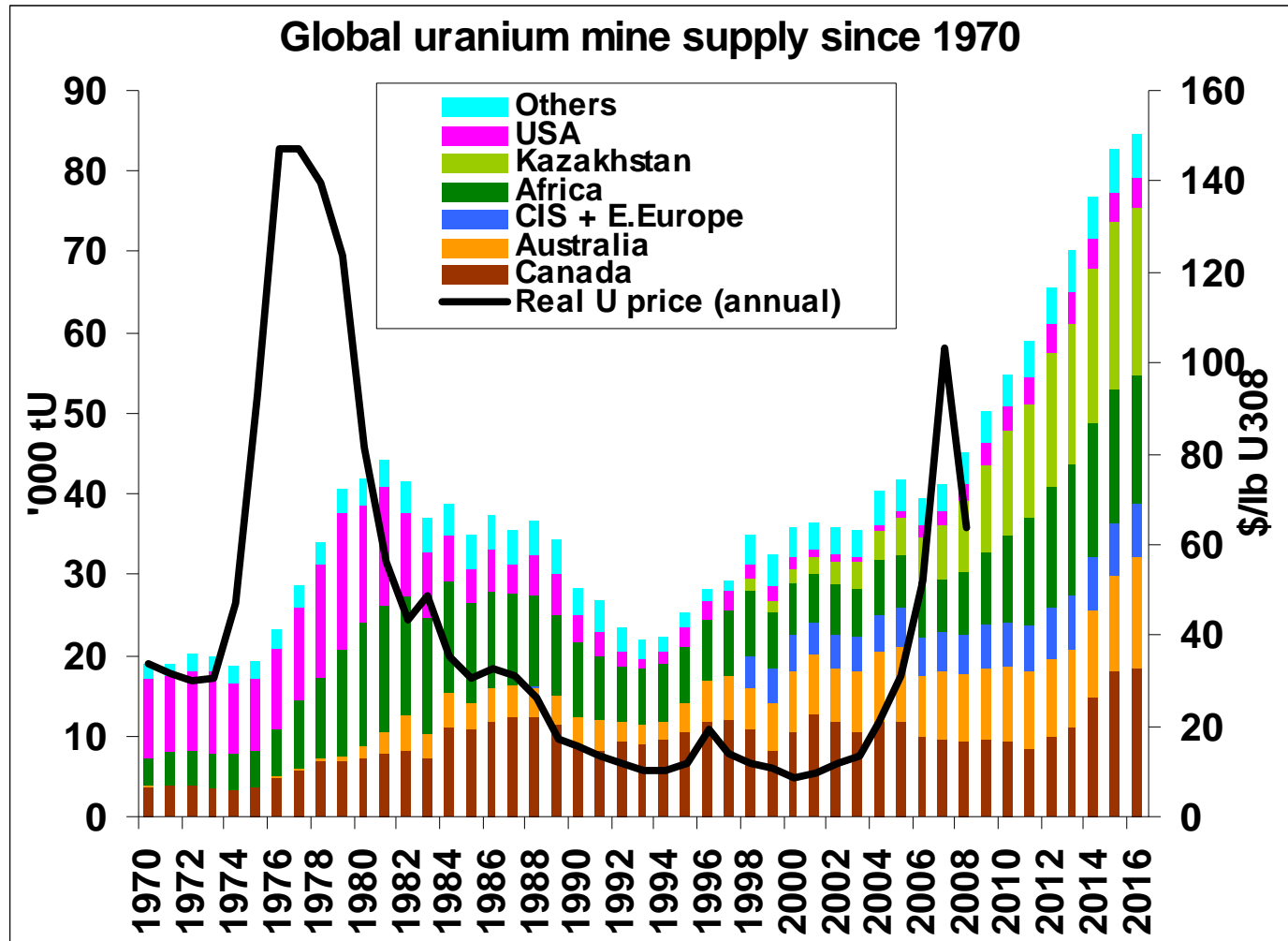
Country/Region	2008	2009	2010	2011	2012	2013	2014	2015	2016	Chg 2016/08	% Chg 2016/08
Asia ex-Chindia	11.0	13.8	13.8	14.4	15.2	15.6	18.3	15.3	15.8	4.8	43.5
China	1.7	2.3	3.7	5.6	6.6	8.3	6.1	7.8	10.4	8.8	524.1
India	0.6	1.0	1.1	2.2	2.5	1.5	1.9	2.2	2.5	1.9	324.0
North America	20.9	21.3	22.5	21.7	26.3	26.9	26.0	24.4	25.6	4.7	22.4
S+C America	0.7	0.7	0.8	1.1	1.7	1.4	1.5	1.6	1.6	0.9	128.4
W. Europe	21.9	21.4	21.8	21.4	21.8	22.7	22.9	22.1	21.7	-0.2	-0.8
Eastern Bloc	8.1	8.4	8.9	10.2	11.1	10.7	11.3	12.0	12.8	4.7	57.4
Africa	0.3	0.3	0.3	0.4	0.5	0.9	1.1	0.9	1.0	0.7	225.5
World	65.2	69.3	73.0	76.9	85.7	88.0	89.1	86.3	91.4	26.2	--
Change tU	1.0	4.1	3.7	4.0	8.7	2.4	1.1	-2.8	5.2	--	--
% Change U	1.5	6.3	5.3	5.4	11.3	2.8	1.2	-3.2	6.0	40.3	--

Source: Macquarie Research, WNA, September 2008

- ➔ Surprised by broad based nature of growth!
- ➔ High degree of conviction over Chinese numbers
- ➔ Owing to initial core ordering, uranium demand is expected to be 'lumpy'



Mine supply: strong growth assumed



Source: WNA, Macquarie Research, September 2008



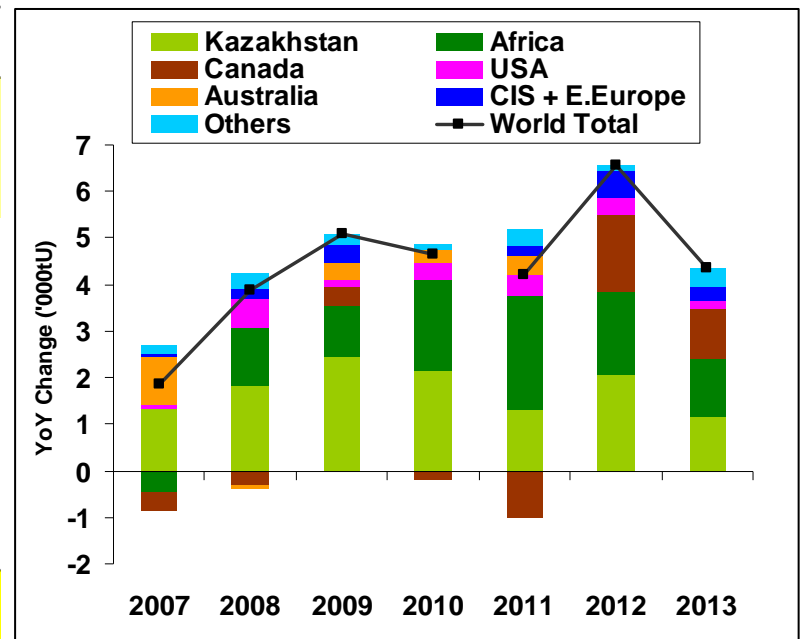
Supply response to 2013 driven by Kazakhstan and Africa

Growth in global mine supply (tU)

Country/Region	2007	2013	Chg	Chg (%)
Kazakhstan	6,637	17,626	10,989	165.6%
Africa	6,575	16,316	9,741	148.2%
USA	1,748	3,850	2,102	120.3%
CIS + E.Europe	4,809	6,550	1,741	36.2%
Canada	9,484	11,107	1,623	17.1%
Others	3,423	4,962	1,539	45.0%
Australia	8,603	9,592	989	11.5%
Total	41,279	70,004	28,725	69.6%

Source: Macquarie Research, UxC September 2008

Growth in global mine supply (tU)



Source: Macquarie Research, UxC, September 2008



Our research suggests incentive prices of \$20-55/lb (sample average \$35/lb)

'Incentive price' estimates for new uranium mines (1)

Project	Country	Company	Capex (\$m)	Capacity lbs U308	Capex per lb	15% RR	OPEX	Total Costs per lb U308
Langer Henirch (Stage 1)	Namibia	Paladin	92	2600	35	5	24	29
Langer Henirch (Stage 2)	Namibia	Paladin	142	3700	38	6	24	30
Valencia	Namibia	Forsys	227	2700	84	13	40	53
Goanikontes (lower cap)	Namibia	Bannerman	430	2900	148	22	26	48
Goanikontes (upper cap)	Namibia	Bannerman	430	4000	108	16	23	39
Kayelekera	Malawi	Paladin	200	3200	63	9	24	33
Trekkopje	Namibia	AREVA	920	9100	101	15	25	40?
Imouraren	Niger	AREVA	1000	9100	110	16	25	41?
Ryst Kuil	South Africa	AREVA	500	2990	167	25	--	--
Dominion (Phase 1)	South Africa	Uranium One	400	3800	105	16	30	46?
South Inkai	Kazakhstan	Uranium One	64.6	1600	40	6	15	21
Kharasaan Stage 1	Kazakhstan	Uranium One	137	2000	69	10	20	30
Kharasaan Stage 2	Kazakhstan	Uranium One	187	5200	36	5	20	25
Cigar Lake	Canada	Cameco/AREVA	1177	18000	65	10	15	25
Midwest (McLean Lake)	Canada	AREVA/Denison	435	8300	52	8	15?	23?
Honeymoon	S. Australia	Uranium One	60	880	68	10	20?	30?
Gurvanbulag	Mongolia	W. Prospector	230	2000	115	17	24	41
Lost Soldier	US	UR Energy	83	1000	83	12	23	35
Lost Creek	US	UR Energy	112.5	1000	113	17	23	40
Average			359	4425	84	13	23	35

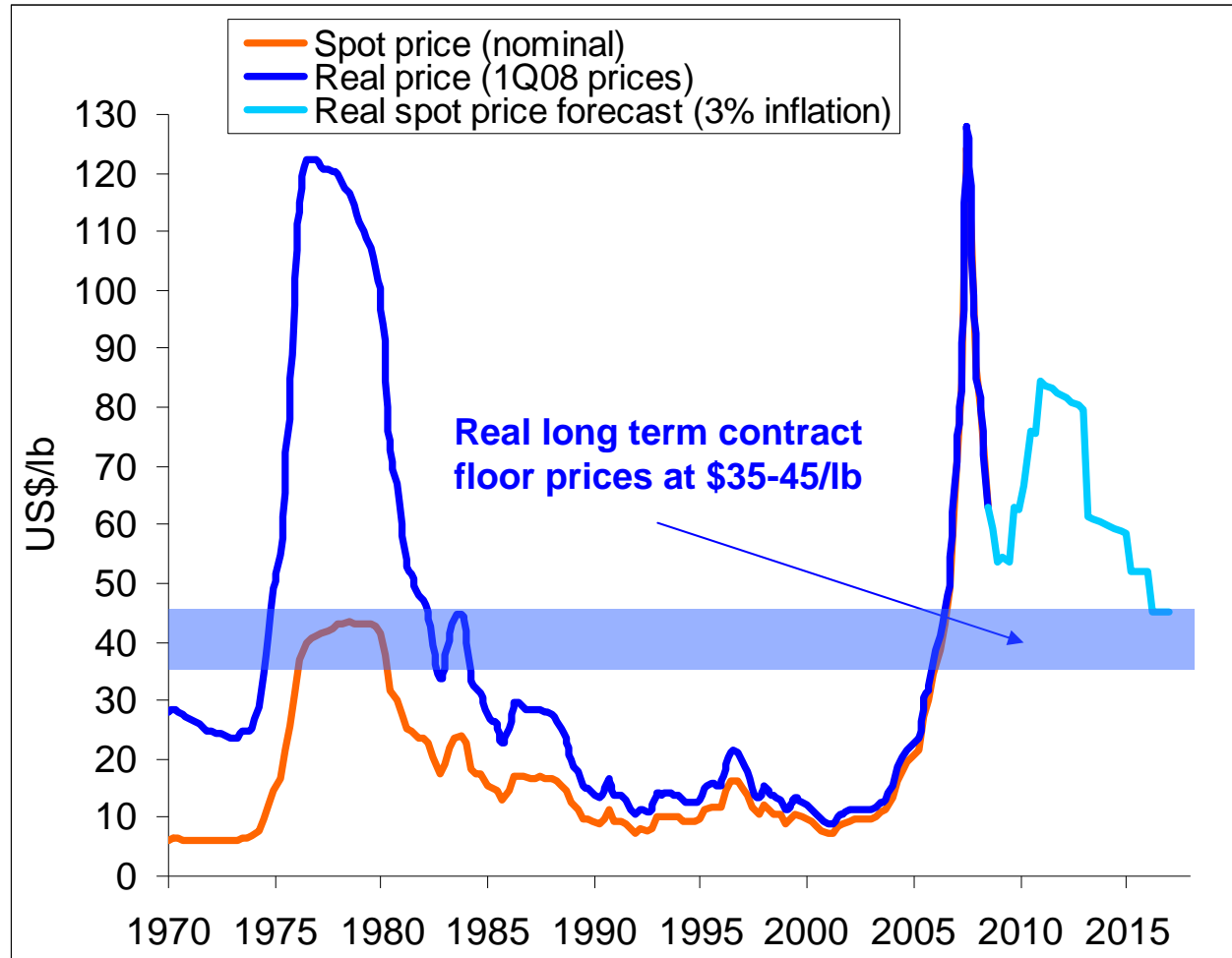
(1) Operating expenditure numbers are estimates based on either company reports or extrapolation, and numbers with question marks are indicative only.

Source: Macquarie Research, September 2008



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Confident of supply growth as average realised prices set to remain high

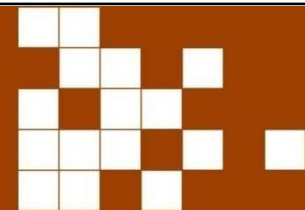


Source: UxC, WNA, Metal Bulletin, Company sources, Macquarie Research, September 2008



Conclusions: is 2008/09 a buying opportunity?

- Yes, but it does not look like there is a huge rush based on our modelling.
- A successful US/India deal, further significant issues at Cigar Lake, or a sharp deterioration in US/Russian political relations could see spot prices rally, but the impact on the short term fundamentals of the market appear limited, so any large rally in spot prices will be a good selling opportunity.
- Anticipated strong Kazakh supply growth in 2008/09/10 may potentially spook investors over the coming 2 years, but in our view this would provide a great buying opportunity.
- Further out our base case is for a sufficient supply response from 2013, on the back of high prices. Non-reactor players may sell into any boom.
- Major question mark is the enrichment market. What will tails assays be doing in Russia, and in world ex-Russia by 2011/12??



Contact Details

Maximilian Layton
Macquarie Capital (Europe) Limited

max.layton@macquarie.com
+44 20 3037 4273

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