2010 Saskatoon Cambridge Conference

Saskatoon, Canada

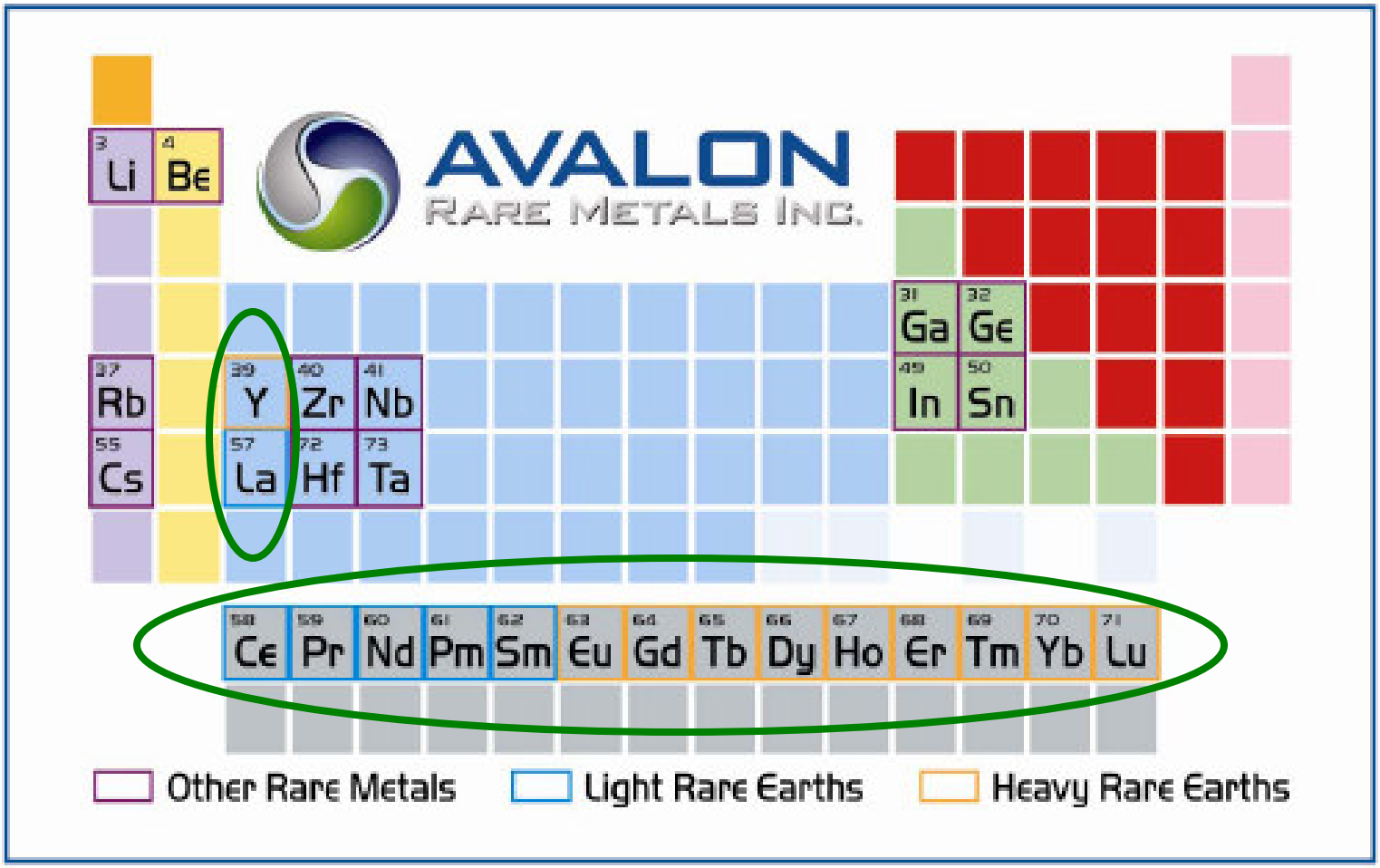
May 7, 2010

Presented by John Kaiser

Kaiser Bottom-Fish

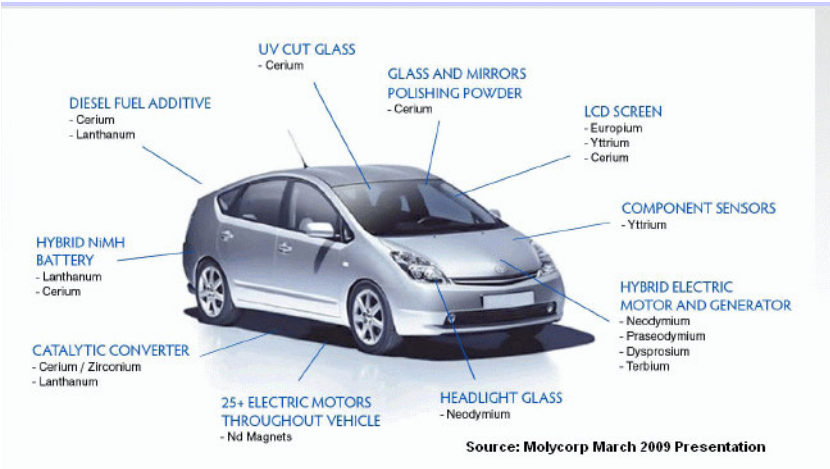
Understanding Rare Earth Mania

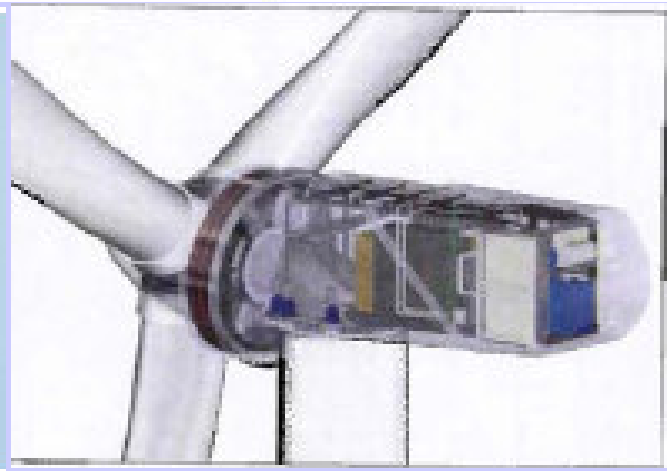
www.KaiserBottomFish.com



Light REE:
La = Lanthanum
Ce = Cerium
Pr = Praseodymium
Nd = Neodymium
Sm = Samarium

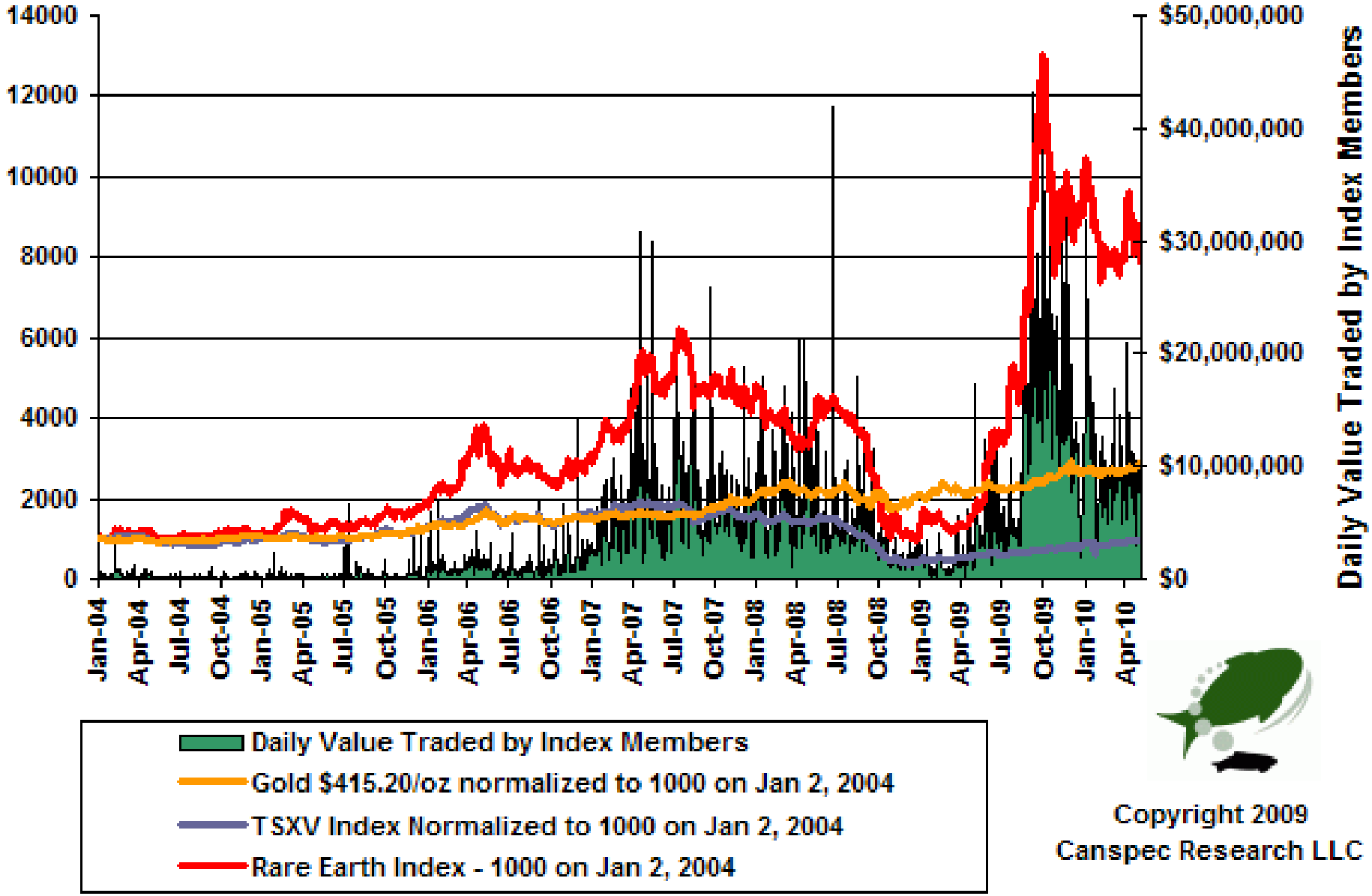
Heavy REE:
Eu = Europium
Gd = Gadolinium
Tb = Terbium
Dy = Dysprosium
Ho = Holmium
Er = Erbium
Tm = Thulium
Yb = Ytterbium
Lu = Lutetium
Y = Yttrium



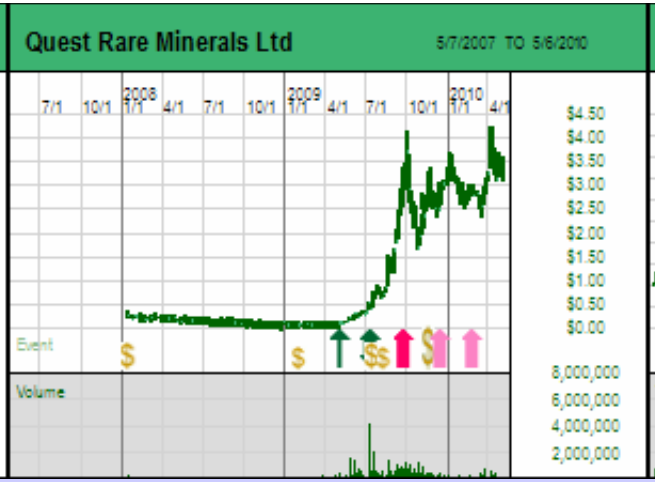


KBFO Rare Earth Index

May 6, 2010

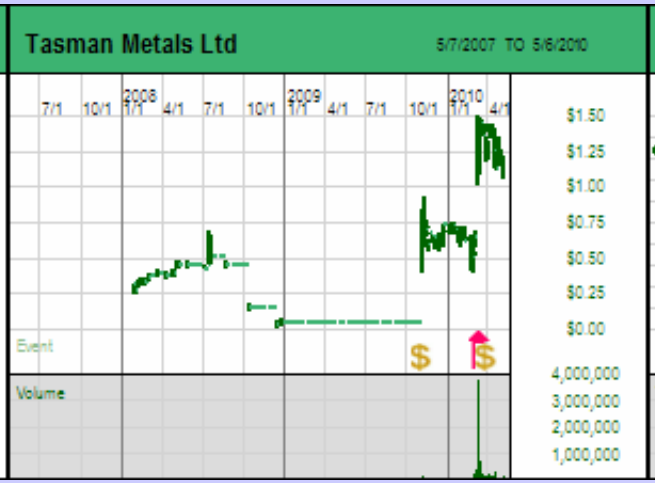


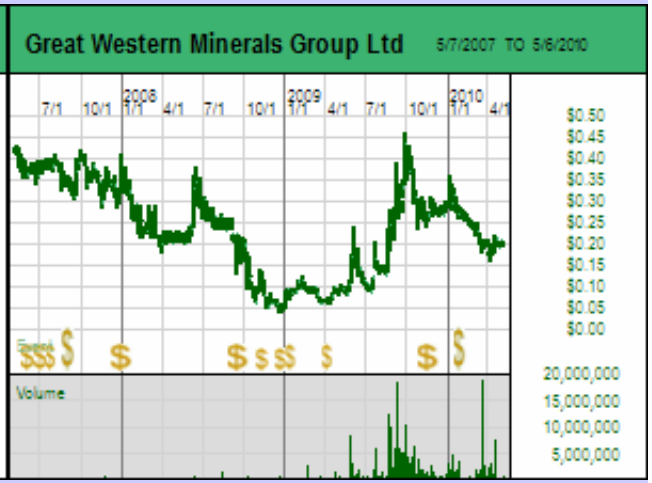

Avalon Rare Metals Inc
5/7/2007 TO 5/6/2010
Event
Volume


Quest Rare Minerals Ltd
5/7/2007 TO 5/6/2010
Event
Volume


Rare Element Resources Ltd
5/7/2007 TO 5/6/2010
Event
Volume


Matamec Explorations Inc
5/7/2007 TO 5/6/2010
Event
Volume

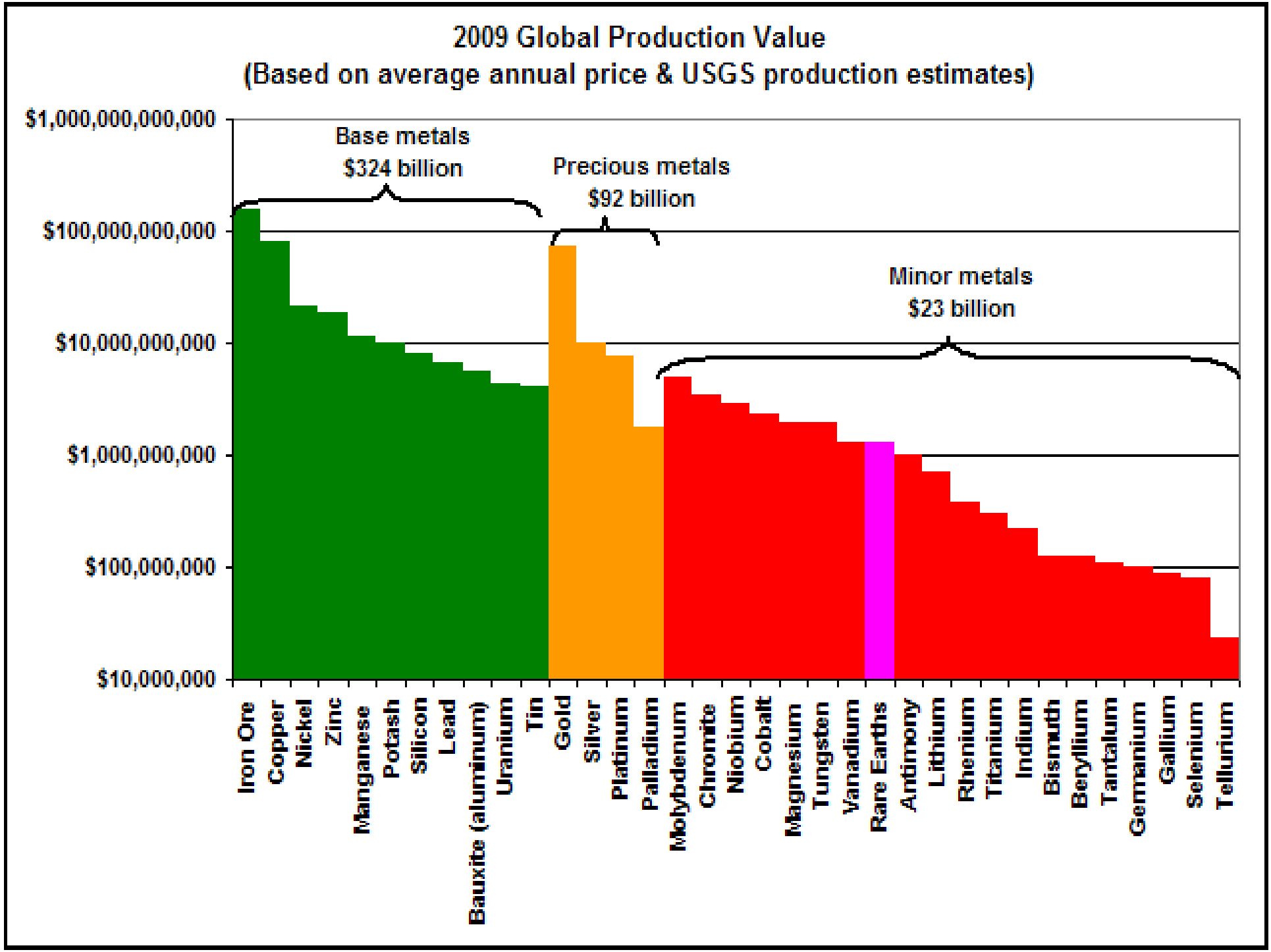

Tasman Metals Ltd
5/7/2007 TO 5/6/2010
Event
Volume

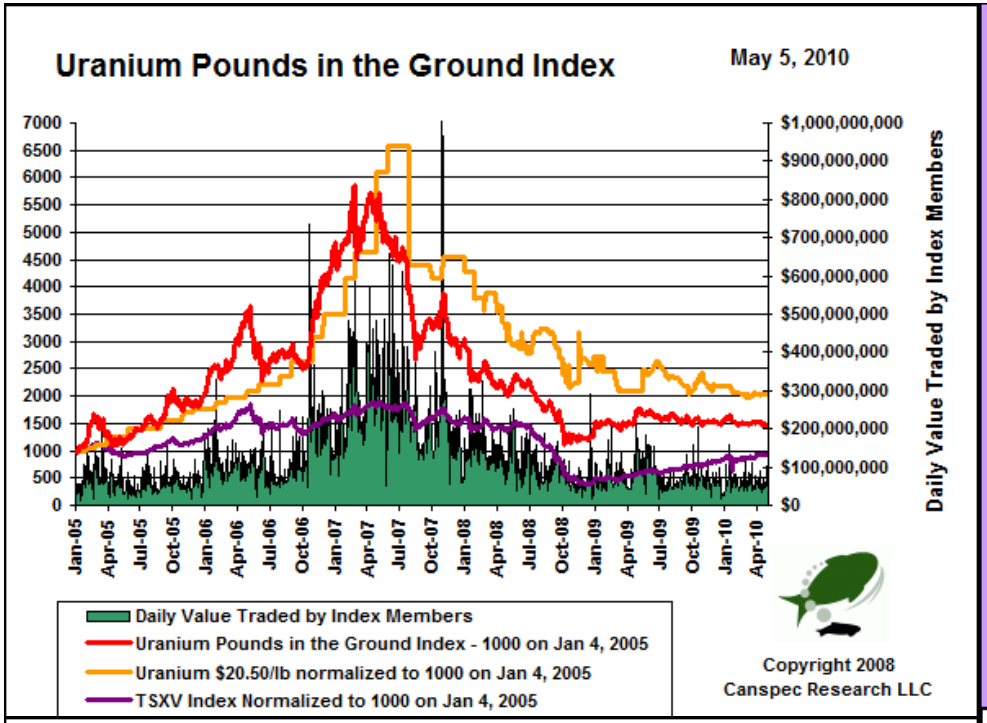

Great Western Minerals Group Ltd
5/7/2007 TO 5/6/2010
Event
Volume

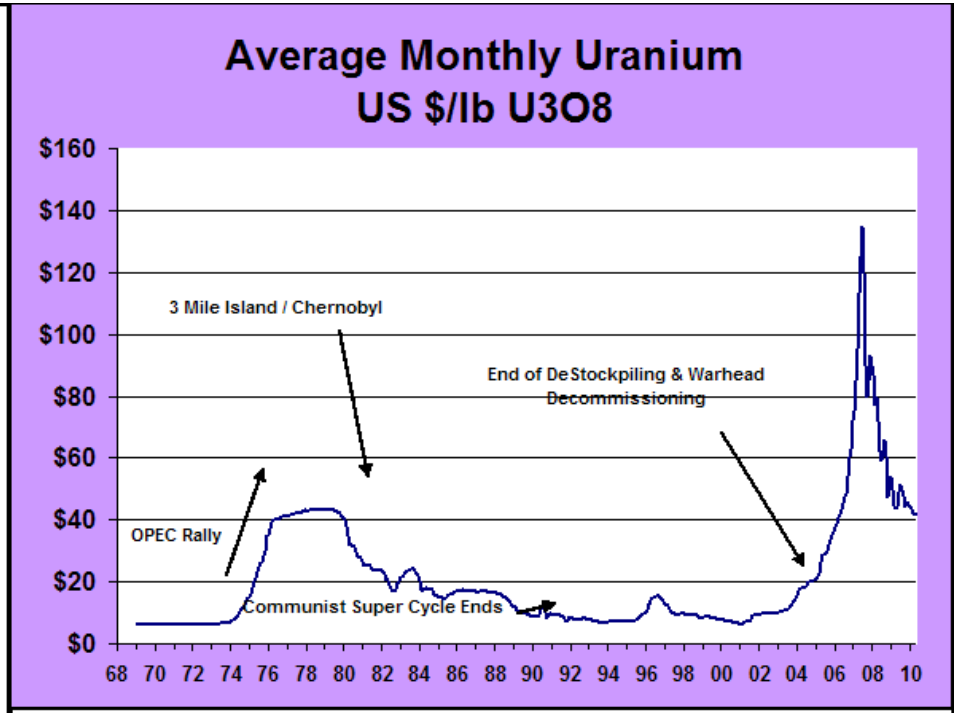

Arafura Resources Ltd
5/7/2007 TO 5/6/2010
Event
Volume

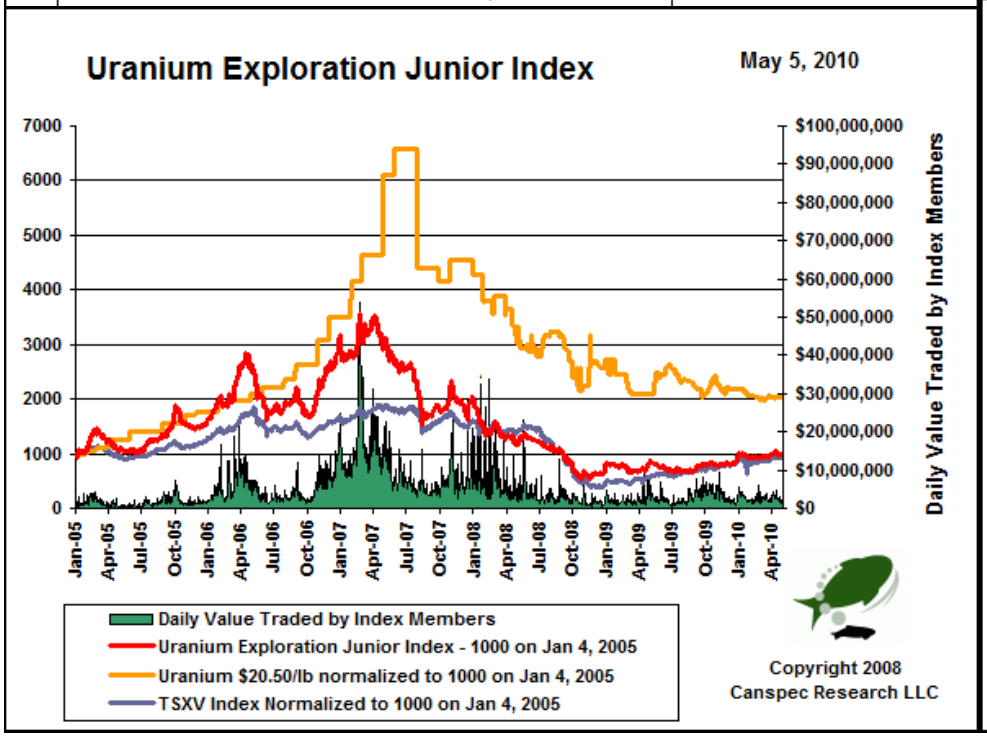

Lynas Corporation Ltd
5/7/2007 TO 5/6/2010
Event
Volume

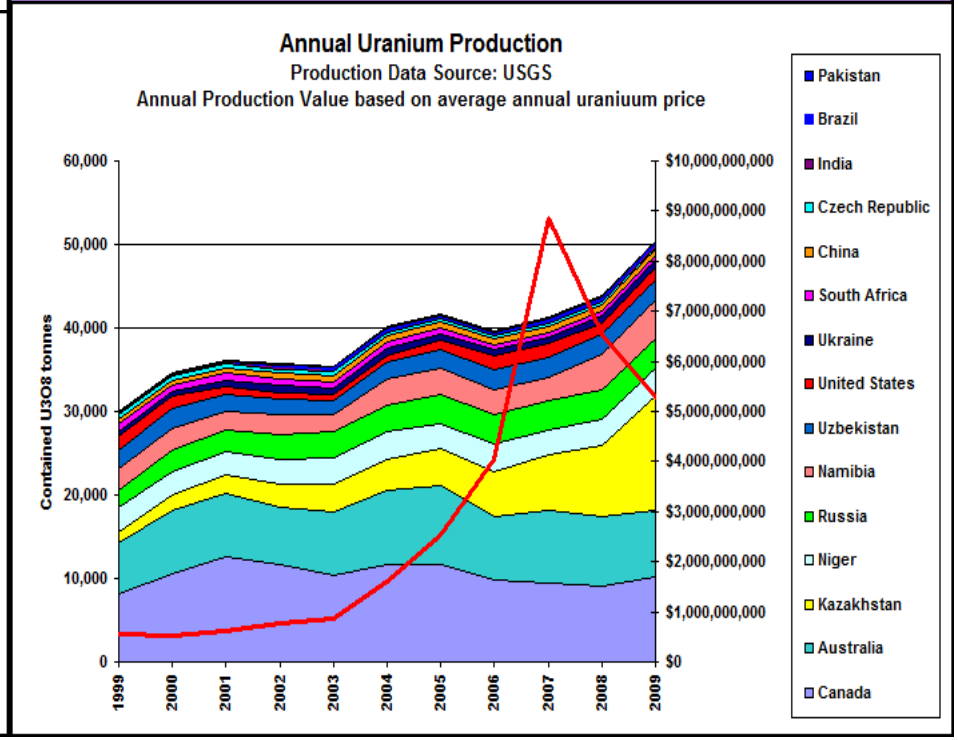

Alkane Resources Ltd
5/7/2007 TO 5/6/2010
Event
Volume


2009 Global Production Value
(Based on average annual price & USGS production estimates)
$1,000,000,000,000
$100,000,000,000
$10,000,000,000
$1,000,000,000
$100,000,000
$10,000,000
Base metals
$324 billion
Precious metals
$92 billion
Minor metals
$23 billion
Iron Ore
Copper
Nickel
Zinc
Manganese
Potash
Silicon
Lead
Bauxite (aluminum)
Uranium
Tin
Gold
Silver
Platinum
Palladium
Molybdenum
Chromite
Niobium
Cobalt
Magnesium
Tungsten
Vanadium
Rare Earths
Antimony
Lithium
Rhenium
Titanium
Indium
Bismuth
Beryllium
Tantalum
Germanium
Gallium
Selenium
Tellurium

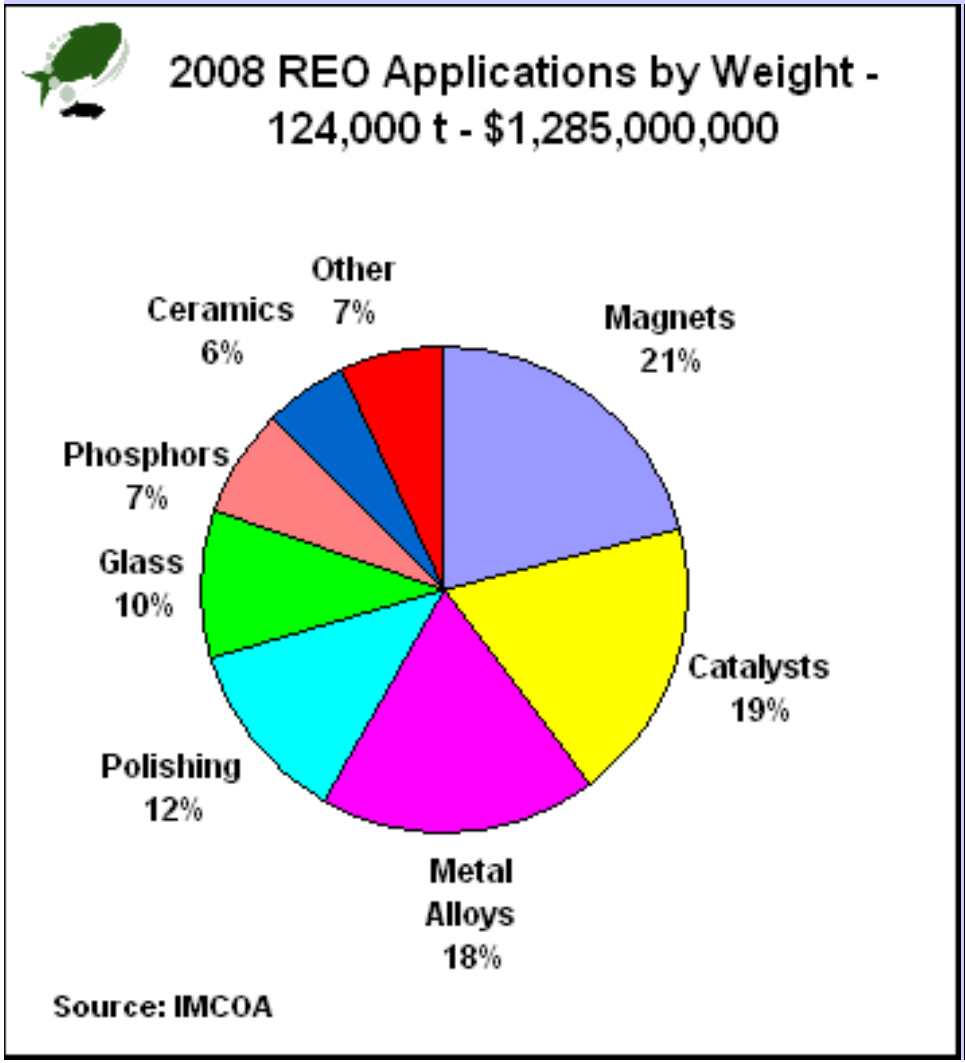

Uranium Pounds in the Ground Index
May 5, 2010
Daily Value Traded by Index Members
Daily Value Traded by Index Members
Uranium Pounds in the Ground Index - 1000 on Jan 4, 2005
Uranium $20.50/lb normalized to 1000 on Jan 4, 2005
TSXV Index Normalized to 1000 on Jan 4, 2005
Copyright 2008
Canspec Research LLC

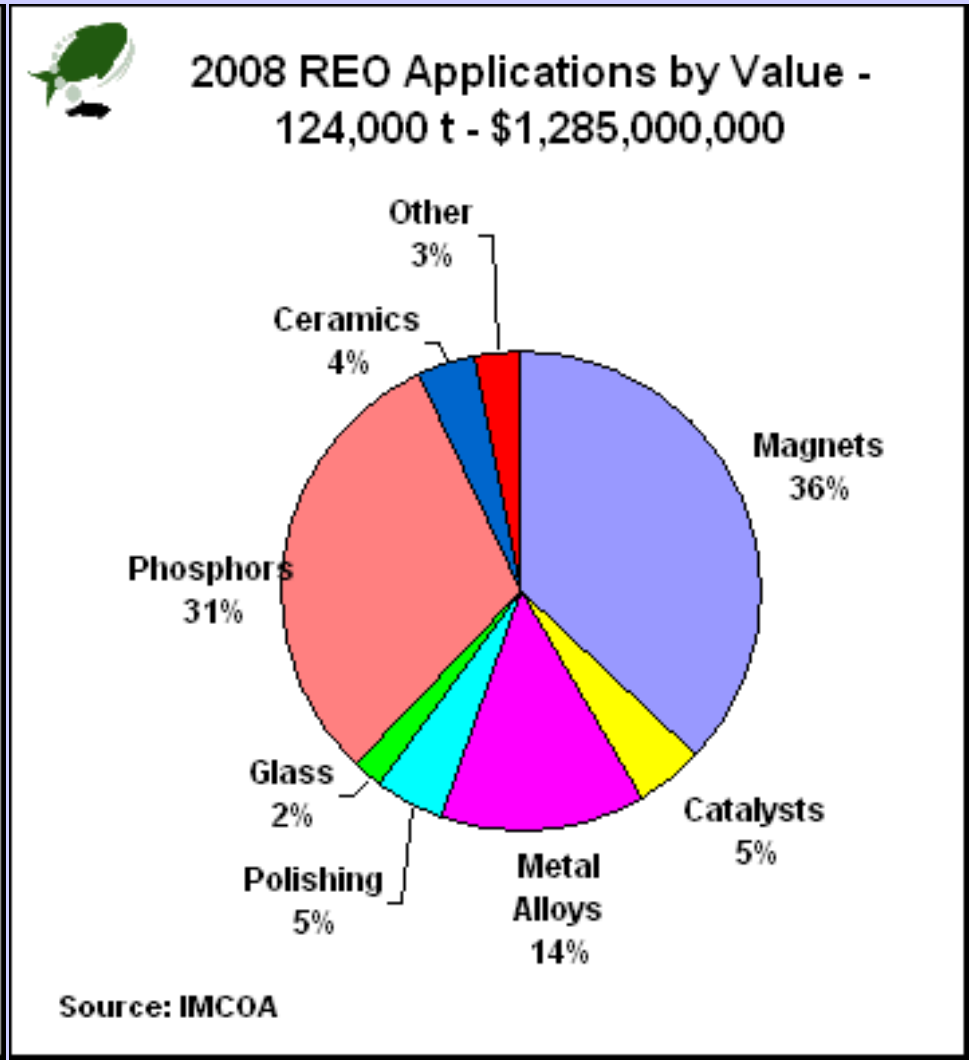

Average Monthly Uranium
US $/lb U3O8
3 Mile Island / Chernobyl
End of DeStockpiling & Warhead Decommissioning
OPEC Rally
Communist Super Cycle Ends


Uranium Exploration Junior Index
May 5, 2010
Daily Value Traded by Index Members
Daily Value Traded by Index Members
Uranium Exploration Junior Index - 1000 on Jan 4, 2005
Uranium $20.50/lb normalized to 1000 on Jan 4, 2005
TSXV Index Normalized to 1000 on Jan 4, 2005
Copyright 2008
Canspec Research LLC

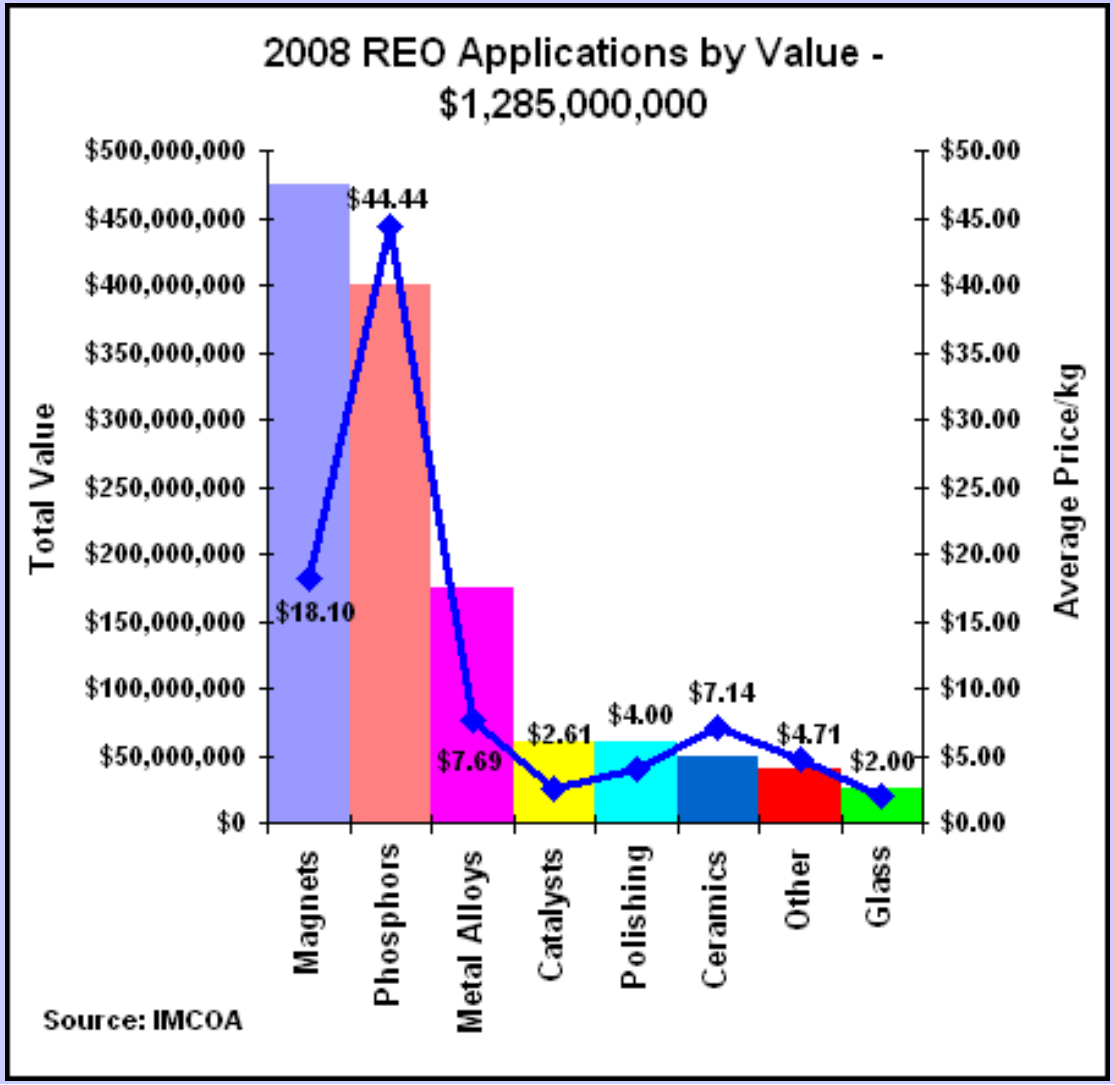

Annual Uranium Production
Production Data Source: USGS
Annual Production Value based on average annual uraniuum price
Contained U3O8 tonnes
Pakistan
Brazil
India
Czech Republic
China
South Africa
Ukraine
United States
Uzbekistan
Namibia
Russia
Niger
Kazakhstan
Australia
Canada

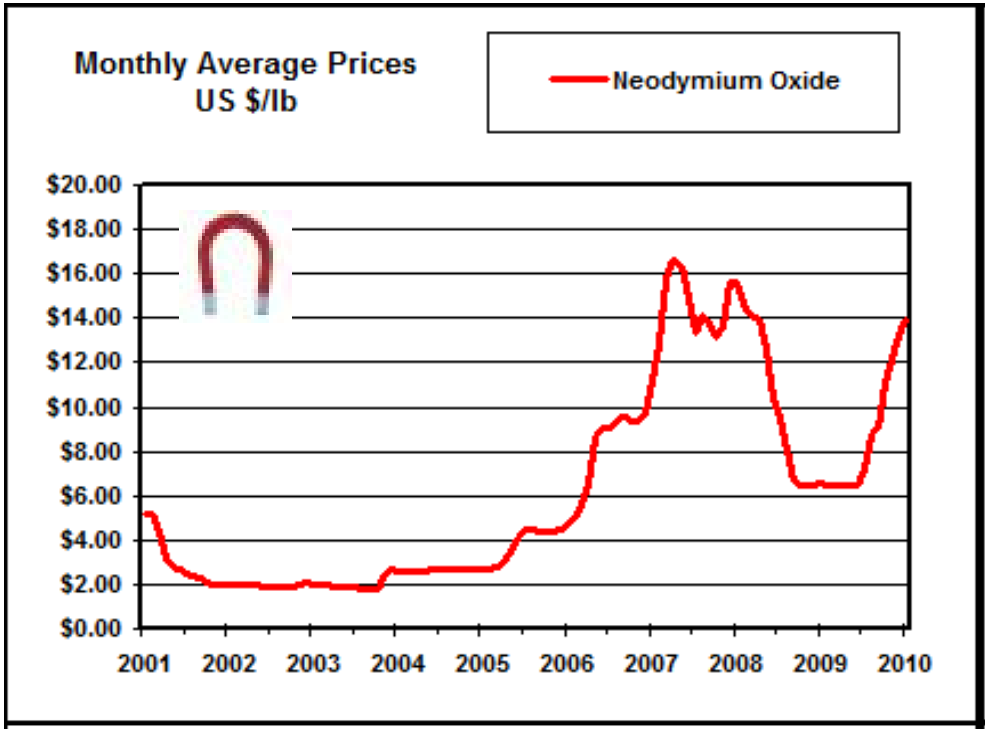
How does the "weight" of REO applications compare to their "value"?

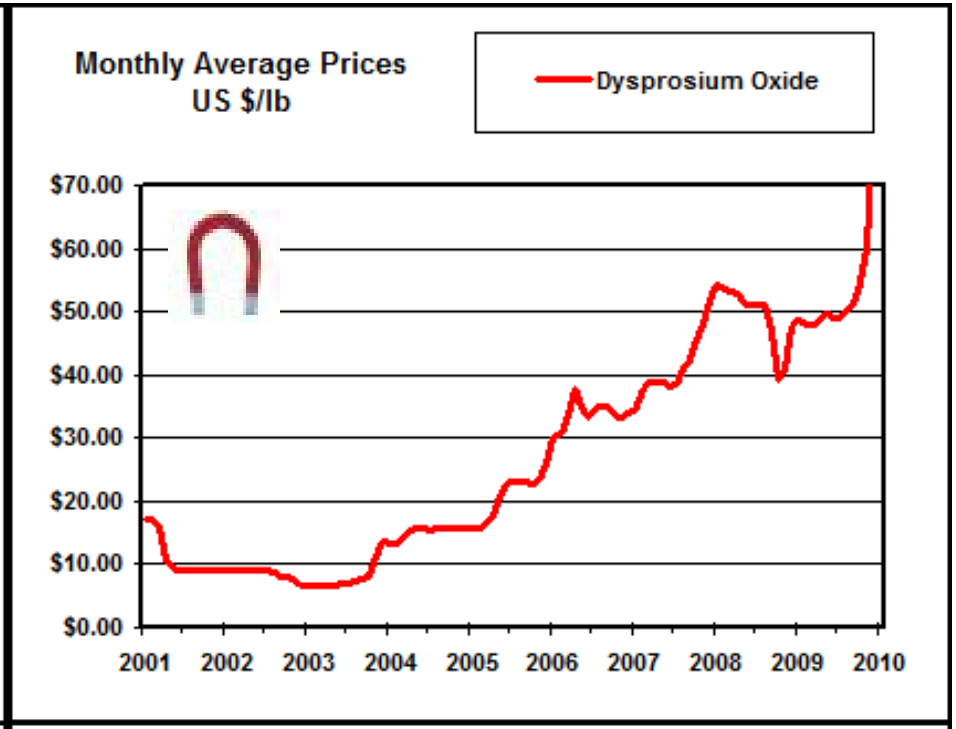


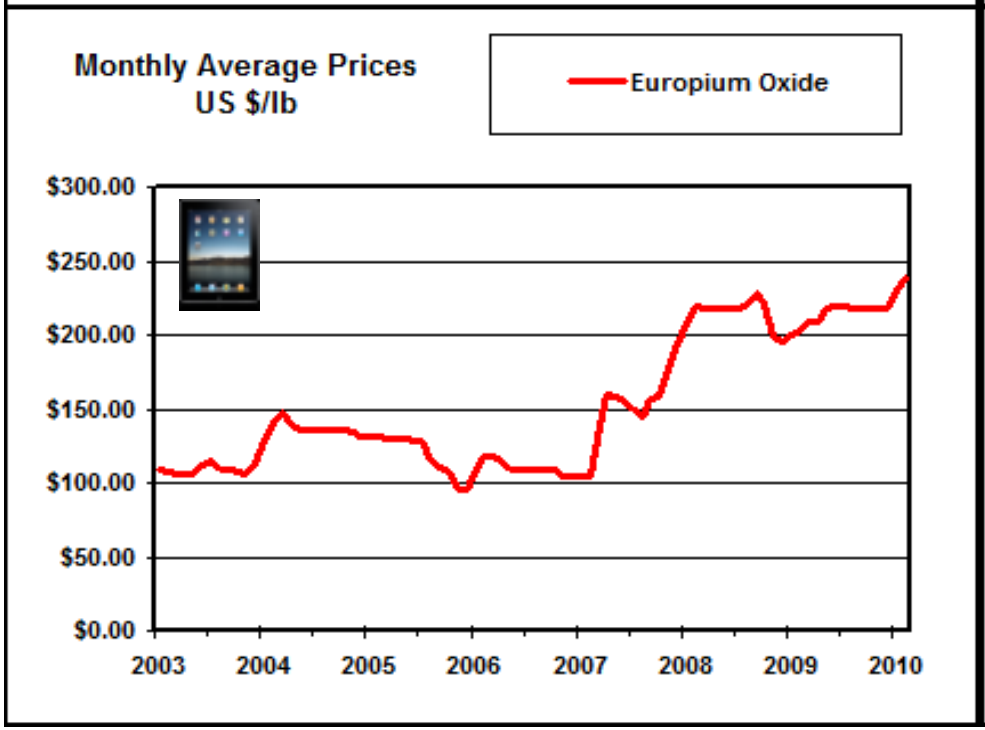


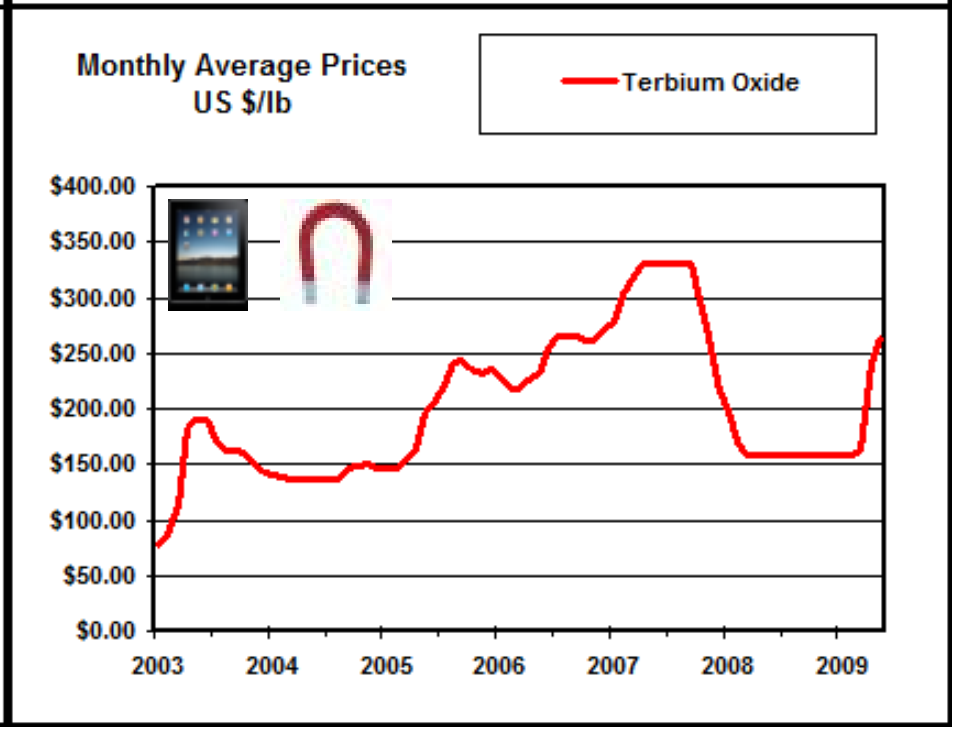
What is the big deal about the "heavy" rare earths vs the "light" rare earths



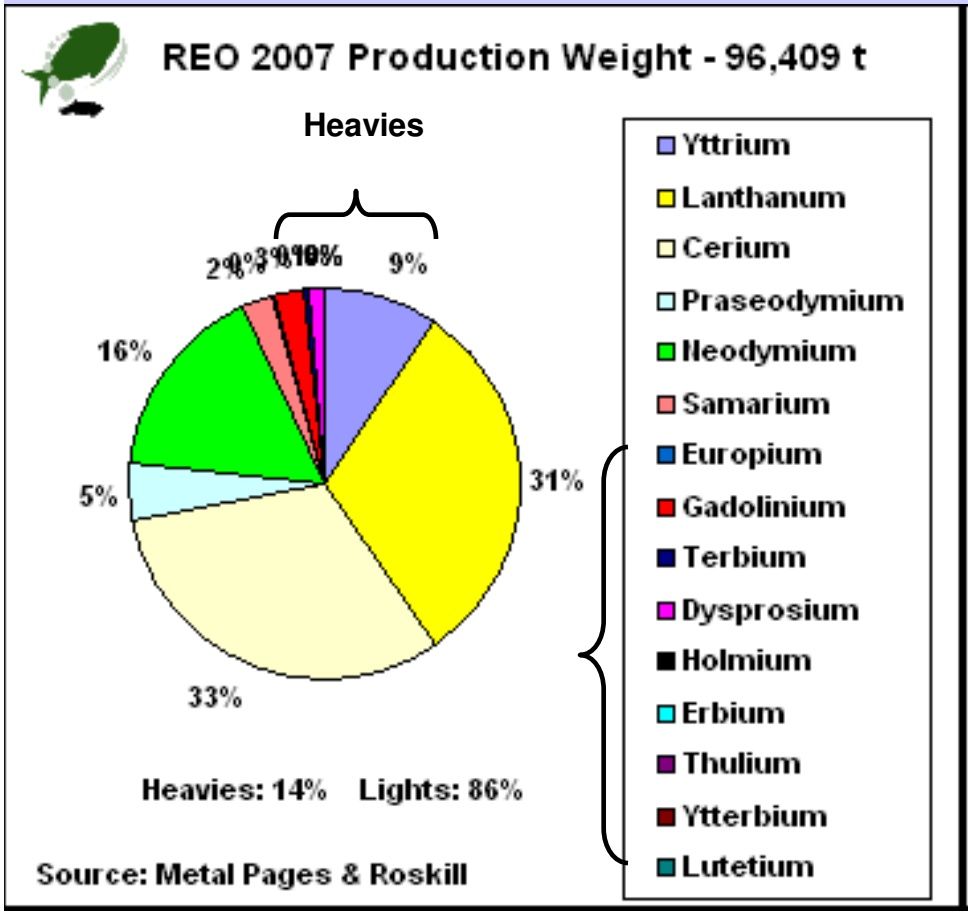

Monthly Average Prices
US $/lb
Neodymium Oxide
$20.00
$18.00
$16.00
$14.00
$12.00
$10.00
$8.00
$6.00
$4.00
$2.00
$0.00
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

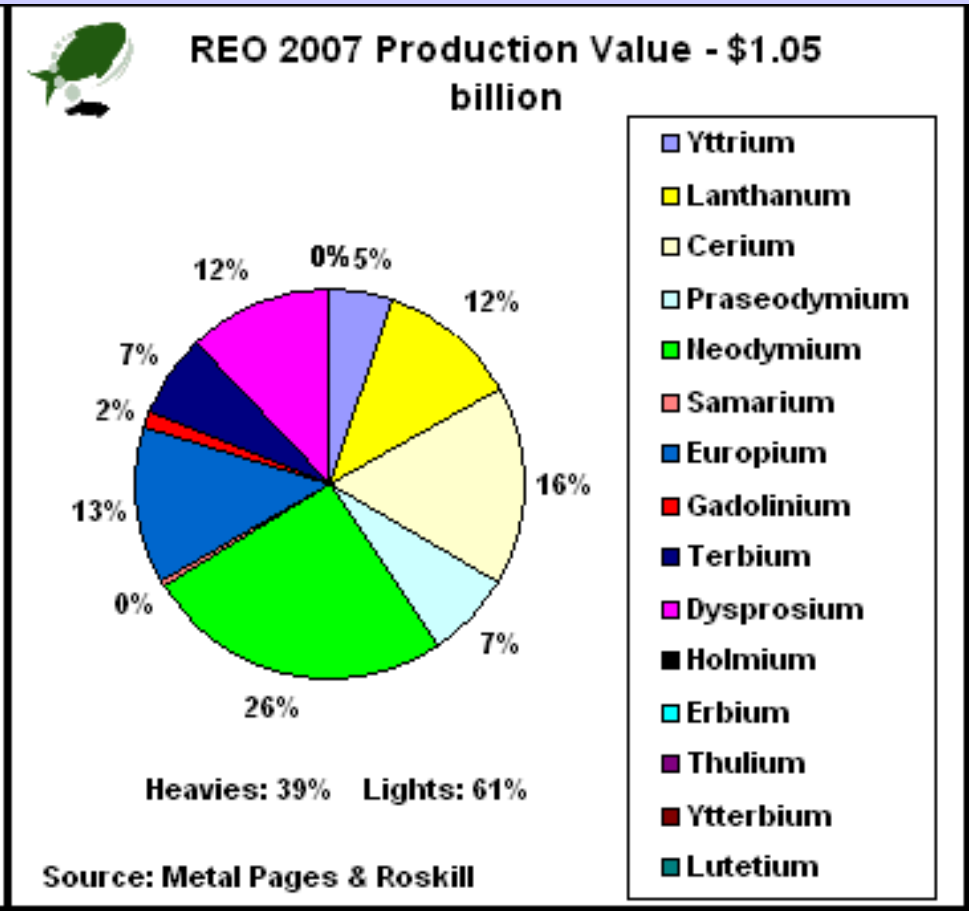

Monthly Average Prices
US $/lb
Dysprosium Oxide
$70.00
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$0.00
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010


Monthly Average Prices
US $/lb
Europium Oxide
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
2003
2004
2005
2006
2007
2008
2009
2010

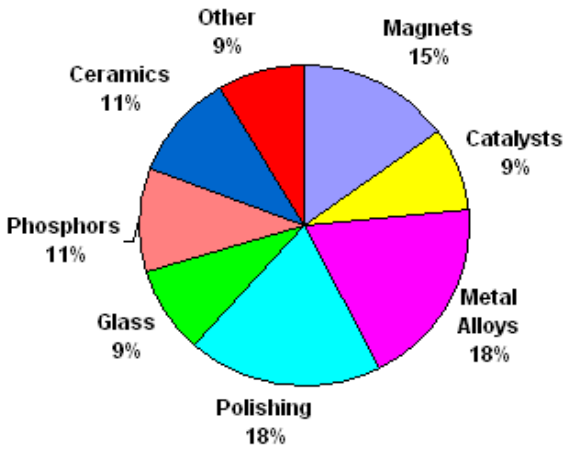

Monthly Average Prices
US $/lb
Terbium Oxide
$400.00
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
2003
2004
2005
2006
2007
2008
2009

The "heavies" add subtle functionality in tiny increments to phosphors and magnets.



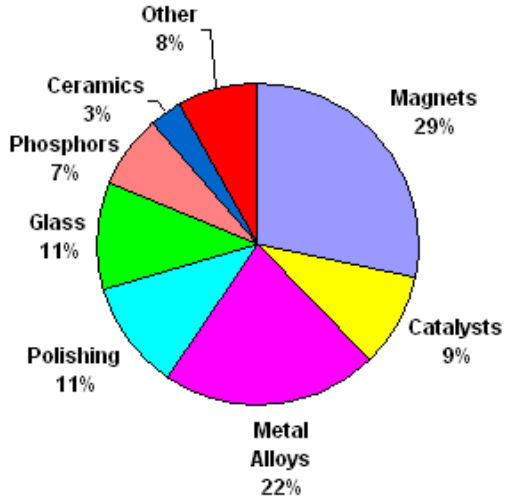


2008 REO Japan & SE Asia Demand by Weight - 23,500 t - $264,000,000



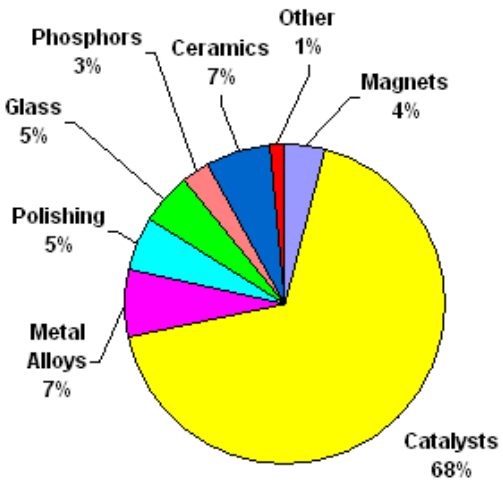
Source: IMCOA

2008 REO China Demand by Weight - 74,000 t - $860,000,000



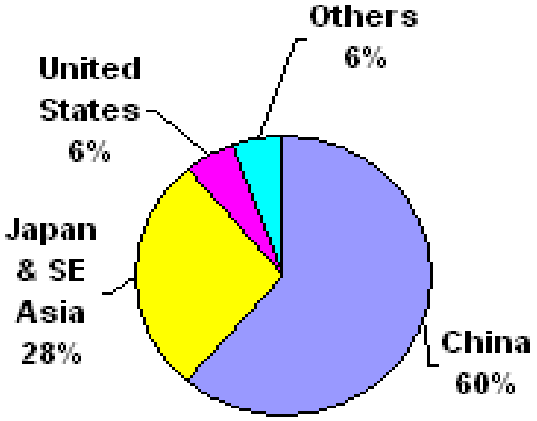
Source: IMCOA

2008 REO US Demand by Weight - 18,500 t - $94,000,000



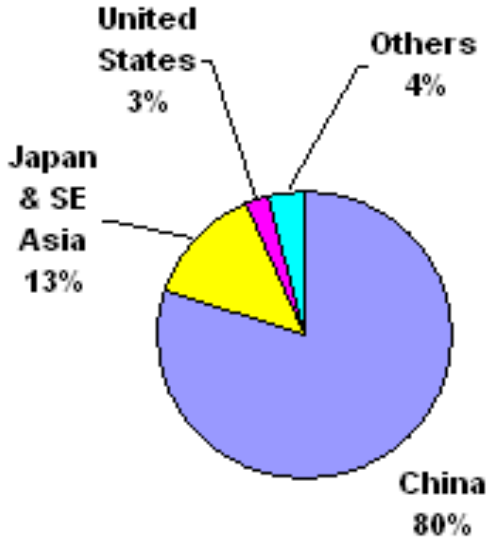
Source: IMCOA

2008 REO Phospor Demand - 9,000 t - $400,000,000



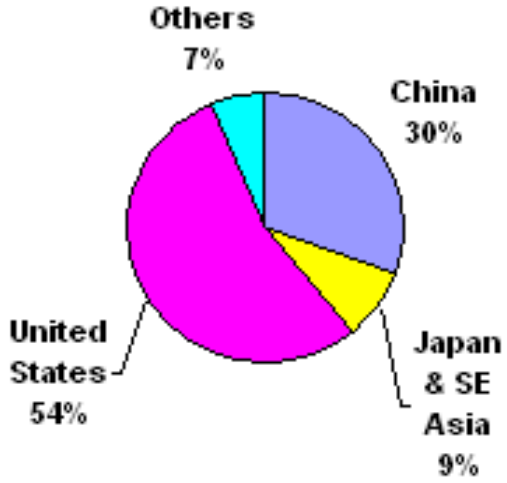
Source: IMCOA

2008 REO Magnet Demand - 26,250 t - $475,000,000

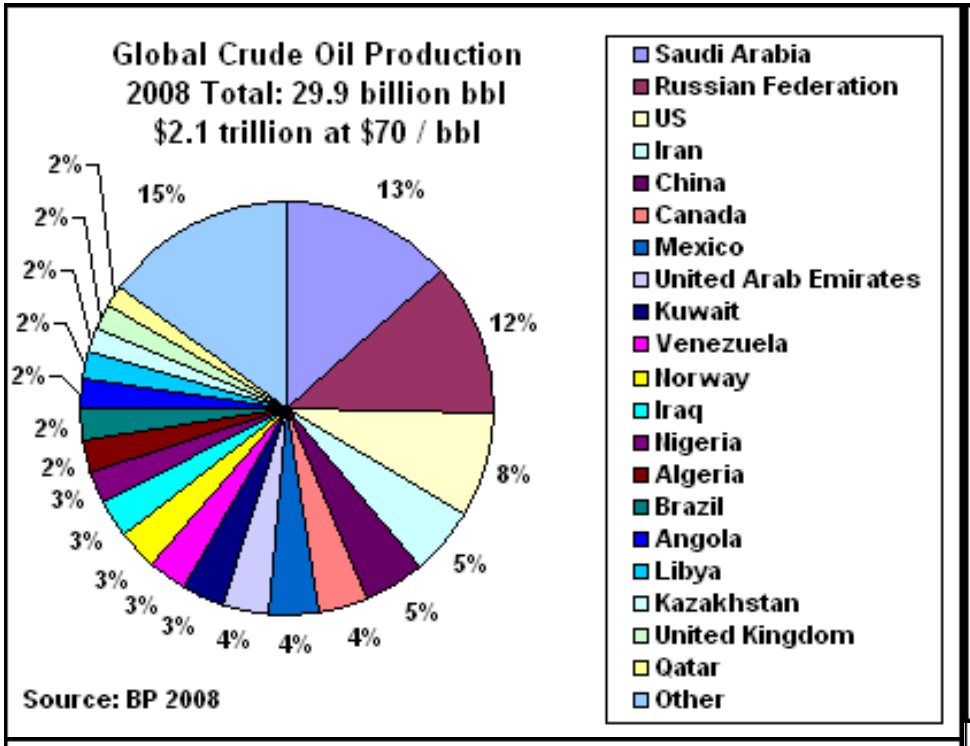


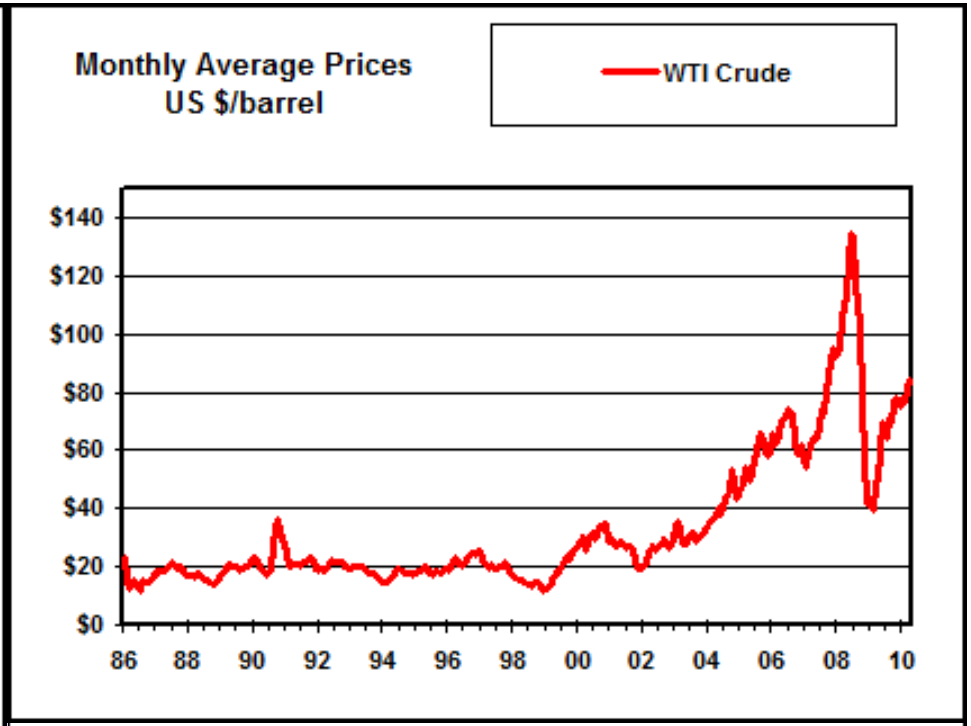
Source: IMCOA

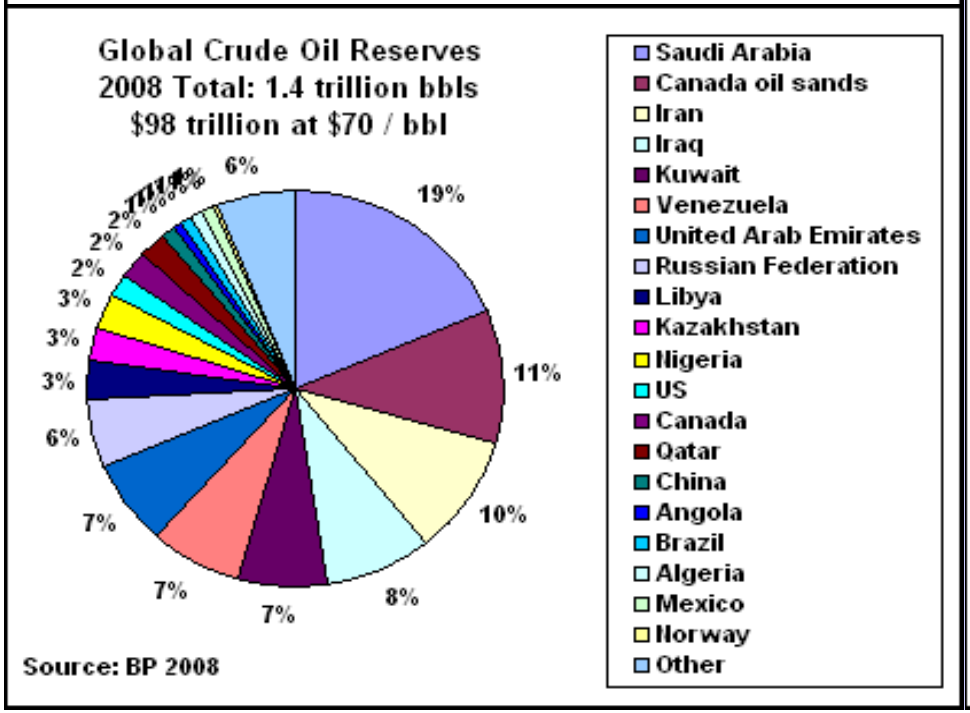
2008 REO Catalyst Demand - 23,000 t - $60,000,000

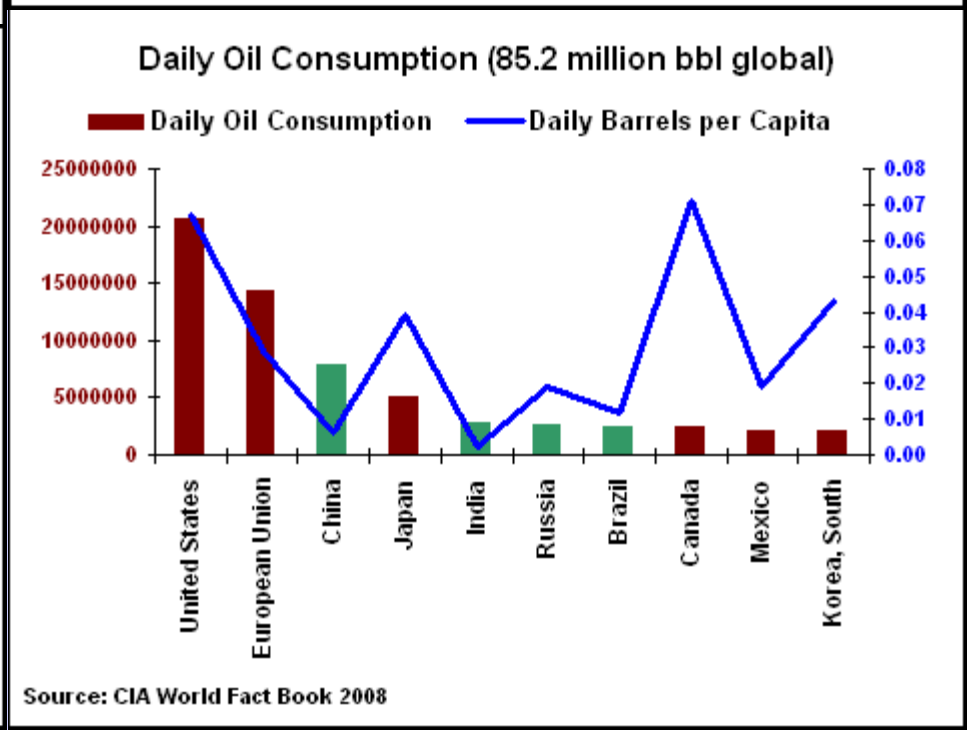


Source: IMCOA

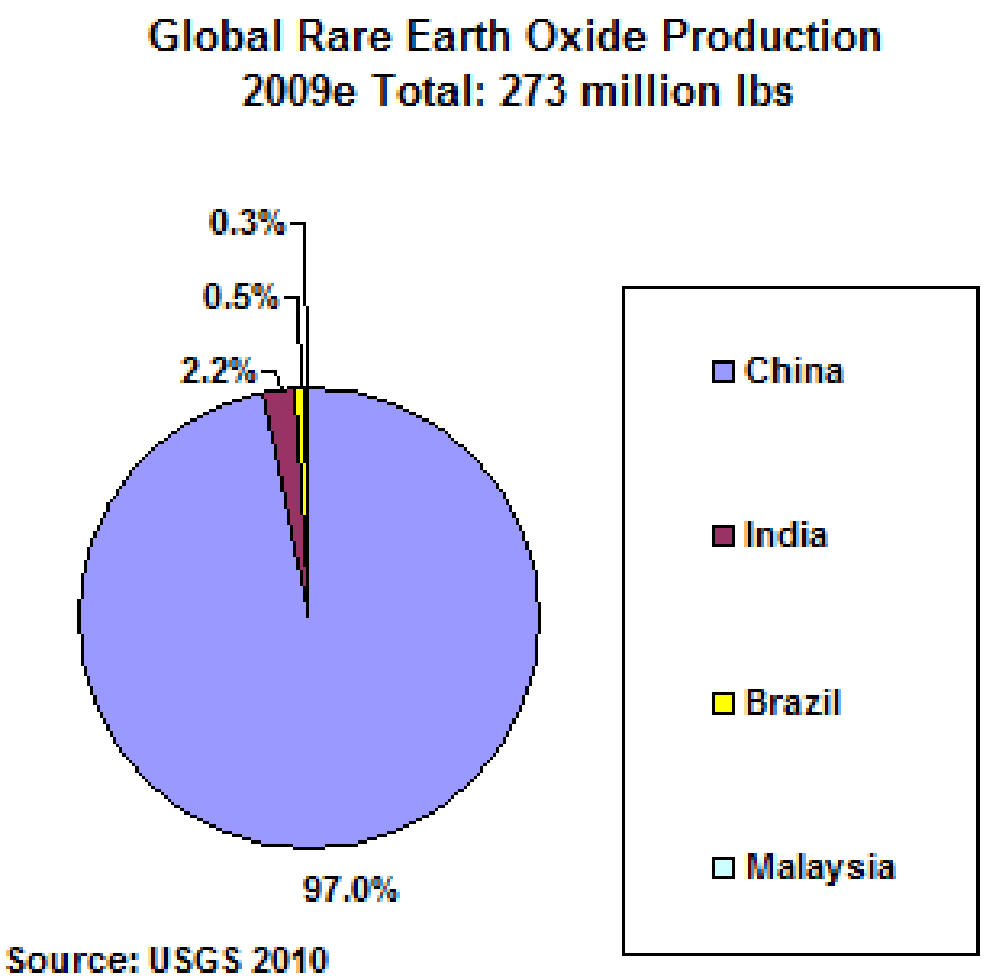

Global Crude Oil Production
2008 Total: 29.9 billion bbl
$2.1 trillion at $70 / bbl
13%
12%
8%
5%
5%
4%
4%
4%
3%
3%
3%
3%
3%
2%
2%
2%
2%
2%
2%
2%
15%
Source: BP 2008
Saudi Arabia
Russian Federation
US
Iran
China
Canada
Mexico
United Arab Emirates
Kuwait
Venezuela
Norway
Iraq
Nigeria
Algeria
Brazil
Angola
Libya
Kazakhstan
United Kingdom
Qatar
Other

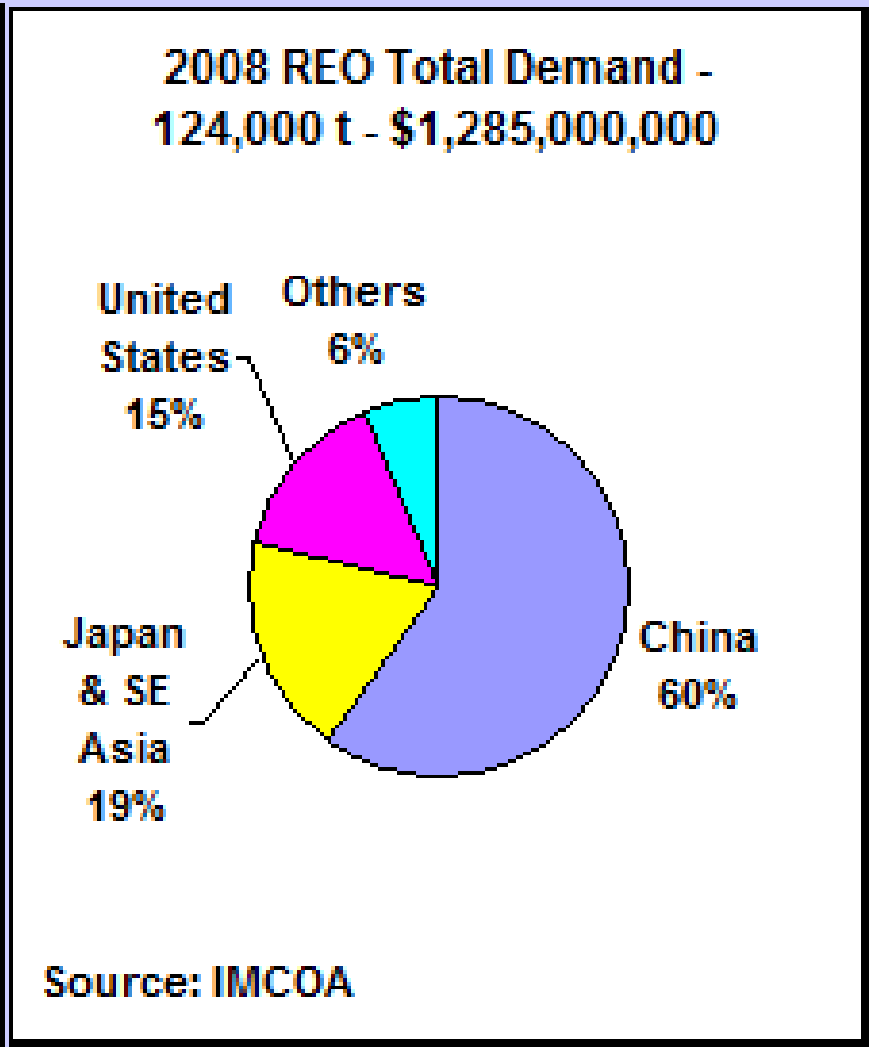

Monthly Average Prices
US $/barrel
WTI Crude
$140
$120
$100
$80
$60
$40
$20
$0
86
88
90
92
94
96
98
00
02
04
06
08
10


Global Crude Oil Reserves
2008 Total: 1.4 trillion bbls
$98 trillion at $70 / bbl
19%
11%
10%
8%
7%
7%
7%
6%
3%
3%
3%
2%
2%
2%
6%
Source: BP 2008
Saudi Arabia
Canada oil sands
Iran
Iraq
Kuwait
Venezuela
United Arab Emirates
Russian Federation
Libya
Kazakhstan
Nigeria
US
Canada
Qatar
China
Angola
Brazil
Algeria
Mexico
Norway
Other

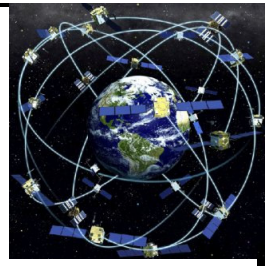

Daily Oil Consumption (85.2 million bbl global)
Daily Oil Consumption
Daily Barrels per Capita
25000000
20000000
15000000
10000000
5000000
0
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
United States
European Union
China
Japan
India
Russia
Brazil
Canada
Mexico
Korea, South
Source: CIA World Fact Book 2008

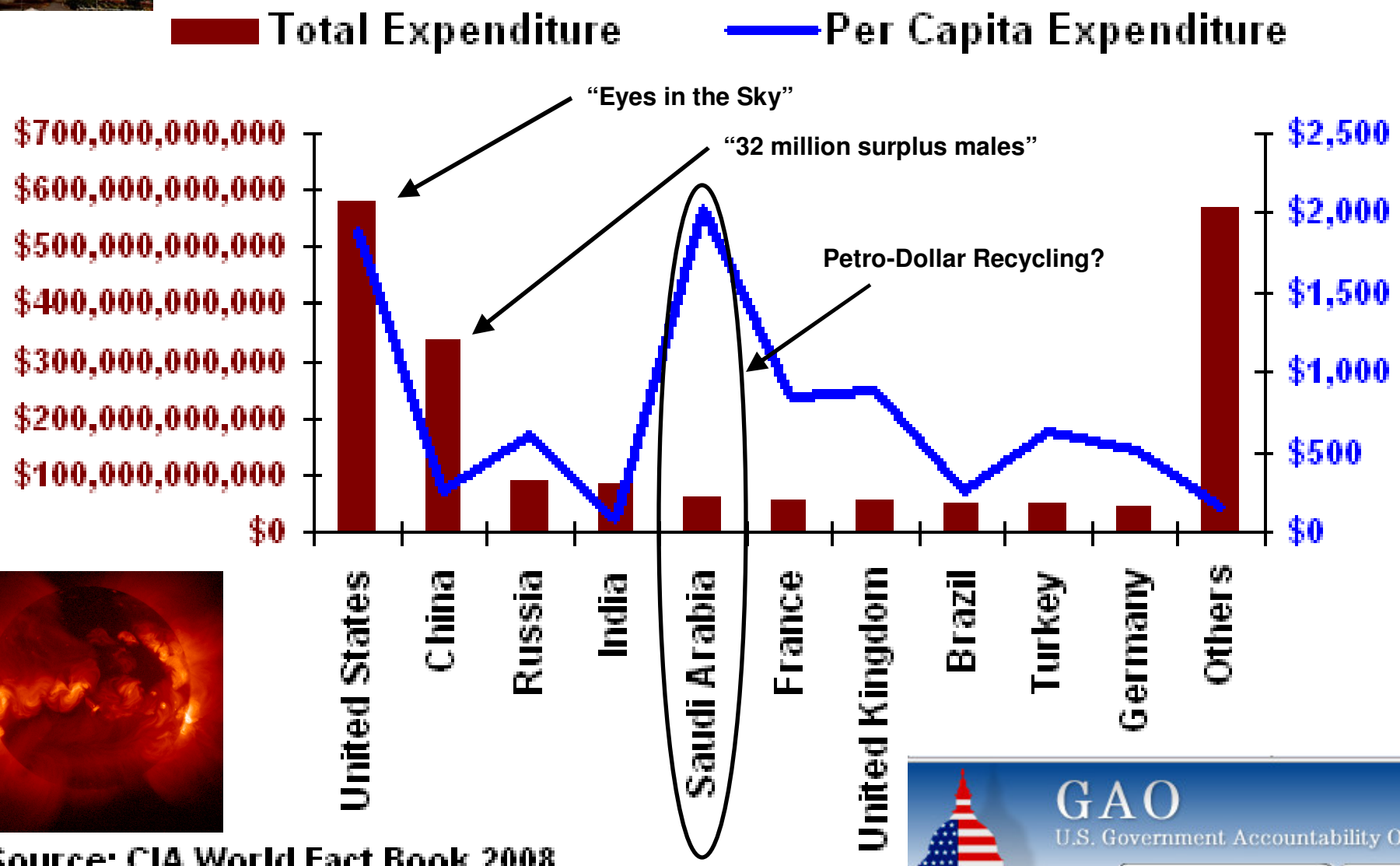
China's goal is to dominate not just upstream REO production but also the production of downstream goods which require REOs as inputs.

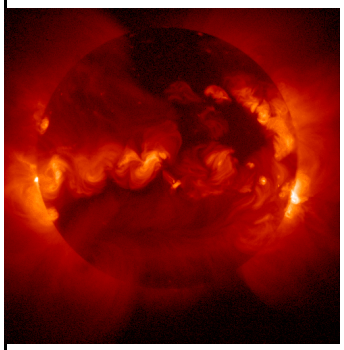




Annual Military Expenditure ($1.4 trillion)



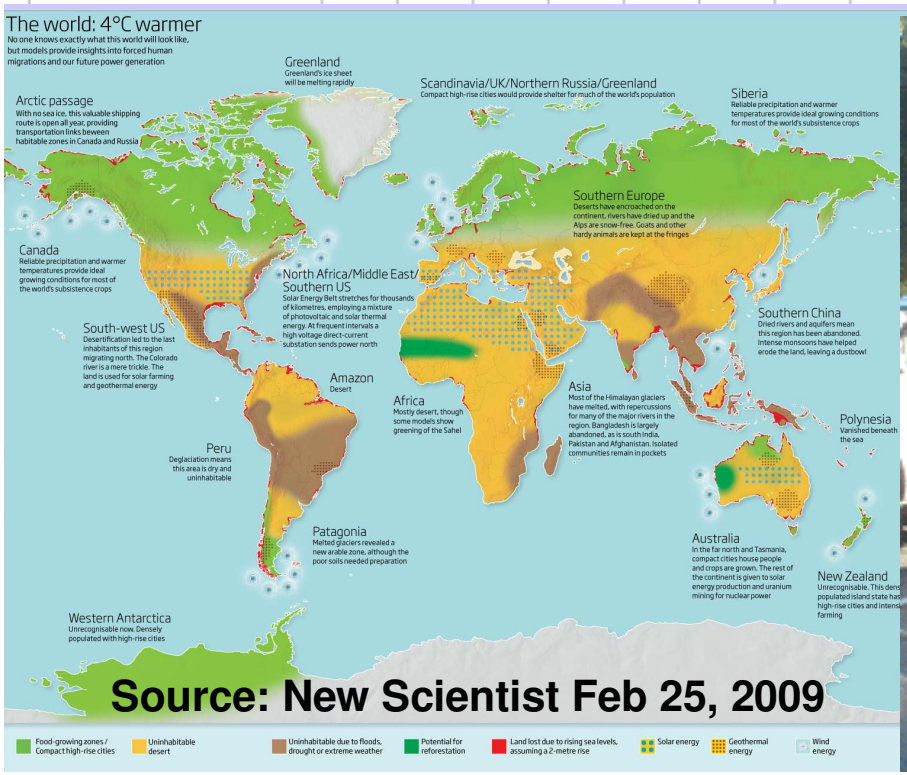




Source: CIA World Fact Book 2008

Transforming the Energy Foundation of the World

Power Cost Structure	Coal			Natural Gas			Oil/Gasoline			Hydro			Nuclear			BioFuels			Renewables (Solar/Wind)		
	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low
Capital Cost																					
Operating Cost																					
Fuel Cost																					
Emission Cost																					
Opportunity Cost																					
Fuel Supply Risk																					

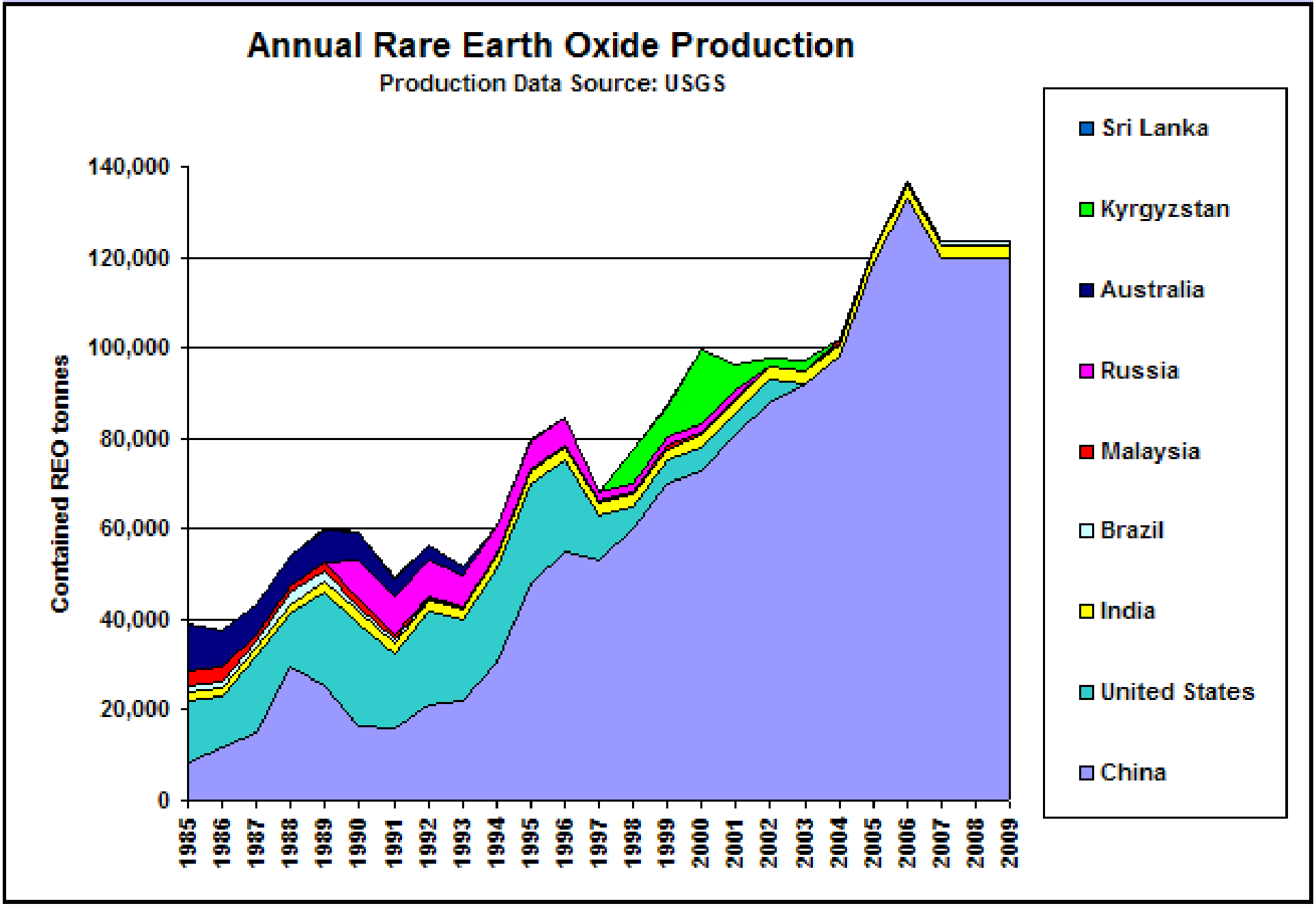


Source: New Scientist Feb 25, 2009

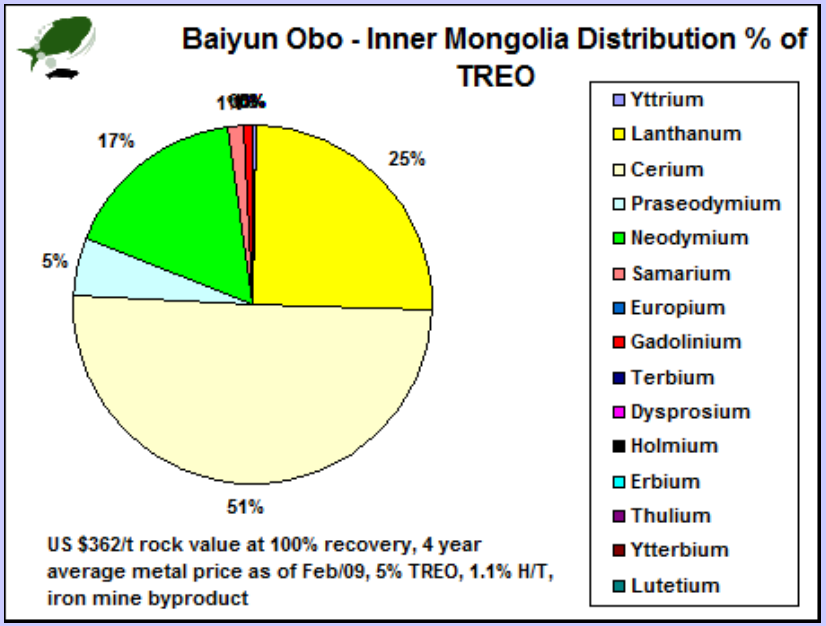
And what happens to the world's rare earth supply if China does indeed crash and burn?

James Chanos: China is in a Bubble

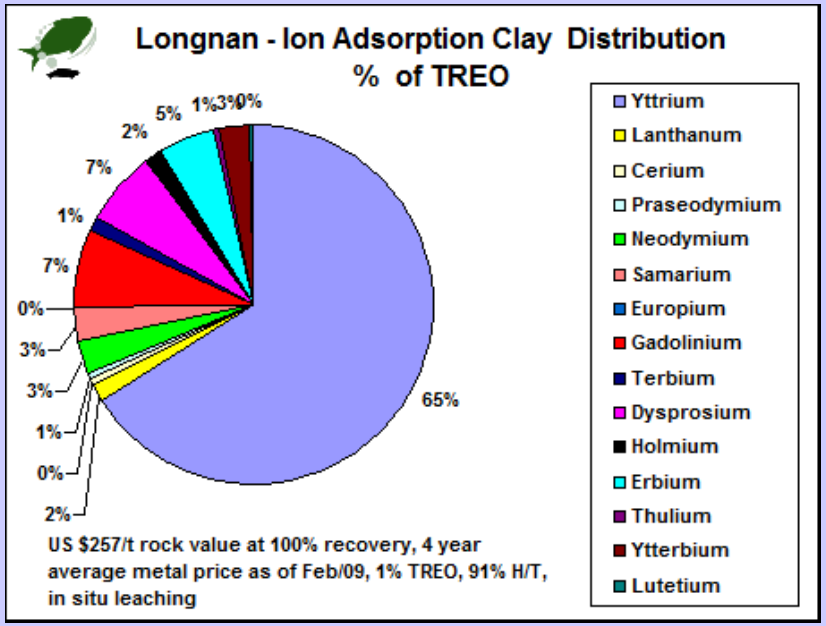
How did China come to dominate REO supply?



Lights



Heavies



Why has China become anxious about its heavy rare earth supply?

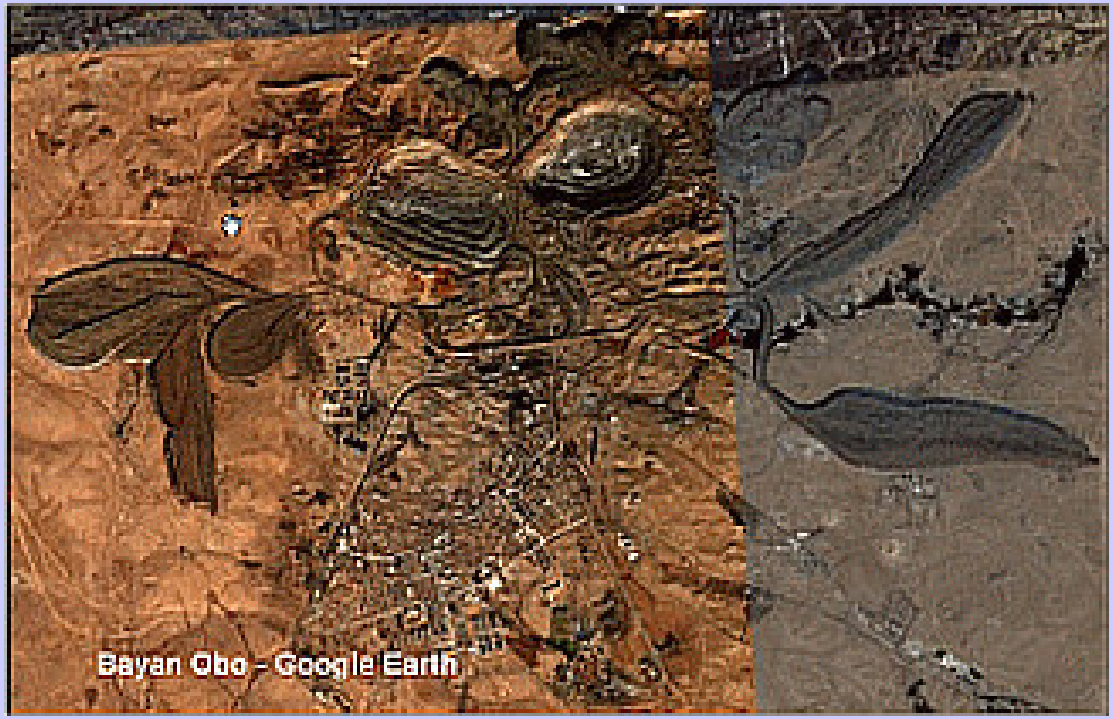
Once this 15-20 m thick "skin" of heavy rare earth bearing clays is gone there is nothing to be found by drilling into the third dimension!

Recent estimates have reduced China's HREO resource life from 20-30 years down to 15-20 years.

R&D into the properties of the heavy rare earth elements are creating the possibility of new applications that can become major demand drivers – ie "smart dust" and the brave new world of sensors.

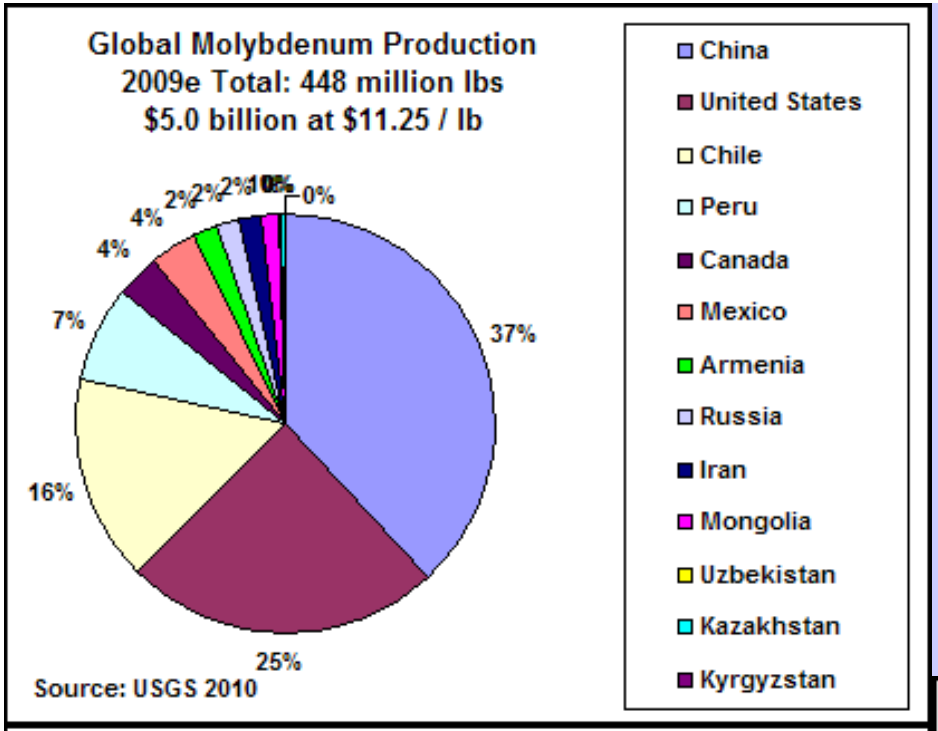
Export Restrictions & Sector Consolidation: Can China be blamed?

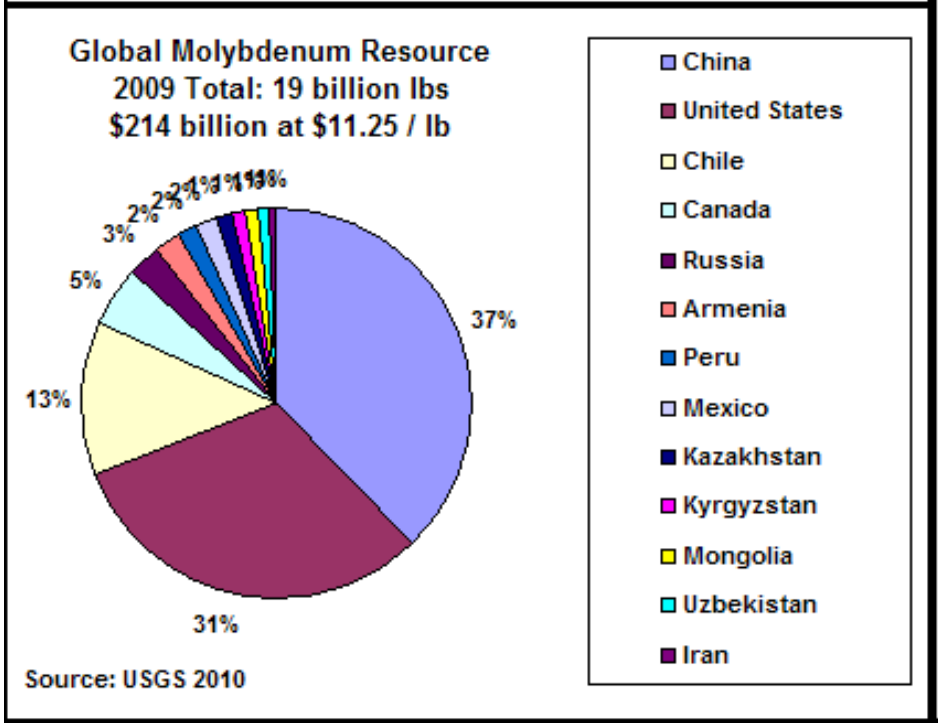
Is China subsidizing the cost structure of mining its rare earth deposits and downstream processing by tolerating inefficient processing methods, inadequate emission controls, and weak health and safety standards?



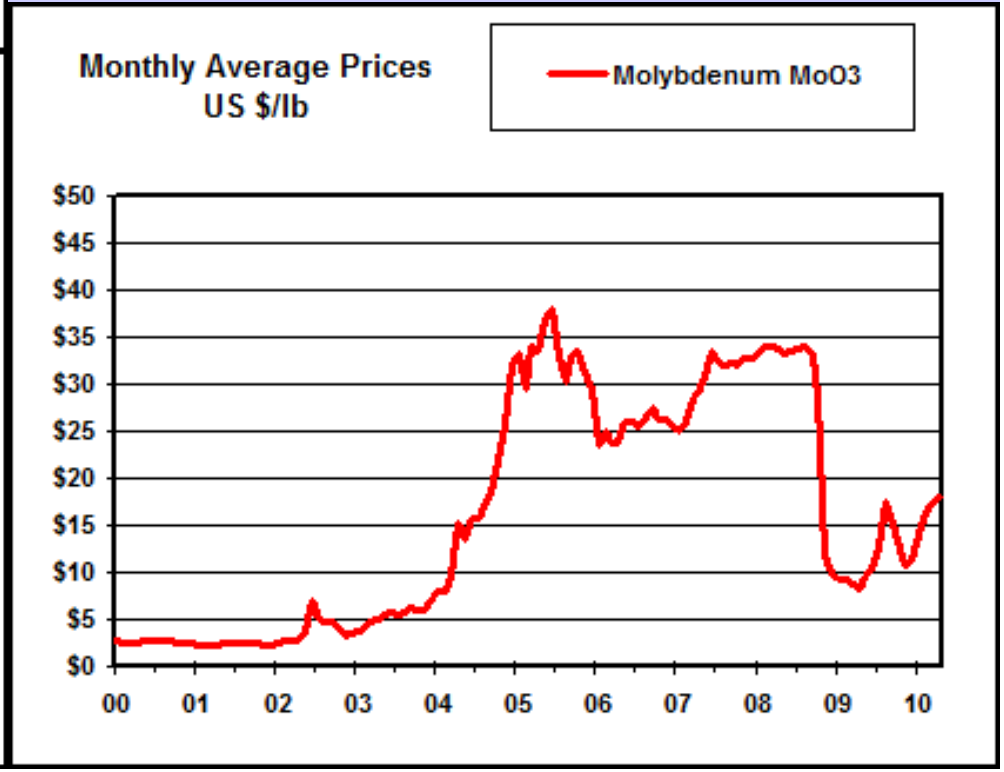
Is the west depending too much on smuggled HREO?

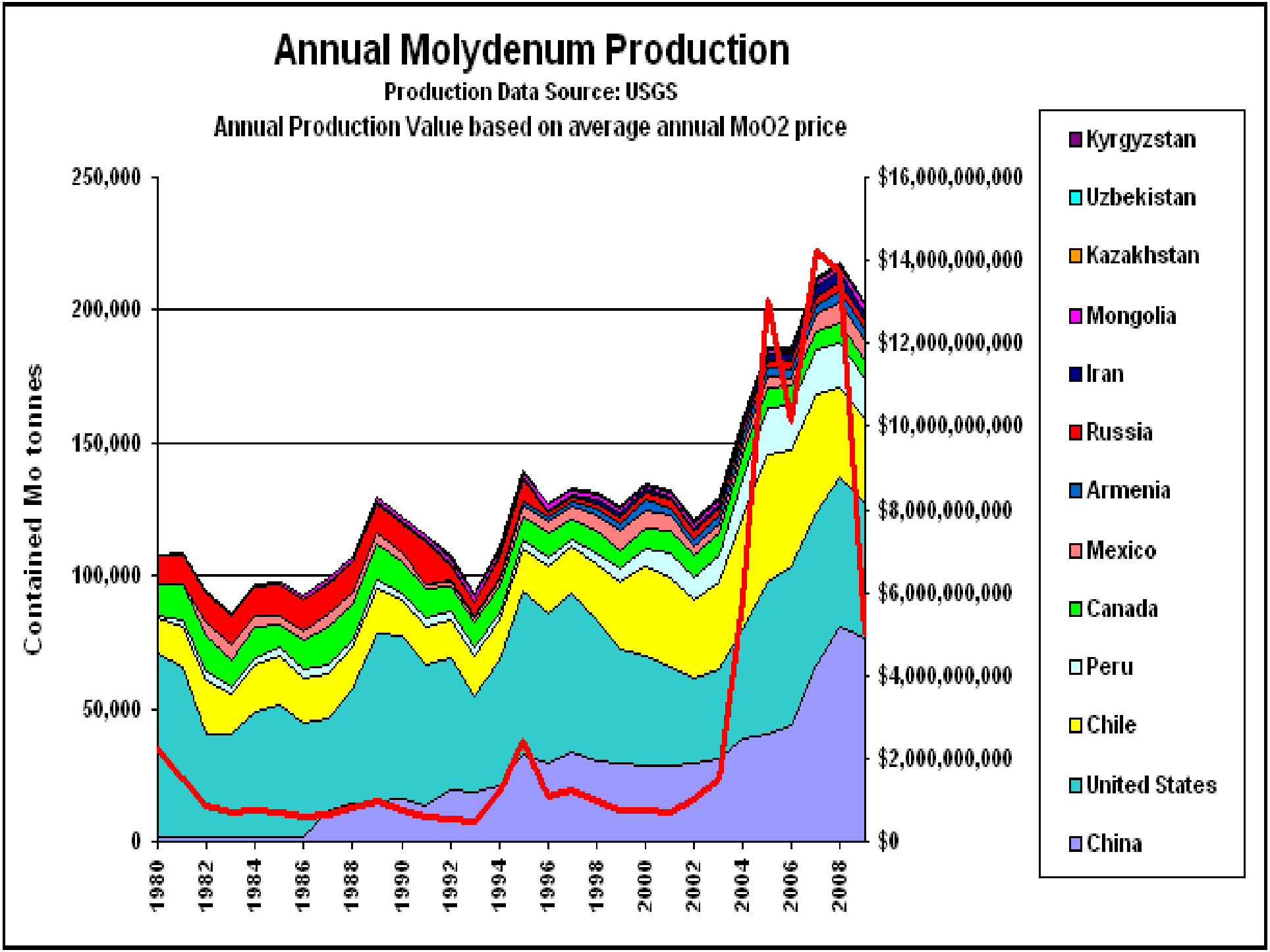
Can we expect prices to double or triple if the "subsidy" is removed & smuggling shut down?

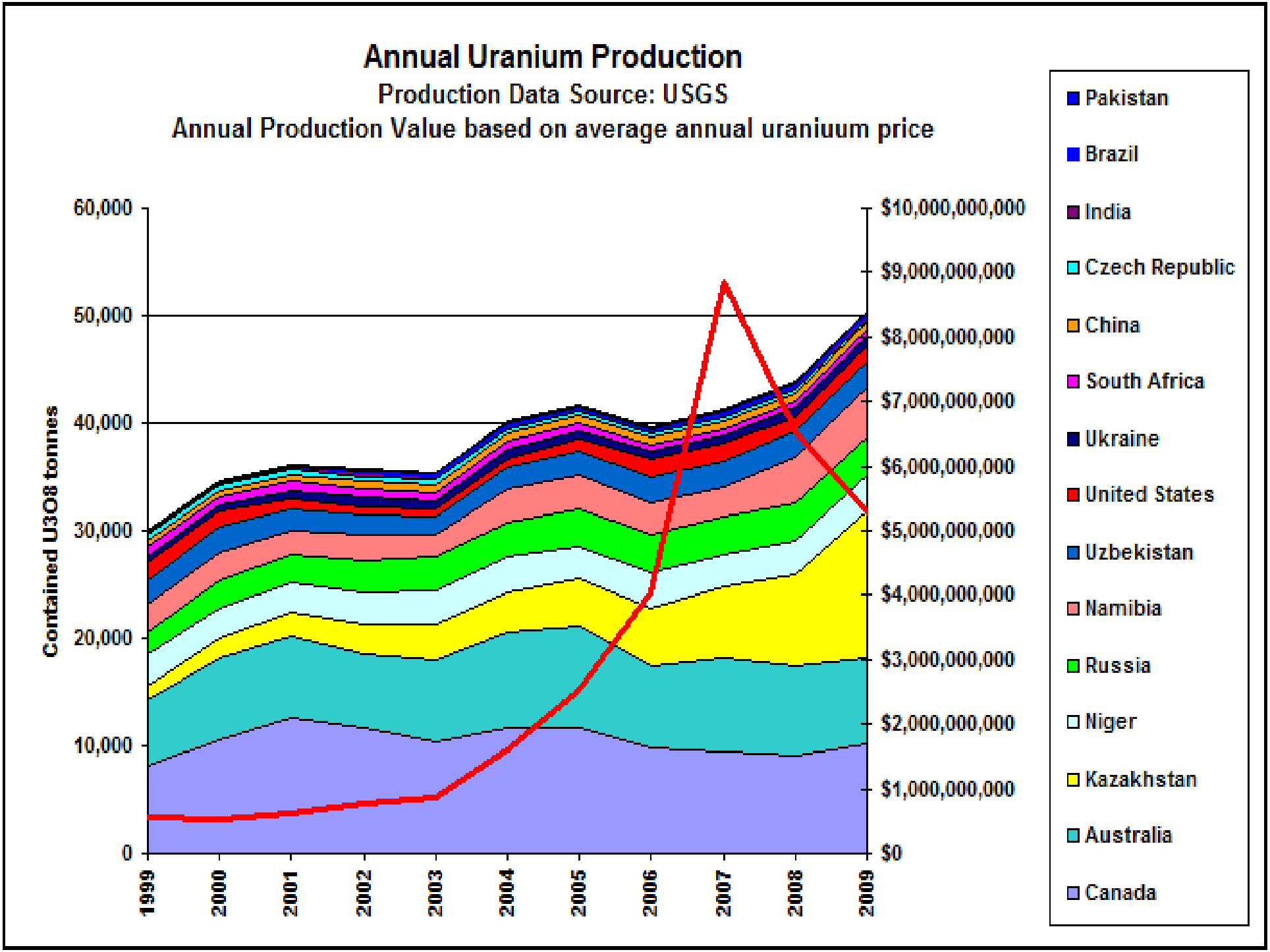


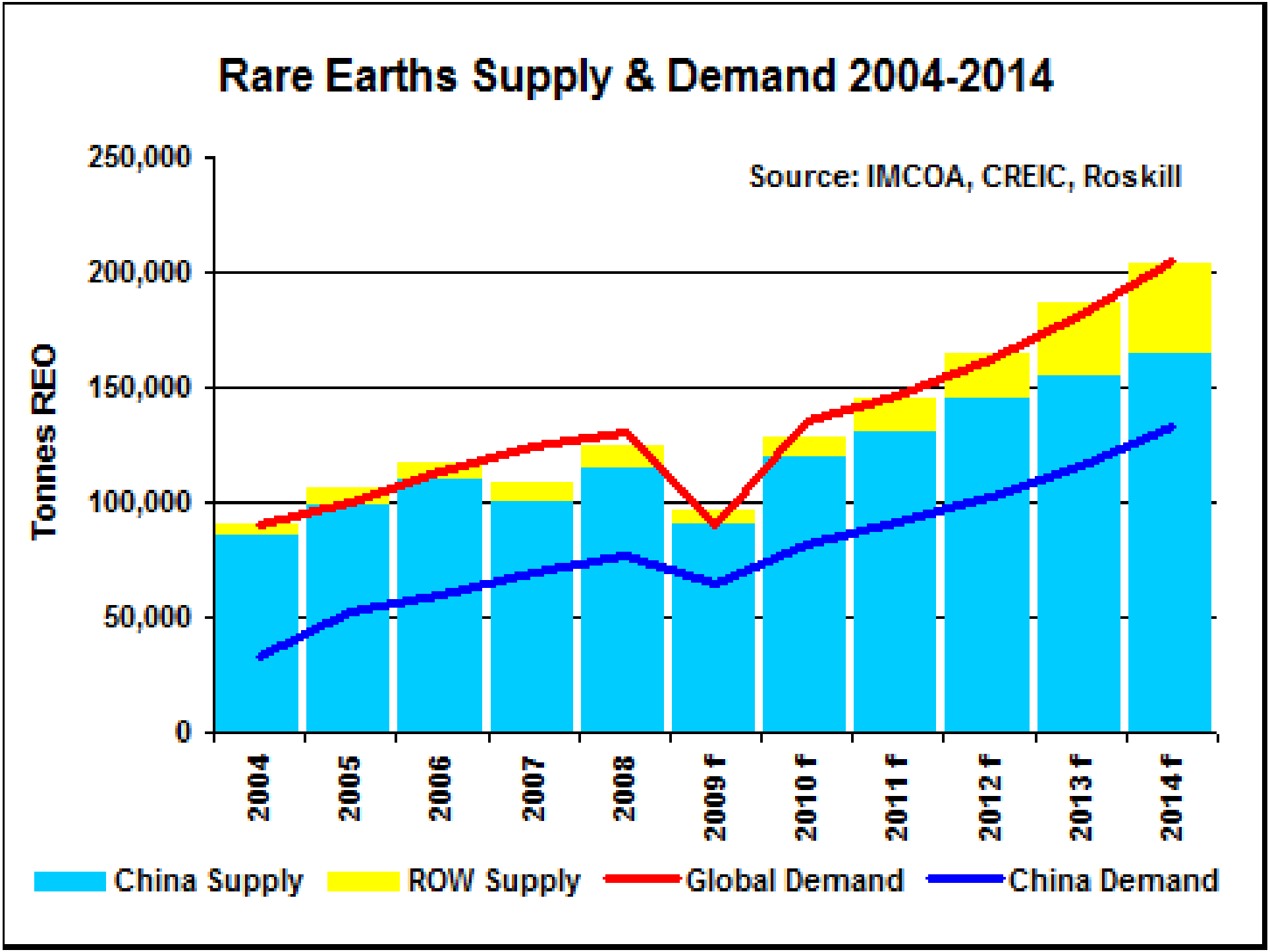


- **Molybdenum is an incremental but critical input for infrastructure steel**
- **Annual moly market was $2 billion in 2003 when China decided to clean up its inefficient and polluting small scale mining operations.**
- **Spot price "spike" from $3/lb to $30 /lb lasted nearly 4 years, boosting annual production value to $10-$15 billion without any impact on demand**
- **China now a net importer of moly**

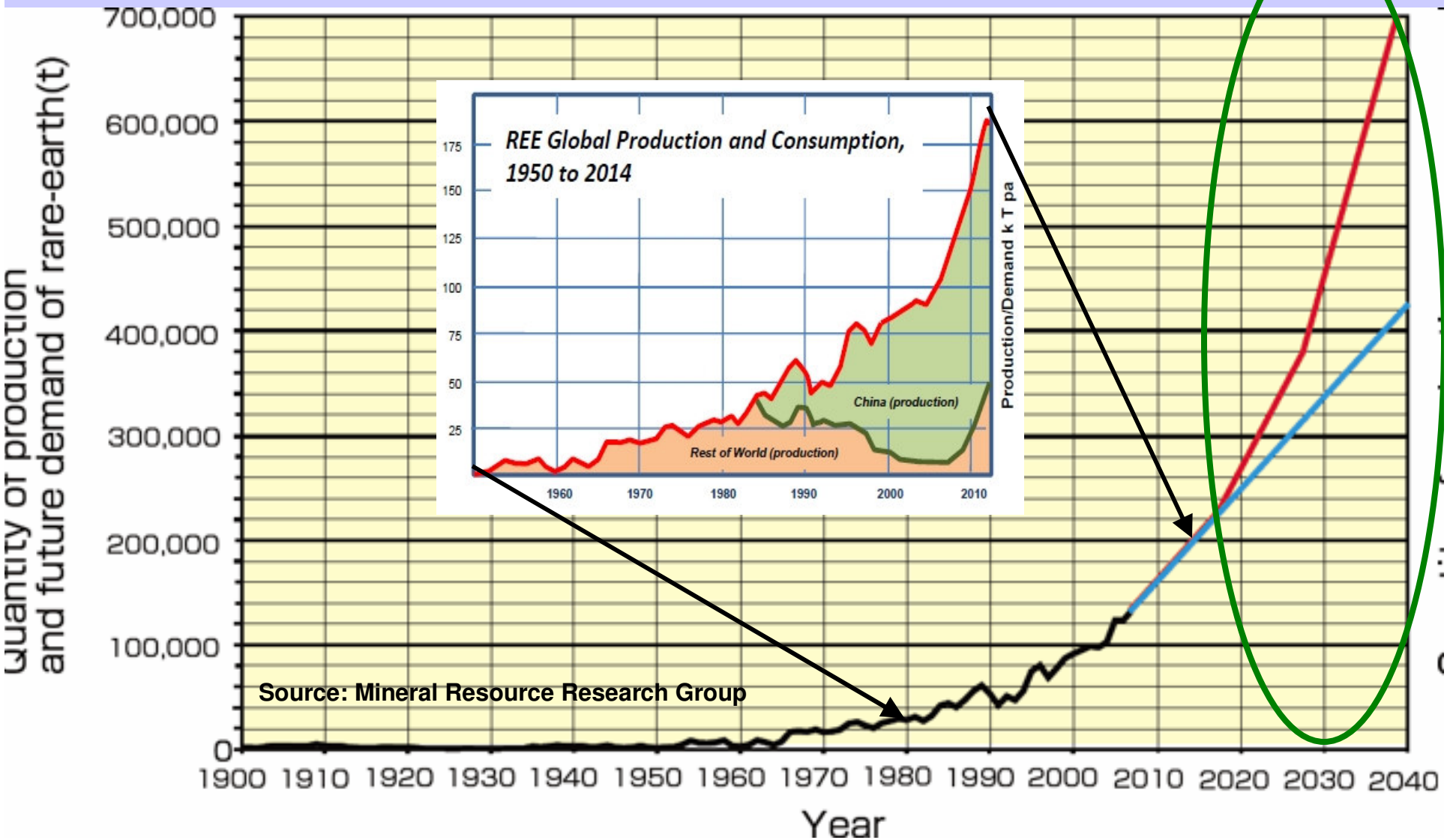



Annual Molydenum Production
Production Data Source: USGS
Annual Production Value based on average annual MoO2 price
Contained Mo tonnes
250,000
200,000
150,000
100,000
50,000
0
$16,000,000,000
$14,000,000,000
$12,000,000,000
$10,000,000,000
$8,000,000,000
$6,000,000,000
$4,000,000,000
$2,000,000,000
$0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Kyrgyzstan
Uzbekistan
Kazakhstan
Mongolia
Iran
Russia
Armenia
Mexico
Canada
Peru
Chile
United States
China


Annual Uranium Production
Production Data Source: USGS
Annual Production Value based on average annual uraniuum price
Contained U3O8 tonnes
60,000
50,000
40,000
30,000
20,000
10,000
0
$10,000,000,000
$9,000,000,000
$8,000,000,000
$7,000,000,000
$6,000,000,000
$5,000,000,000
$4,000,000,000
$3,000,000,000
$2,000,000,000
$1,000,000,000
$0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Pakistan
Brazil
India
Czech Republic
China
South Africa
Ukraine
United States
Uzbekistan
Namibia
Russia
Niger
Kazakhstan
Australia
Canada


Rare Earths Supply & Demand 2004-2014
Source: IMCOA, CREIC, Roskill
Tonnes REO
250,000
200,000
150,000
100,000
50,000
0
2004
2005
2006
2007
2008
2009 f
2010 f
2011 f
2012 f
2013 f
2014 f
China Supply
ROW Supply
Global Demand
China Demand

It's not the rare earth demand growth in the next 5 years that is the critical issue today, but the demand growth 5 years and beyond when clean tech really scales up.



What is a Wild Demand Dynamic?

- Elements with complex properties, such as the rare earth metals, have open ended technology development potential
- The R&D push for ever greater miniaturization and efficiency enhancement drives the discovery of new or expanded functionality that increases the utility per volume unit of critical inputs
- This allows the price of the input to increase, which in turn boosts the economics of supplying those input
- Better economics results in greater supply of an otherwise scarce raw material
- The resulting security of supply encourages the commercialization of new applications, which boosts total demand that absorbs new supply coming on stream
- Rare earth metals typically occur as clusters skewed toward “light” or “heavy” elements, some of which are scarcer than others and thus have fewer commercialized applications
- A surge in availability of these scarcer rare earth elements as a by-product encourages demand development for them

Would a rare earth price shock reduce demand?

Jevons' Paradox:

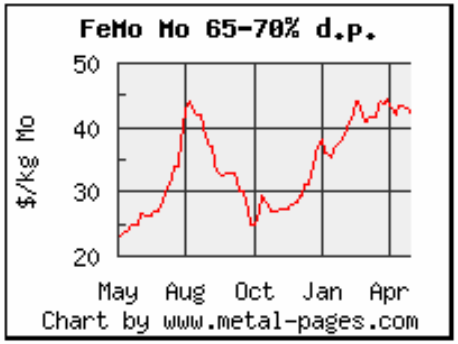
Scarcity results in higher prices for raw material inputs, which should result in lower demand through substitution, but when substitution is not possible, a push for more efficient utilization of inputs is undertaken, which, if successful, will stimulate total demand growth, which in turn enables raw material supply expansion without glutting the market and triggering a price collapse.

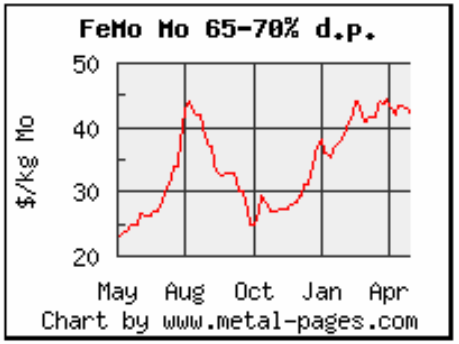
Rare Earth elements lend themselves well to R&D aimed at developing more efficient utilization.

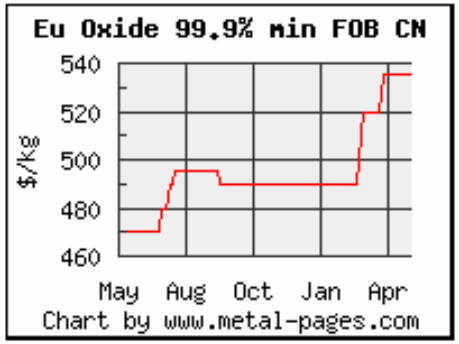
Rare Earth Oxide	4 Year Average $/kg	Current Price $/kg
Lanthanum	$3.57	$6.35
Cerium	$2.43	$4.65
Praseodymium	$19.45	$29.75
Neodymium	$20.19	$30.35
Samarium	$3.33	$4.50
Europium	$351.52	$525.00
Gadolinium	$10.20	$7.65
Terbium	$507.42	$580.00
Dysprosium	$76.33	$190.00
Holmium	$25.50	$25.50
Erbium	$55.00	$55.00
Thulium	$90.00	$90.00
Ytterbium	$25.00	$25.00
Lutetium	$500.00	$500.00
Yttrium	$8.74	$11.00

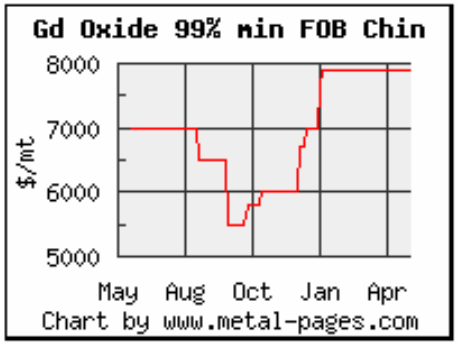
Prices have spiked in recent months

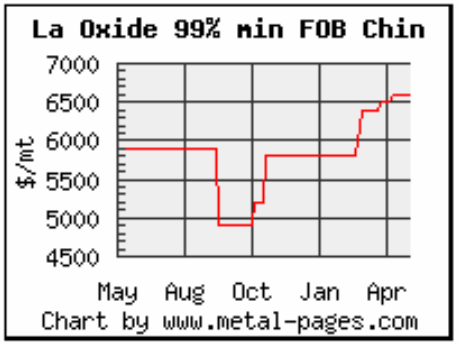
One Year Charts for selected Rare Earth Oxides provided by Metal-Pages.com

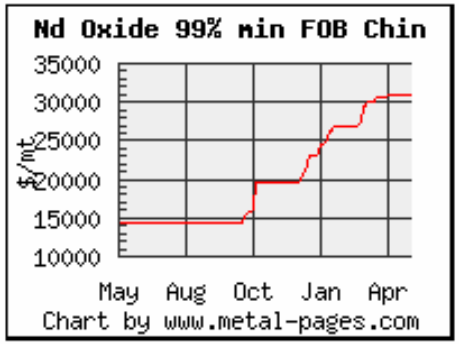


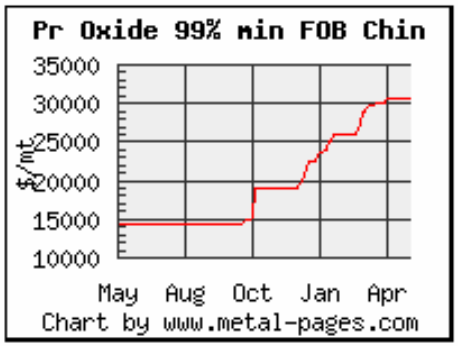


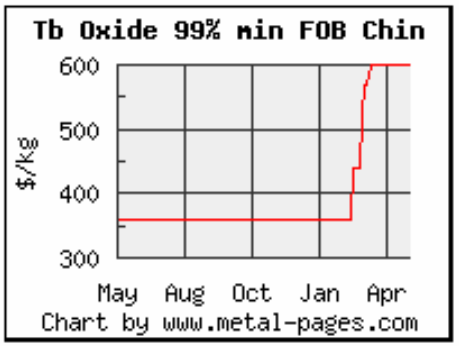


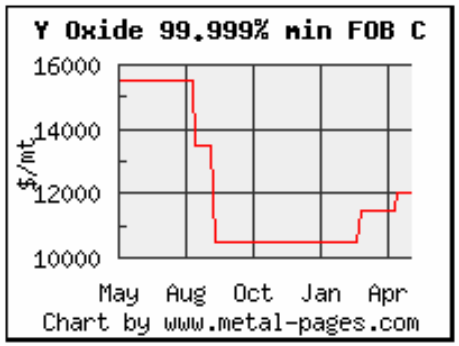


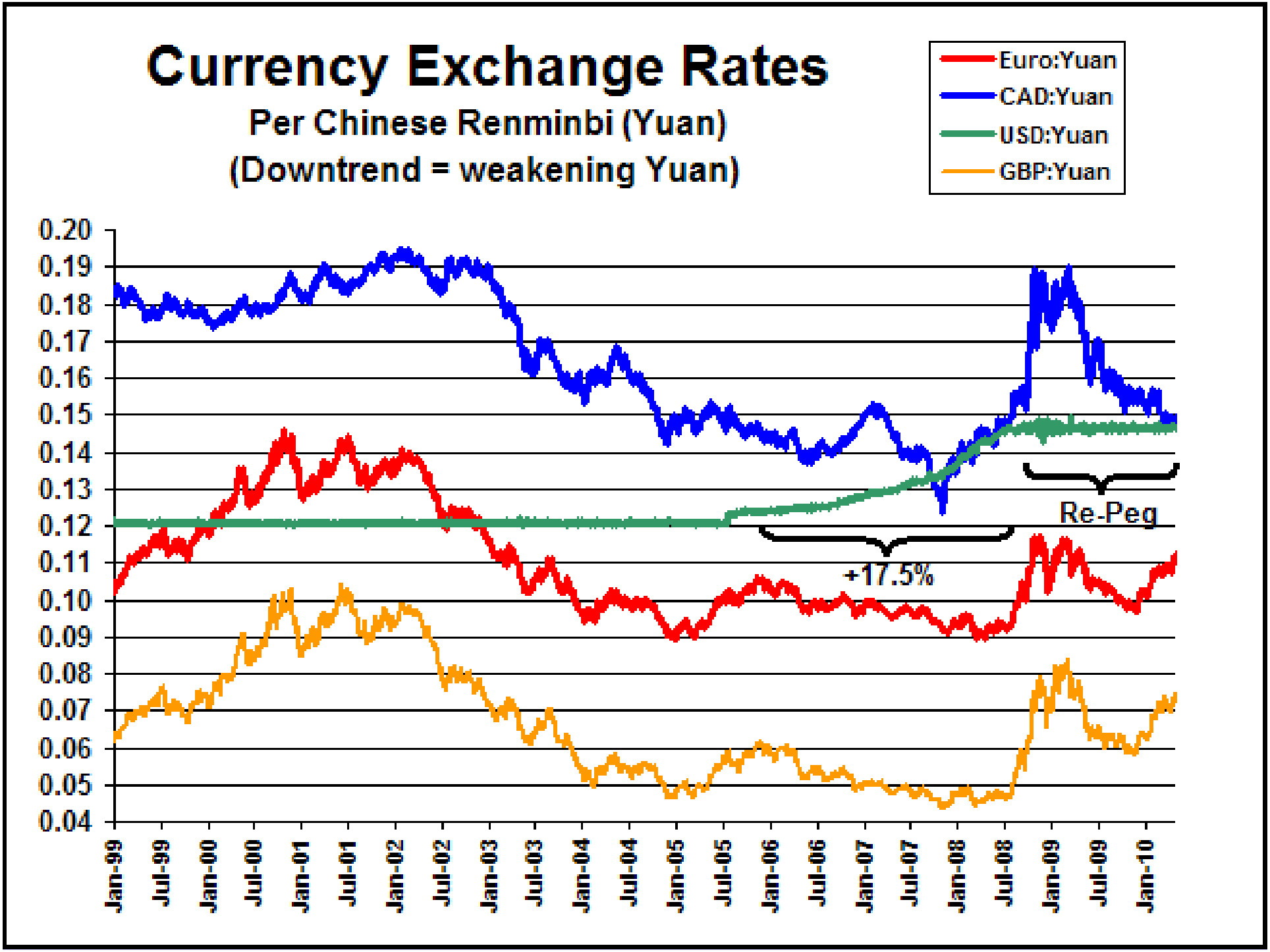











Currency Exchange Rates
Per Chinese Renminbi (Yuan)
(Downtrend = weakening Yuan)
Euro:Yuan
CAD:Yuan
USD:Yuan
GBP:Yuan
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
+17.5%
Re-Peg
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
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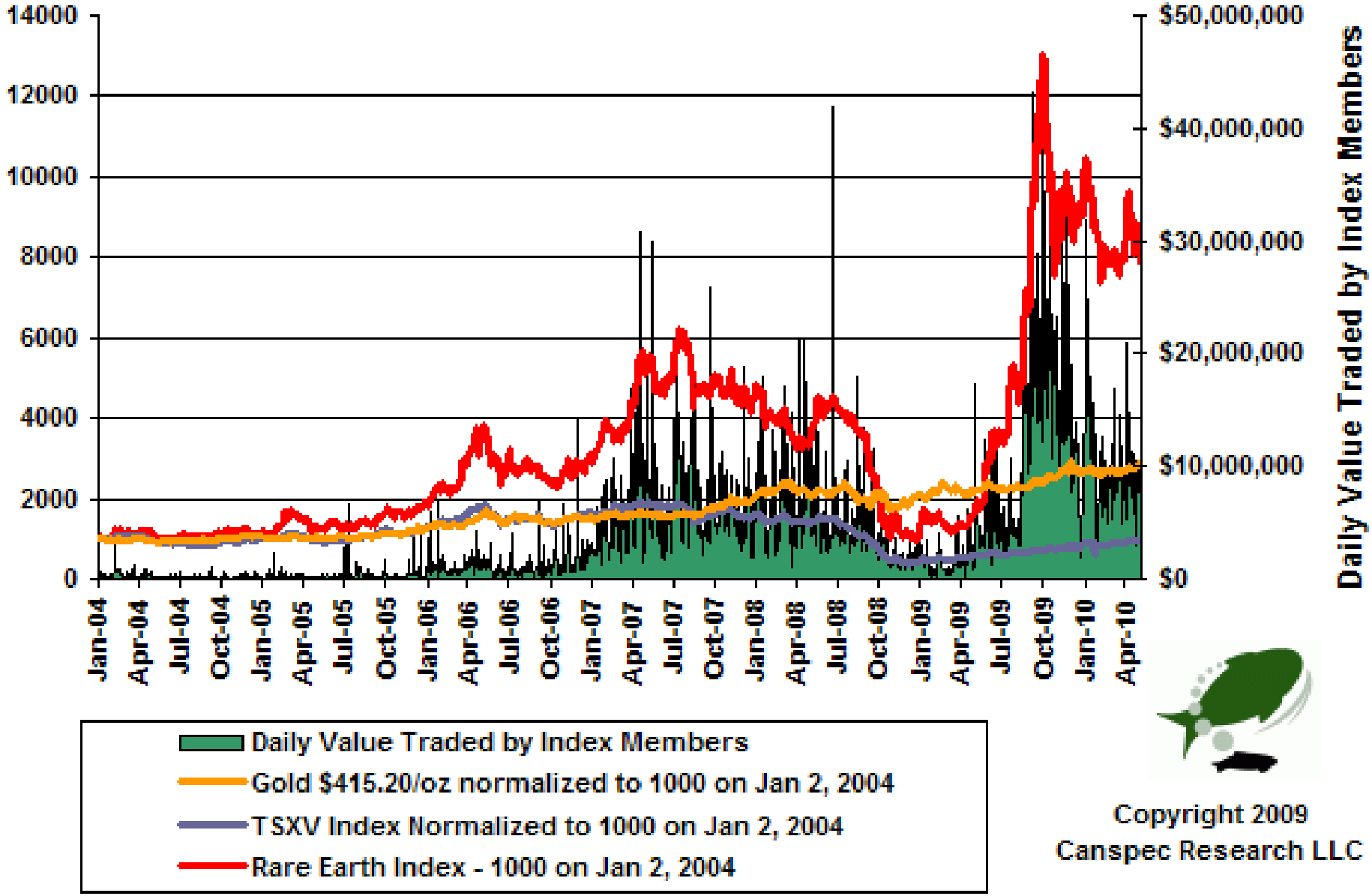
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10

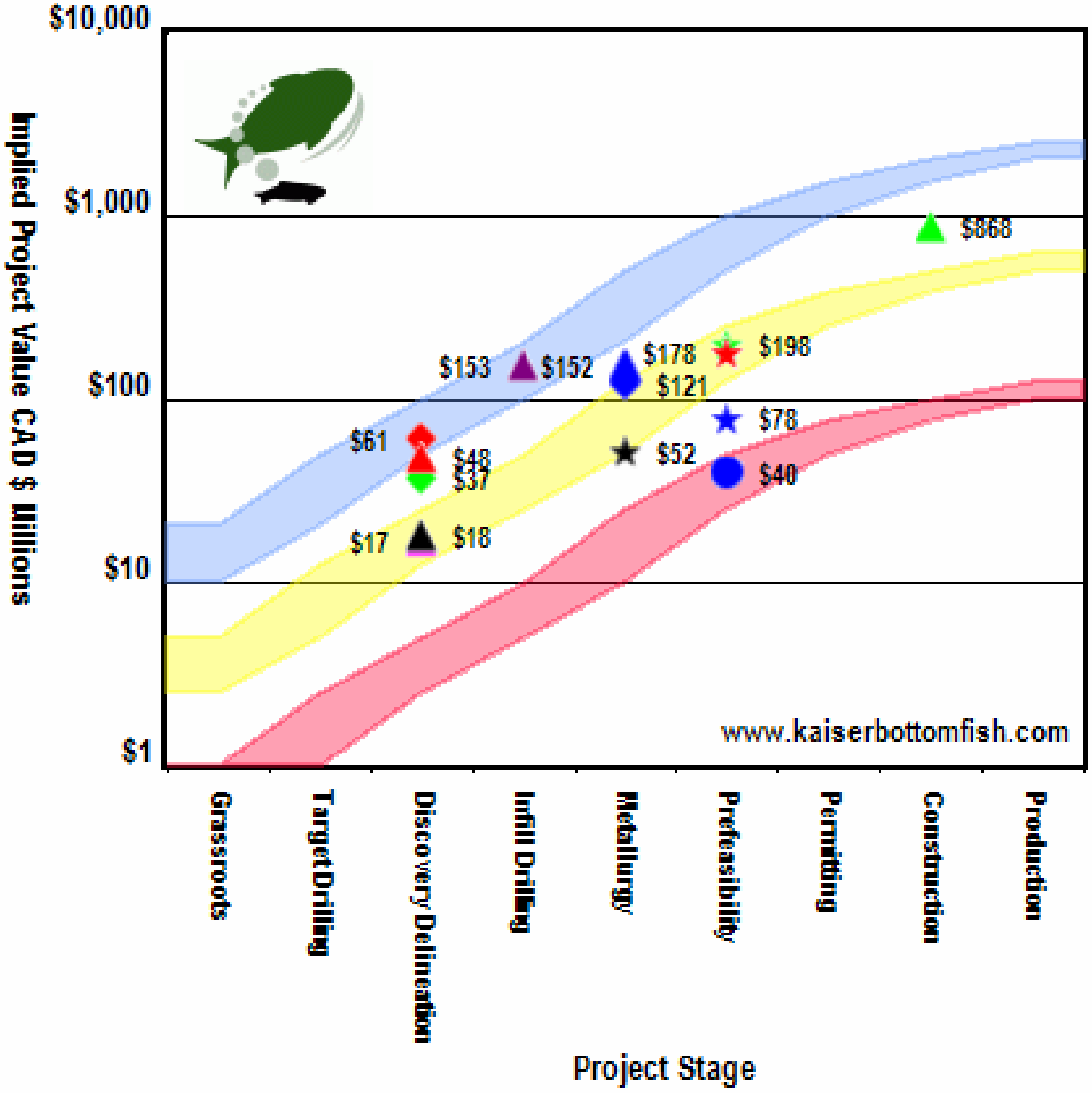
KBFO Rare Earth Index

May 6, 2010



Rare Earth Index Project Valuations

Thursday, May 06, 2010



Dream Target Channels

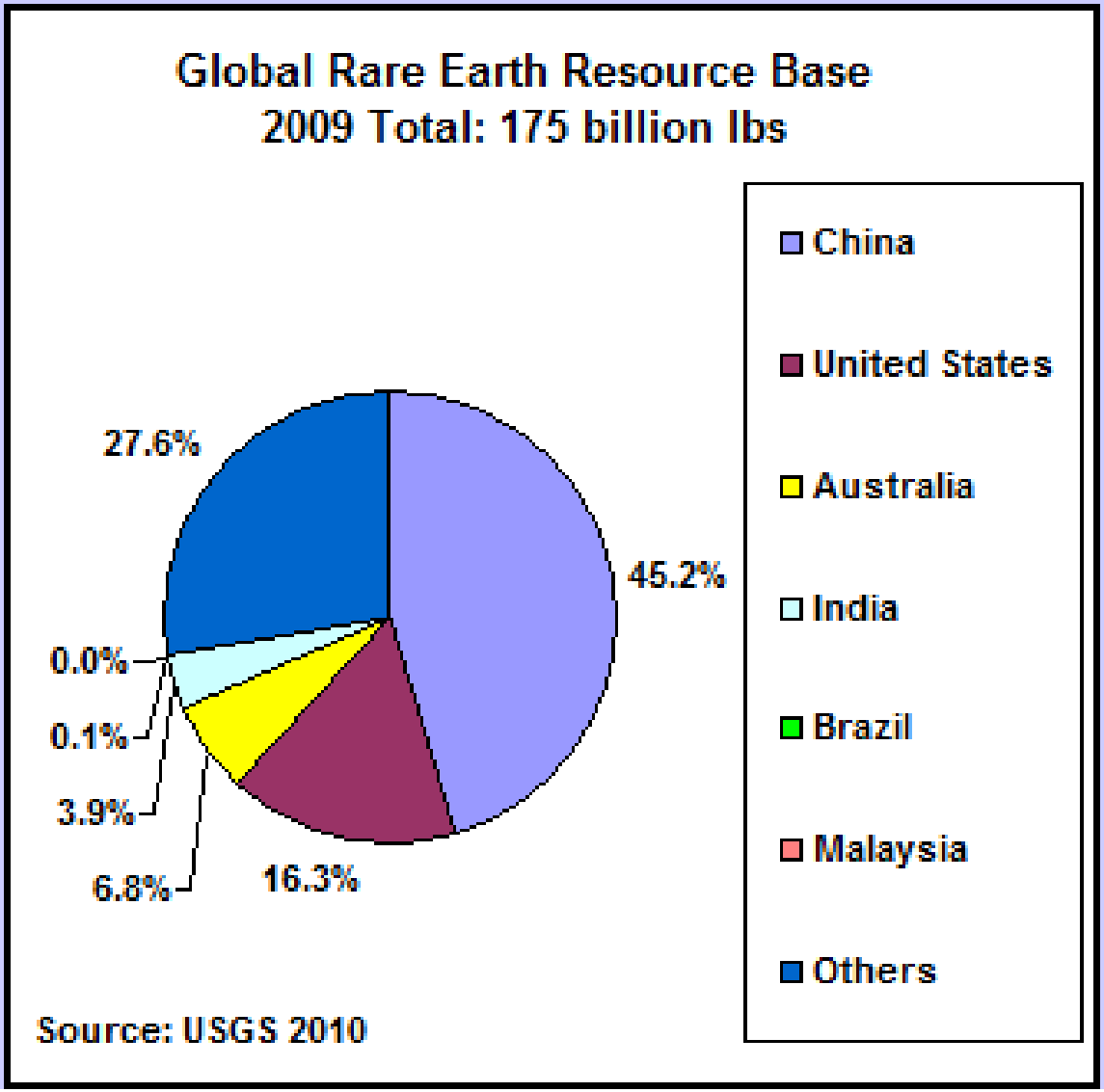
- $100 million Dream Target
- $500 million Dream Target
- $2 billion Dream Target

Key Company Projects

- Alkane - Dubbo
- Arafura - Nolans Bore
- Avalon - Nechalacho
- Great Western - Hoidas Lake
- Greenland Mnrls - Kvanefjeld
- Hudson - Sarfartoq Carbonatite
- Lynas - Mt Weld
- Matamec - Zeus-Kipawa
- Quest Uranium - Strange Lake
- Rare Earth Metals - Clay-Howells
- Rare Element - Bear Lodge
- Tasman Metals - Norra Karr
- Ucore - Bokan - Dotson Ridge
- Stans Energy - Kutessay II

$60 billion TREO in the ground, $2 billion market cap

The solution to the rare earth security of supply problem lies with the undeveloped non-Chinese deposits controlled by the juniors.



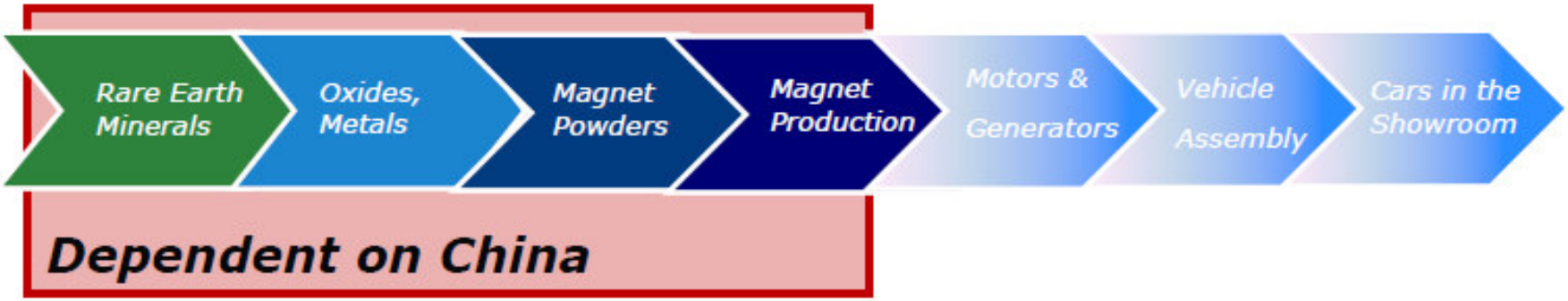
But this solution cannot be implemented in the normal way.

How do we get to a mine?

Stage	Exploration Cycle Stage	Objective	Time Required
1	Grassroots	Conceptual, land acquisition	1 year
2	Target Generation & Drilling	Filtering for drill targets	1-2 years
3	Discovery Delineation	Defining the limits of a discovery - tonnage & grade	1-2 years
4	Infill Drilling	Producing a mineral resource estimate & scoping study	1-2 years
5	Bulk Sample & Metallurgy	Evaluating recoveries and optimal processing method	1 year
6	Prefeasibility	Produce a mineable reserve, establish a mining plan and associated costs	1-2 years
7	Permitting, Marketing & Feasibility	Securing approval, negotiating offtake, making a production decision	1-3 years
8	Construction	Building the mine	1-3 years
9	Production	Mining cash flow	10-20 years

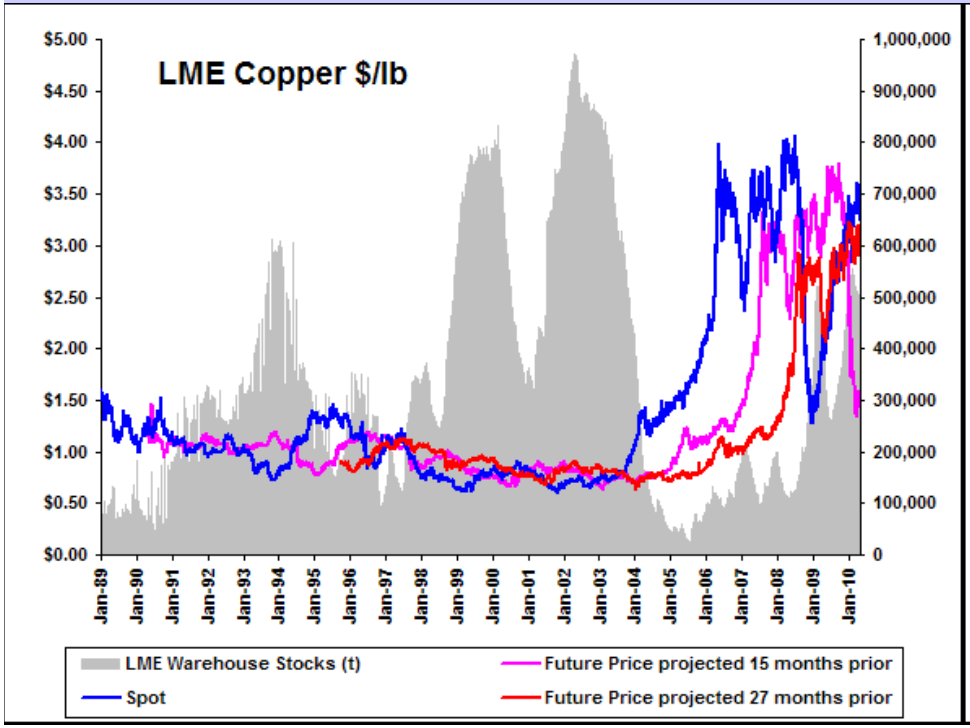
Source: Molycorp March 2009 Presentation

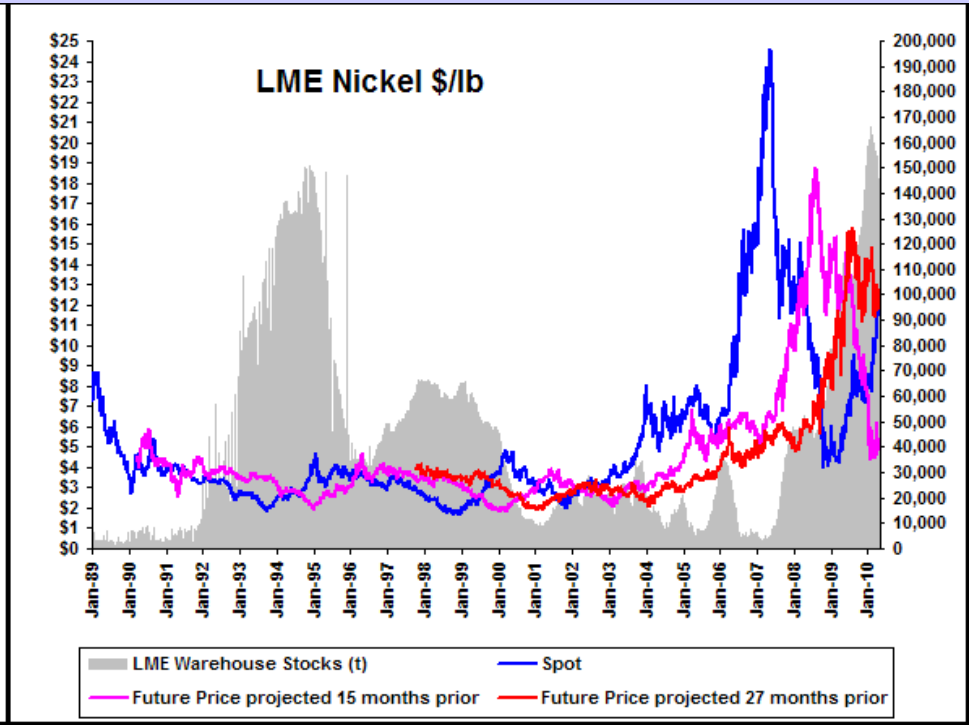
Hybrid Vehicle Supply Chain

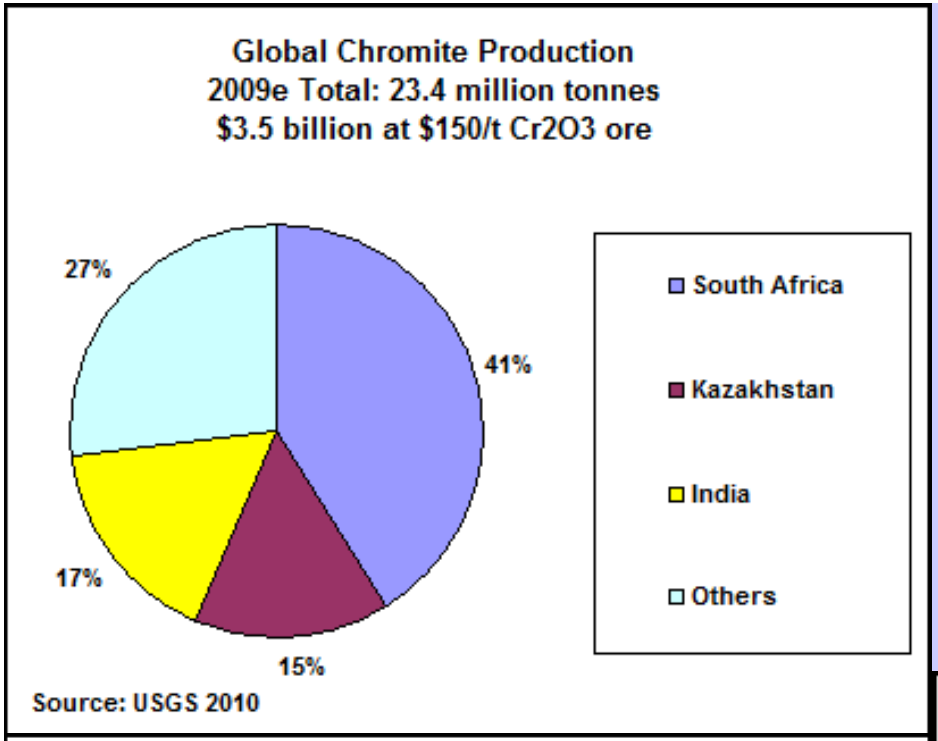


Economic vs Strategic Logic

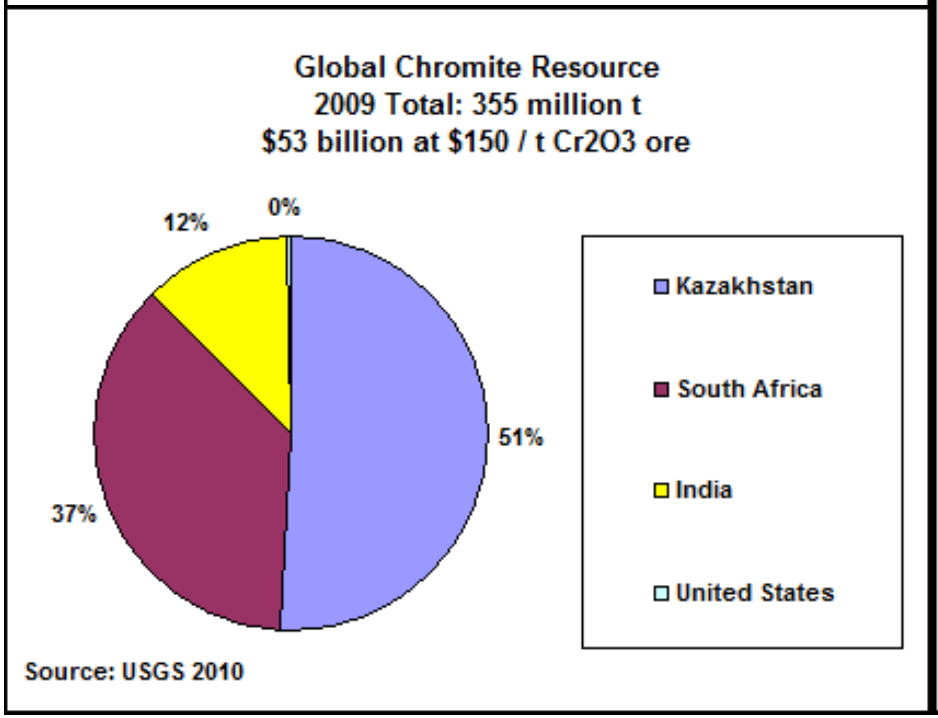
- Price discovery through futures commodity markets becomes chaotic
- Cost structure in so far that self-sufficiency within a closed system has not been achieved becomes unpredictable
- Economic analysis involving discounted value of future cash flows becomes pure guesswork
- Mine development focuses on large systems with sweet spots allowing for rapid capital cost payback
- The survivors will be those who have title to the means of production and security of supply with regard to the raw material inputs

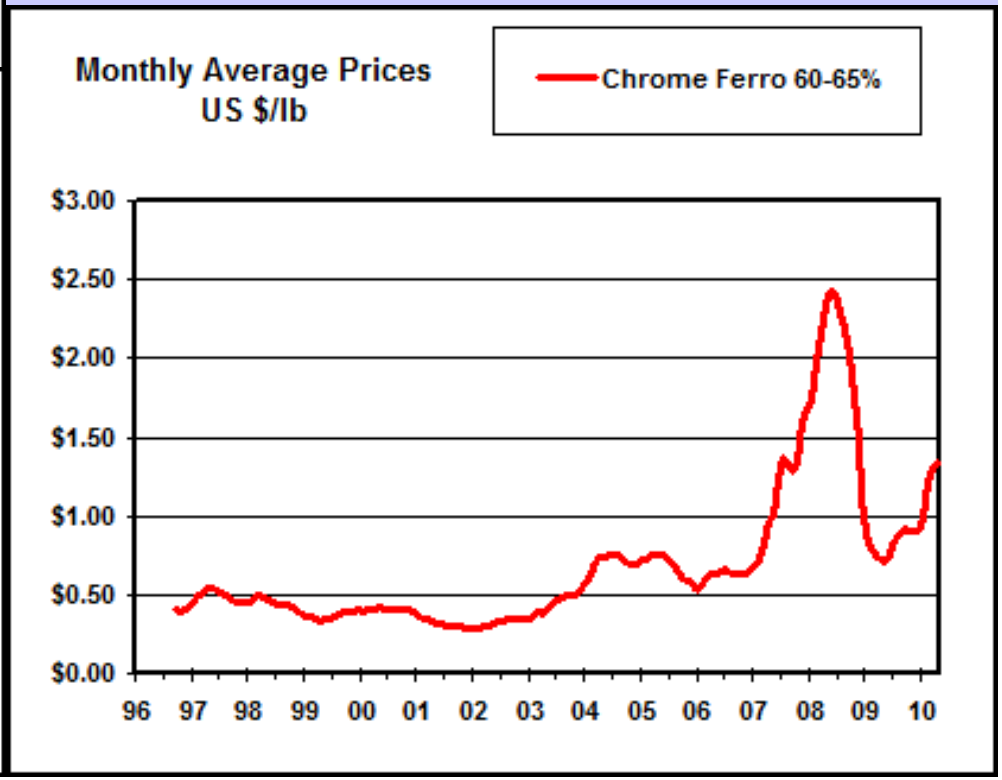






- Global reserve base "sufficient to meet conceivable demand for centuries" (USGS)
- China lacks chromite resource
- US has 54% import reliance, rest comes from recycling
- No substitute for chromium in stainless steel production
- South Africa wants to restrict chromite ore export, dominant producer of ferro chrome, energy problems

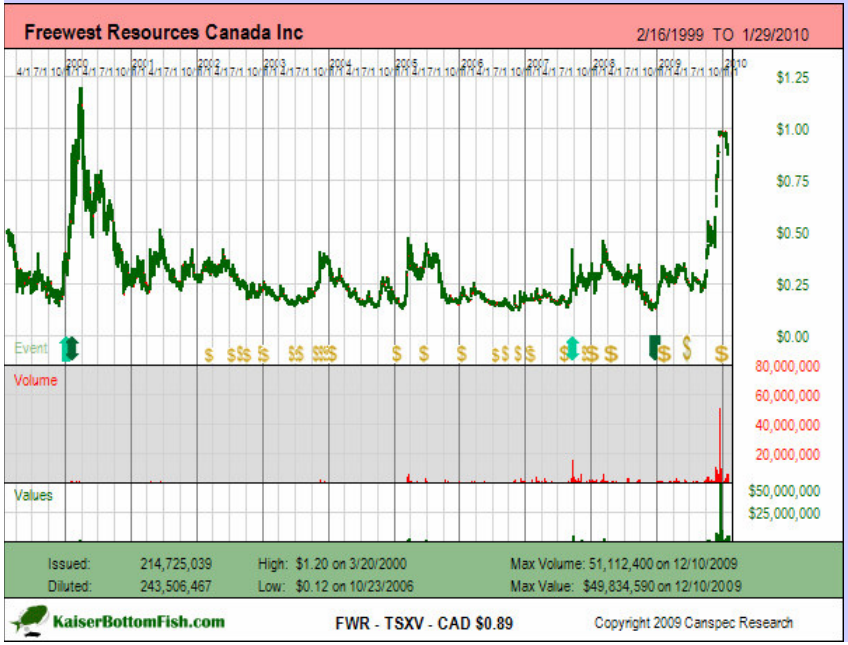




Cliffs Natural Resources Inc

- NYSE listed producer of iron ore pellets and coking coal
- 2008 revenues of $3.6 billion
- Significant NA operations
- Supplies US steelmakers
- Market capitalization of $5 billion
- Bought Freewest's chromite asset via takeover bid of 0.020106 CLF share for 1 FWR share

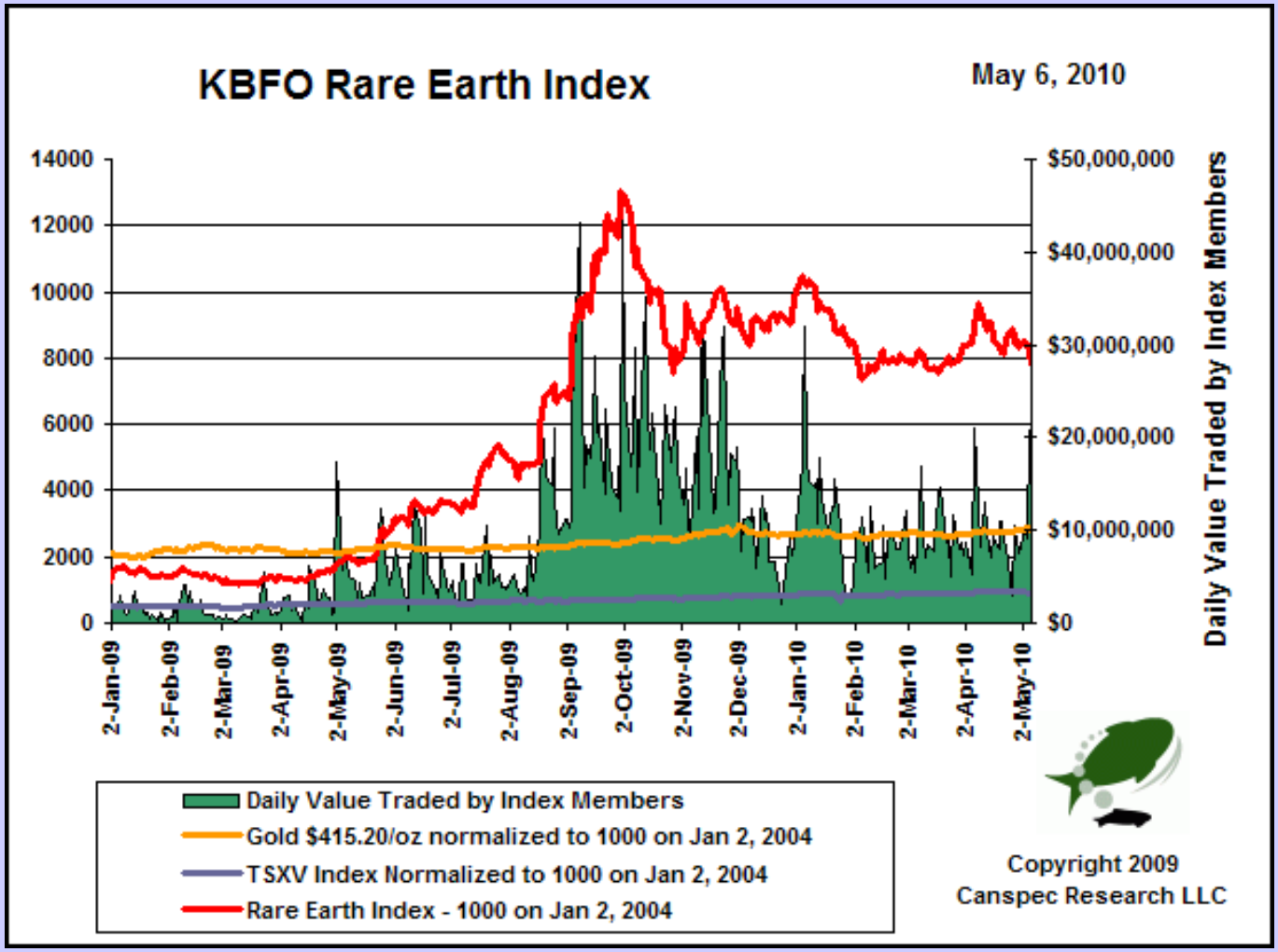
Freewest Resources Canada Inc



- TSXV listed resource exploration junior, 244 M FD, closed at $0.89 on Jan 28, 2010
- Buyout value $217 million on closing, $368 million at US $75/sh CLF today
- Owns 100% of Black Thor chromite discovery and 40% of Big Daddy in northern Ontario
- 122 million tonne open-pittable footprint, grade range 27.8%, below South African standard of 40%+
- Estimated $1.5 billion capital cost

Critical & Strategic Metals

- **State controlled capital investment: Chinese trend is for state controlled entities to make investments in raw material supply around the world which often go hand in hand with parallel infrastructure investments guided by long term security of supply rather than profit goals**
- **Free Market Crisis for Just in time Procurement: Free markets in which metals go to the highest bidder will become thinner and less reliable for just-in-time procurement strategies**
- **Mainstream Mining Sector's aversion to uncertainty: Mainstream mining companies are unlikely to invest in primary specialty metal mines such as rare earth deposits, and will at most add circuits to recover them as by-product metals from existing base metal mines**
- **Long term Cost Volatility & Spot Price Opacity: Volatility in currency exchange rates and energy/chemical costs rule out long term price based contracts while lack of transparency and poor price discovery mechanisms make spot market pricing unreliable**
- **A new upstream role for end-users: End users with large downstream markets at stake will need to make upstream equity and/or debt investments in resource juniors which raise risk capital to acquire and advance specialty metal deposits**
- **A new downstream role for producers: Rare earth producers not owned and operated by a consortium of downstream users will need to own downstream operations which add value to the mined raw materials**
- **Strategic Logic – measuring profit in terms of what security of supply for incremental upstream inputs implies for downstream products: profits will reside in the downstream products for which metals are a critical but incremental input, not in the margin between mining cost and market price**



Thank You

www.KaiserBottomfish.com