



⊙ Action

While investors watch the gold price touch new highs, metals termed rare earth (RE) that are used in a variety of industrial applications have climbed far faster over the past month. Export restrictions as well as ongoing demand from its domestic electronics industry has highlighted the role China plays as the sole source of supply for these obscure metals. Although a net oil importer, China's dominance in the supply of REs means it is able to act as a monopoly producer in the short run.

Anchor themes

Rare earths are a collection of 17 chemical/metal elements from the periodic table that are widely used in industrial applications, such as catalysts, magnets or special alloys. They are abundant in the earth's crust, but China and North Korea have economically viable large reserves.

In July, China announced it was cutting rare earth export quotas by more than 70% for 2H10 and has continued to decrease overseas supplies.

Rare earths: China's indigenous precious metal (II)

① A re-rating for minor metals?

The increasing need by the electronics industry for special metals with defined characteristics, such as inertness, conductivity and fusibility, has seen a revival in demand for REs.

Since the September diplomatic tension between China and Japan, which saw China temporarily withdraw RE exports to Japan, countries have begun to seek alternative supplies. Unfortunately, both Japan and Korea have found that they will need to seek support from governments in Mongolia, Vietnam and India to develop local resources. Interestingly, the main source of fresh supply will come from secondary or recycled scrap, but this may not be necessarily efficient and may also have environmental consequences.

Market calls

We highlighted the significant supply-demand imbalance appearing in the minor metals including rare earth metals on 1 October, 2010. We recently turned more bullish on oil. Within the natural resource space, we have preferred softs over base metals. Given the dependence of Asia's electronics, super-alloys and auto industry players on minor metals and their smaller group of rare earth metals, we would expect the companies below to be beneficiaries of this demand.

Strategist

Sean Darby
+852 2252 2182
sean.darby@nomura.com

Analysts

Amy Lee, CFA
+852 2252 2181
amy.lee@nomura.com

Mixo Das

+852 2252 1424
mixo.das@nomura.com

Rare earth basket

Company	Bloomberg code	Price	Nomura rating
Aluminum Corp of China Ltd	2600 HK	7.60	Not Rated
Inner Mongolia Baotou Steel Rare-Earth Hi-Tech	600111 CH	76.86	Not Rated
Jiangxi Copper	358 HK	20.30	Not Rated
China Rare Earth Holdings	769 HK	3.91	Not Rated
Lynas Corp	LYC AU	1.52	Not Rated
Arafura Resources	ARU AU	1.28	Not Rated
Alkane Resources	ALK AU	0.82	Not Rated

Note: as of 7 October, 2010

Source: Bloomberg; Nomura

Any authors named on this report are strategists unless otherwise indicated. See the important disclosures and analyst certifications on pages 12 to 15.

Rare earths: China's indigenous precious metal (II)

A re-rating for minor metals?

"The Middle East has its oil, China has its rare earth" — Deng Xiaoping, June 1987

"In the past, Chinese rare earth metals were sold with little regard to cost and more to generate much-needed export revenues. Over the past three years, China has sought to curb production in order to safeguard resources and perhaps in recognition of the fact that REs had been sold without reference to their strategic value. China controls more than 90% of global production of REs and has embarked on a series of deals to secure output from other international producers, meaning it accounts for 97% of all REs sold globally" — *Rare earths: China's indigenous precious metal*, 1 October, 2010

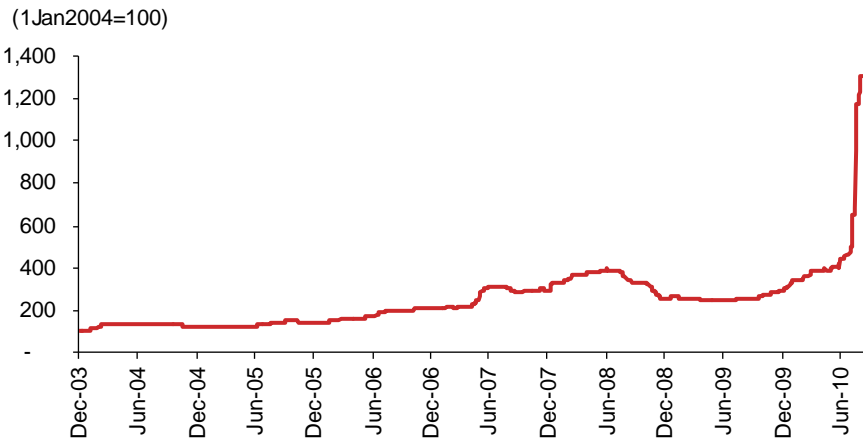
At one time in the late 1980s, the US was the largest swing producer of the minor metals and particularly the rare earths (REs). However, the end of the cold war and increased supply from new mines in China undercut North American producers. The increasing need by the electronics industry for special metals with defined characteristics, such as inertness, conductivity and fusibility, has seen a revival in demand for the REs. Further, as more global electronics production was placed into the mainland to take advantage of the domestic consumer appetite for mobile phones and PCs, China has found it necessary to curb exports to feed the insatiable demand from its home-grown electronics industry.

Since the September diplomatic tension between China and Japan, which saw China temporarily withdraw RE exports to Japan, countries have begun to seek alternative supplies. Unfortunately, both Japan and Korea have found that they will need to seek support from governments in Mongolia, Vietnam and India to develop local resources. Toyota's affiliated trading company Toyota Tsusho is likely to bring production from a Vietnamese mine 2012, but other projects (eg, in Mongolia) are not slated to start production until 2014. Interestingly, the main source of fresh supply will come from secondary or recycled scrap, but this may not be necessarily efficient and may also have environmental consequences.

While the US, Japan and Korea initiate programmes to create stockpiles and find independent means of obtaining RE ore, the EU recently completed a detailed study highlighting the need for diversified supply. The report, *"Critical raw materials for the EU"*, published in June this year concluded that 14 raw materials should be considered as critical due to their high relative economic performance and high relative supply risk.

The EU report rounded up by commenting that 'for the critical raw materials, their high supply risk is mainly due to the fact that a high share of the worldwide production comes from China (antimony, fluorspar, gallium, graphite, indium, magnesium, rare earths, tungsten), Russia (platinum group metals), Congo (cobalt, tantalum) and Brazil (niobium and tantalum). Interestingly, the report also concluded that the concentration of metals in the above countries was compounded by "low sustainability and low recycling rates".

Exhibit 1. Rare earths price index

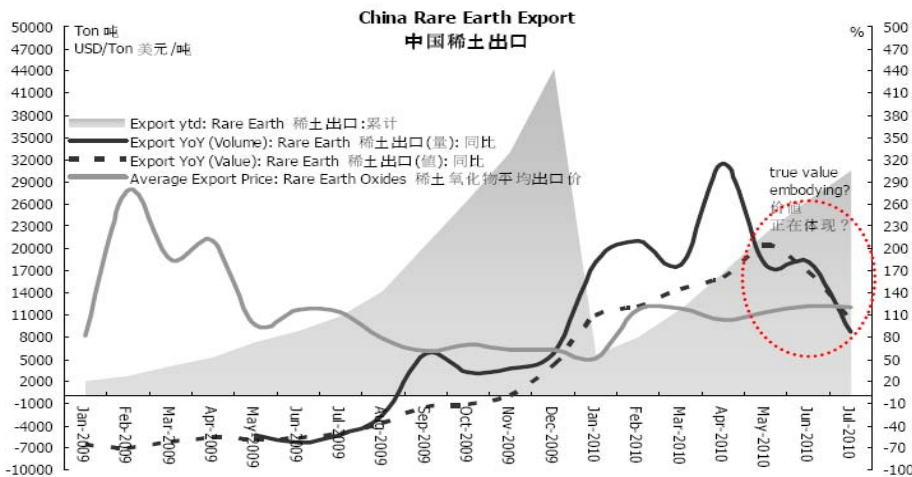


The price of rare earths has soared by 200% over the past three months

Note: aggregate of nine major rare earth elements

Source: Thomson Reuters Datastream, Nomura International (Hong Kong) Limited – Investment Strategy

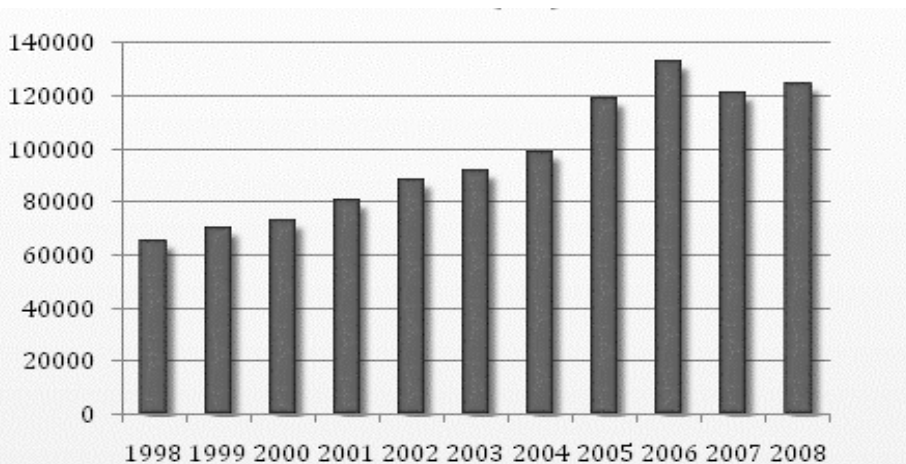
Exhibit 2. China: rare earth exports



Investors have become more aware of China's RE metal monopoly after export quotas have been gradually reduced over the past year

Source: CEIC, Nomura International (Hong Kong) Limited – Investment Strategy

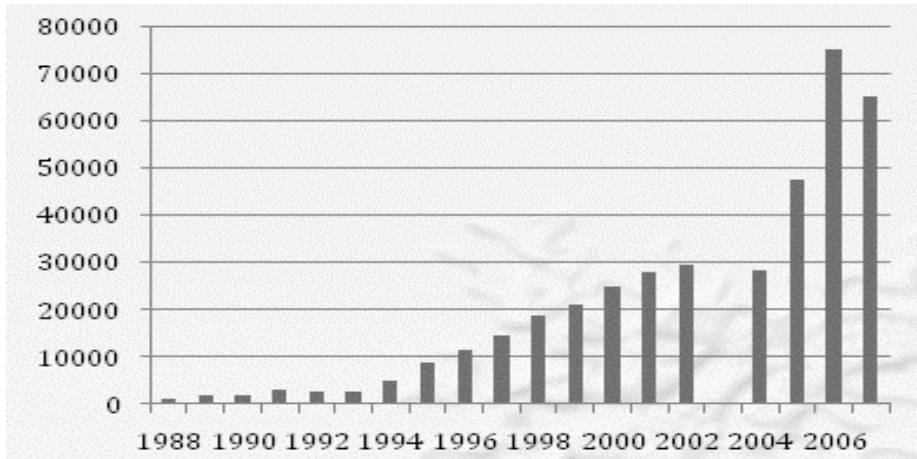
Exhibit 3. China: output of rare earth concentrate (tonnes)



Interestingly, the data suggests that China has controlled output successfully since 2006 as it sought to consolidate the domestic industry into a handful of players

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

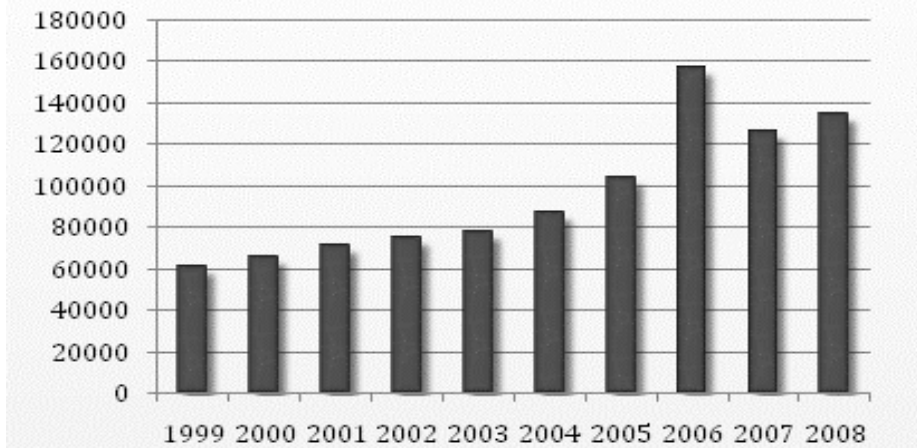
Exhibit 4. China: output of rare earth oxides (tonnes)



However, rare earth oxide output has ballooned since 2004

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

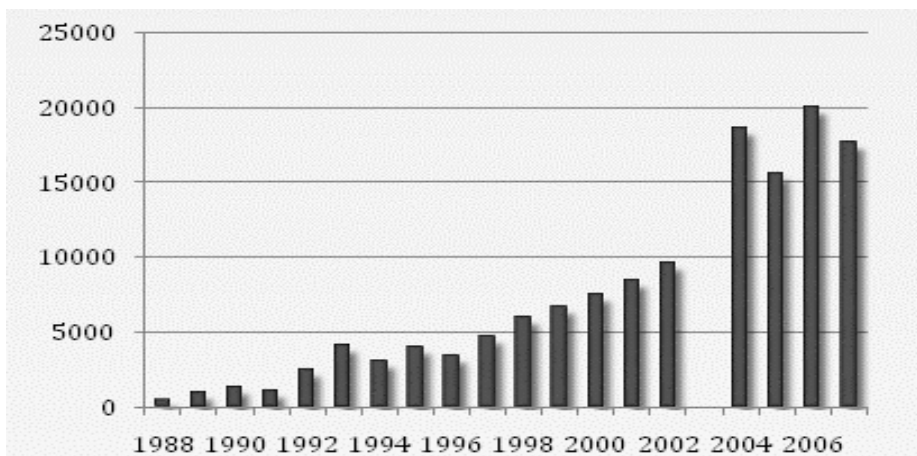
Exhibit 5. China: output of smelting separation products (REO, tonne)



Smelting of the final product appears to have stabilised...

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

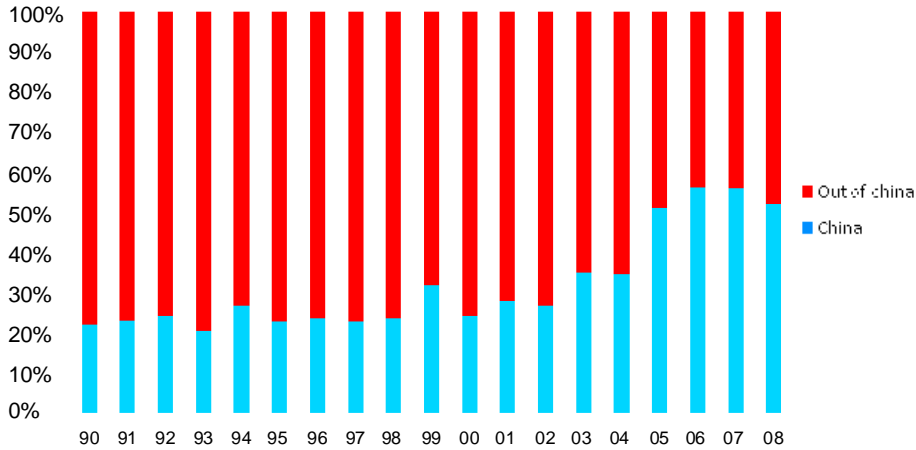
Exhibit 6. China: output of rare earth metals (tonnes)



... however, production of final rare earth metals (REM) has grown sharply

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

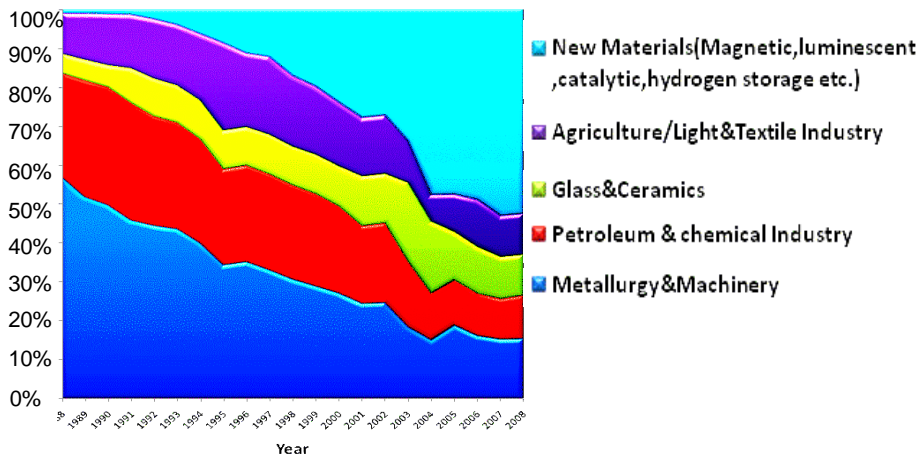
Exhibit 7. Share of global rare earth consumption: China vs rest of world



China accounts for more than half of global RE consumption...

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

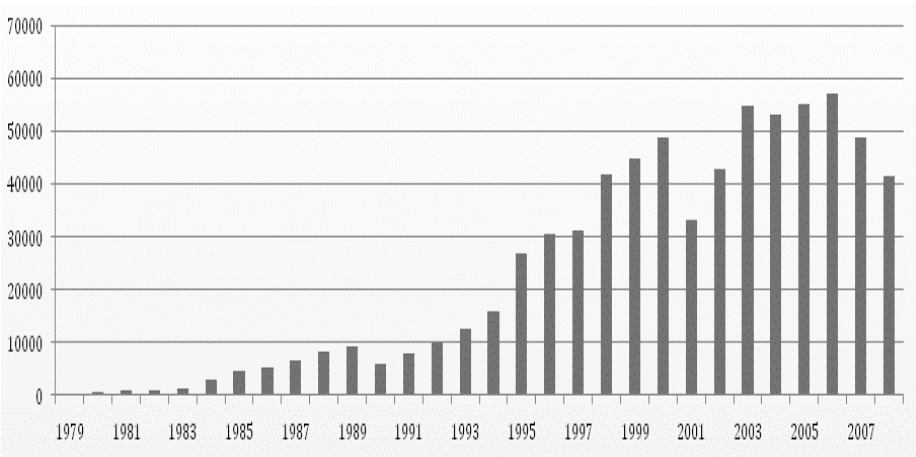
Exhibit 8. China: RE consumption structure



... while boosting new materials industry, requiring more RE consumptions

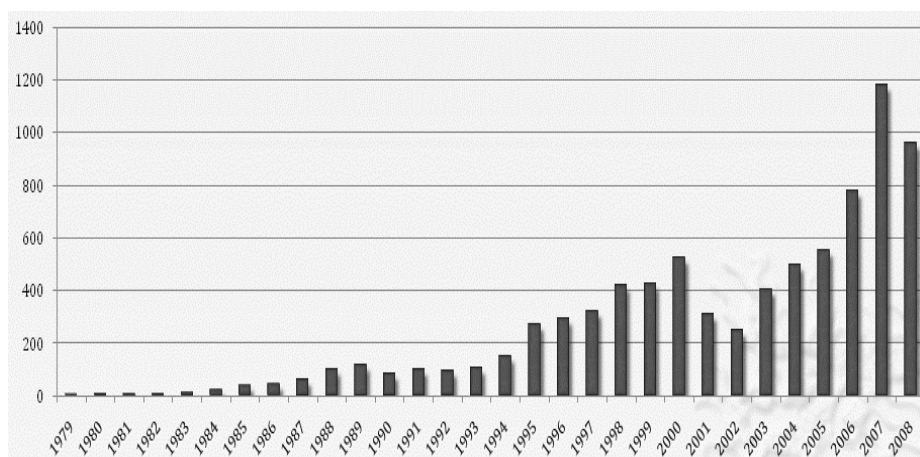
Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

Exhibit 9. China: gross export volume of RE products (tonnes)



We believe REM product exports have diminished due to a combination of China controlling domestic output and strong consumption from its home-grown electronics industry

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

Exhibit 10. China: gross export value of RE products (US\$m)

Source: The Chinese Society of Rare Earths, Nomura International (Hong Kong) Limited – Investment Strategy

Even though more of the metal is being consumed domestically, the export value of the metal sold overseas has soared

Exhibit 11. Forecast global demand and supply for individual RE in 2014F (±15%)

Rare earth oxide	Demand		Supply/Production	
	(REO tonnes)	(%)	(REO tonnes)	(%)
Lanthanum	51,050	28.4	55,100	26.9
Cerium	65,750	36.5	82,400	40.2
Praseodymium	7,900	4.4	10,000	4.9
Neodymium	34,900	19.4	33,300	16.3
Samarium	1,390	0.8	4,000	2.0
Europium	840	0.5	900	0.4
Gadolinium	2,300	1.3	3,150	1.5
Terbium	590	0.3	400	0.2
Dysprosium	2,040	1.1	1,800	0.9
Erbium	940	0.5	1,000	0.5
Yttrium	12,100	6.7	11,650	5.7
Ho-Tm-Yb-Lu	200	0.1	1,300	0.5
Total	180,000	100.0	205,000	100.0

Source: Industrial Mineral Company of Australia (IMCOA)

Only by 2014F will supply come into balance with forecast demand, according to the IMCOA

Exhibit 12. Adjusted demand and supply forecast (tonnes)

Supply & Demand	2004	2005	2006	2007	2008	2009F	2010F	2011F	2012F	2013F	2014F
Global Demand	90,000	98,000	110,000	120,000	124,000	85,000	124,000	135,500	148,500	163,000	180,000
Adjusted Global Demand	90,000	100,000	113,000	125,000	131,000	90,000	135,000	146,000	162,000	182,000	205,000
China Demand	33,000	52,000	60,000	70,000	77,000	65,000	82,000	91,000	102,000	116,000	133,000
China Supply	85,500	99,000	110,000	100,000	115,000	90,000	120,000	130,000	145	154,500	165,000
ROW Supply	5,000	6,500	7,500	8,500	9,000	6,500	7,500	15,000	20,000	32,000	38,500
Global Supply	90,500	105,500	117,500	108,500	124,000	96,500	127,500	145,000	165,000	186,500	203,500
Surplus/Deficit	500	5,500	4,500	16,500	7,000	6,500	7,500	1,000	3,000	4,500	1,500

Note: Demand has been 'adjusted' to allow for the issue of balance.

Source: IMCOA

However, China will still account for the majority of the expansion

Exhibit 13. China: RE consumption breakdown in 2007 (REO tonnes)

Application	Field	Consumption volume	Percentage
Five Advanced Materials	Advanced magnets	22,250	30.7
	Polishing powder	7,369	10.2
	Hydrogen storage materials	6,200	8.5
	Fluorescent materials	4,490	6.2
	Auto catalysts	2,710	3.7
	Subtotal	43,019	59.3
Others	Metallurgy	10,994	15.2
	Petrochemical industry	7,548	10.4
	Glass & ceramics	3,303	4.5
	Others	7,686	10.6
	Subtotal	29,531	40.7
	Total	72,550	100.0

Source: CREIC November 2008

Most of China's REM consumption is for high-end applications, such as magnets...

Exhibit 14. China: output of 'added-value' RE products (absolute tonnes)

Advanced materials	2005	2006	2007	Average growth rate (%)
Permanent magnets	35,200	41,350	50,800	20.1
Hydrogen storage materials	13,000	15,000	18,600	19.6
Fluorescent materials	5,650	5,870	8,480	22.5
Polishing powder	4,457	6,092	7,523	29.9
Auto emission purifier (,000 unit)	8,400	10,000	10,850	13.8

Source: CREIC November 2008

... electronic materials...

Exhibit 15. China: output of RE phosphors (absolute tonnes)

Year	2005	2006	2007	Average growth rate (%)
Trichromatic phosphor for lamps	2,500	3,200	6,400	60.0
Phosphor for CRT colour TV	1650	1300	1000	-22.2
Long afterglow phosphors	1,500	1,195	900	-22.5
Other phosphors	-	175	180	negligible
Total	5,650	5,870	8,480	22.5

Source: CREIC November 2008

... and specialist light-emitting products

Exhibit 16. Export taxes on RE exports from China

Materials	Tax (%)
Europium, terbium, dysprosium, yttrium as oxides, carbonates or chlorides	25
All other rare earth oxides, carbonates and chlorides	15
Neodymium metal	15
All other rare earth metals	25
Ferro rare earth alloys	20

Source: Local press reports

In late 2006, the Chinese government introduced a tax on RE exports of 10%, which was increased to 15% on selected REs in 2007. In December 2007, the authorities increased the export taxes on all RE exports, with effect from 1 January, 2008

Exhibit 17. China: history of RE export quotas (2004-2009)

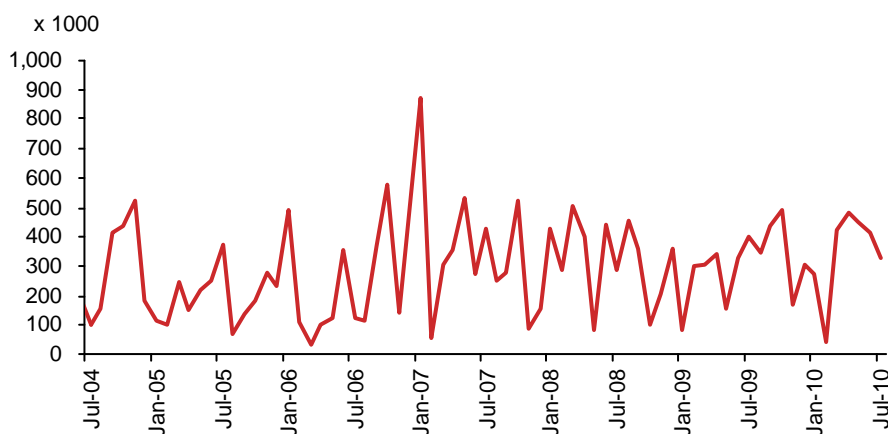
Year	1st Allocation		2nd Allocation		Total			Estimated Rest of World Demand	
	Domestic Enterprises	Foreign Enterprises	Domestic Enterprises	Foreign Enterprises	Domestic Enterprises	Foreign Enterprises	Grand Total		
2004	n/a	n/a	n/a	n/a	48,040t	17,569t	65,609t	-	57,000t
2005	n/a	n/a	n/a	n/a	48,040t	17,569t	65,609t	0%	46,000t
2006	n/a	n/a	n/a	n/a	45,752t	16,069t	61,821t	-6%	50,000t
2007	19,600t	8,211t	23,974t	8,289t	43,574t	16,069t	59,643t	-4%	50,000t
2008	22,780t	8,211t ¹	11,376t	5,082t ¹	Actual: 34,156t Adjusted: 40,987t ²	Actual: 13,293t Adjusted: 15,834t ²	Actual: 47,449t Adjusted: 56,939t ²	-5.5% ²	50,000t ³
2009	15,043t	6,685t	18,257t	10,160t	33,300t	16,845t	50,145t	-12%	35,000t ³

Source: Greenland and Minerals and Energy Ltd annual report

Notes:

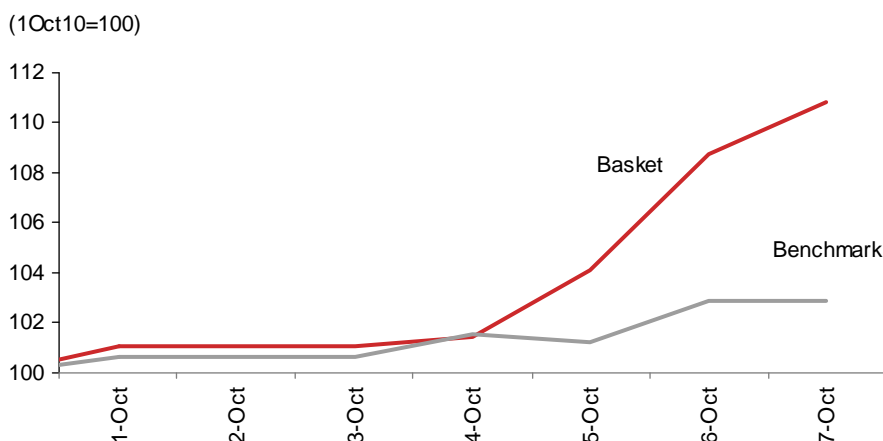
1. In 2008, quotas were allocated for 10 months (second tranche was effectively for 4 months) to align with the calendar year
2. Adjusted for 12-month allocation for comparative purposes
3. Estimated demand from Japan in 2008 and 2009 is >35,000tREO and >25,000tREO, respectively

Slowly but surely, China has been squeezing rare earth export quotas

Exhibit 18. Taiwan REM imports from China

Source: Directorate General Of Customs, Ministry Of Finance, Nomura International (Hong Kong) Limited – Investment Strategy

Although Taiwan's imports appear flat, that is due to the fact that so much of China's production goes to Taiwanese plants located on the mainland

Exhibit 19. Rare Earths basket

Source: Bloomberg, Nomura International (Hong Kong) Limited – Investment Strategy

We initiated our Rare Earths basket on 1 October

Exhibit 20. Rare Earths basket: share price performance

Company	Bloomberg code	Inception date	Absolute change (%)						
			1D	1W	1M	3M	6M	1Y	
Aluminum Corp of China (Chalco)	2600 HK	2-Oct-10 (1.0)	3.8	14.5	25.0 (14.6)	(13.2)			
Inner Mongolia Baotou Steel Rare-Earth Hi-Tech Co Ltd	600111 CH	2-Oct-10	-	-	25.7	109.5	155.7	185.0	
Jiangxi Copper Co Ltd	358 HK	2-Oct-10 (3.1)	3.3	12.5	32.2	8.4	12.3		
China Rare Earth Holdings Ltd	769 HK	2-Oct-10 11.1	16.7	82.7	117.2	101.5	126.0		
Lynas Corp Ltd	LYC AU	2-Oct-10 0.3	11.4	31.6	155.5	178.9	125.2		
Arafura Resources Ltd	ARU AU	2-Oct-10 0.8	13.3	50.6	126.5	98.4	31.3		
Alkane Resources Ltd	ALK AU	2-Oct-10 1.9	18.0	33.3	198.2	141.2	74.5		
MSCI AC AP ex JP			0.8	13.3	50.6	126.5	98.4	31.3	
Average (absolute)			1.5	7.0	33.4	87.9	86.0	87.0	
		(relative)	0.66	(5.51)	(11.42)	(17.07)	(6.28)	42.47	

Note: as of 7 October, 2010

Source: Bloomberg, Nomura International (Hong Kong) Limited – Investment Strategy

While Chalco is likely to have either direct or indirect exposure to RE...

Exhibit 21. Rare Earths basket: consensus valuation

Company	Bloomberg code	Price	P/E (x)		P/BV (x)		DY (%)		ROE (%)	
			FY1F	FY2F	FY1F	FY2F	FY1F	FY2F	FY1F	FY2F
Aluminum Corp of China	2600 HK	7.60	65.5	25.1	1.6	1.5	0.4	1.2	2.5	7.0
Inner Mongolia Baotou Steel Rare-Earth Hi-Tech Co Ltd	600111 CH	76.86	94.5	66.1	20.2	14.1	0.7	1.0	33.4	36.0
Jiangxi Copper Co Ltd	358 HK	20.30	13.9	11.1	2.0	1.8	1.3	1.8	15.6	17.1
China Rare Earth Holdings Ltd	769 HK	3.91	23.0	15.6	2.1	1.9	1.0	1.5	8.7	11.8
Lynas Corp Ltd	LYC AU	1.52	n/a	89.4	4.1	4.0	-	-	(3.2)	7.8
Arafura Resources Ltd	ARU AU	1.28	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Alkane Resources Ltd	ALK AU	0.82	43.2	n/a	n/a	n/a	n/a	n/a	11.0	n/a

Note: as of 7 October, 2010

Source: Bloomberg, Nomura International (Hong Kong) Limited – Investment Strategy

... Australian companies are set to add more production

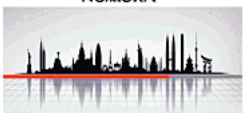
Exhibit 22. Recent strategy reports


Date	Title
7-Oct-2010	Absence of the normal (IV) http://www.nomura.com/research/GetPub.aspx?pid=394163
5-Oct-2010	Musical Chairs (III) http://www.nomura.com/research/GetPub.aspx?spid=6921
4-Oct-2010	Rare earths: China's indigenous precious metal http://www.nomura.com/research/GetPub.aspx?spid=6910
30-Sep-2010	HK: pegged to last (XIII) http://www.nomura.com/research/GetPub.aspx?spid=6897
30-Sep-2010	Mid-cycle correction or mid-life crisis? http://www.nomura.com/research/GetPub.aspx?spid=6895
28-Sep-2010	The return of the Spice Route (XI): Sri Lanka (IV) http://www.nomura.com/research/GetPub.aspx?pid=392657
27-Sep-2010	The absence of the normal (III) http://www.nomura.com/research/GetPub.aspx?spid=6867
22-Sep-2010	Asia's soft commodity crunch (XXI) http://www.nomura.com/research/GetPub.aspx?spid=6852
20-Sep-2010	Musical chairs (II) http://www.nomura.com/research/GetPub.aspx?spid=6827
13-Sep-2010	The absence of the normal (II) http://www.nomura.com/research/GetPub.aspx?spid=6793
8-Sep-2010	HK: pegged to last? (XII) http://www.nomura.com/research/GetPub.aspx?spid=6776
6-Sep-2010	Korea: Accounting for change http://www.nomura.com/research/GetPub.aspx?spid=6759
2-Sep-2010	China A shares: an underground bull market (IV) and HK: pegged to last (XI) http://www.nomura.com/research/GetPub.aspx?spid=6741
2-Sep-2010	Australia: leadership challenges http://www.nomura.com/research/GetPub.aspx?spid=6740
30-Aug-2010	Greater China Inc. (VII) and Pegged to last (X) http://www.nomura.com/research/GetPub.aspx?spid=6719
23-Aug-2010	The absence of the normal http://www.nomura.com/research/GetPub.aspx?spid=6680
20-Aug-2010	Australia: A reflection of China's housing market? http://www.nomura.com/research/GetPub.aspx?spid=6678
20-Aug-2010	New Zealand: an agriculture-led rebalancing act http://www.nomura.com/research/GetPub.aspx?spid=6672
18-Aug-2010	Greater China Inc. (VI) and China A shares an underground bull market (III) http://www.nomura.com/research/GetPub.aspx?spid=6660
16-Aug-2010	China A shares: an underground bull market (II) http://www.nomura.com/research/GetPub.aspx?spid=6638
11-Aug-2010	HK: The story of one peg, two monetary policies and three housing markets (II) http://www.nomura.com/research/GetPub.aspx?spid=386142
10-Aug-2010	Macau: eat your heart out Club Med! http://www.nomura.com/research/GetPub.aspx?spid=6581
9-Aug-2010	HK: Cappuccino or Frappuccino? http://www.nomura.com/research/GetPub.aspx?spid=6575
6-Aug-2010	Korea: Korea Inc vs policy makers http://www.nomura.com/research/GetPub.aspx?spid=6551
2-Aug-2010	HK: The story of one peg, two monetary policies and three housing markets http://www.nomura.com/research/GetPub.aspx?spid=6494
2-Aug-2010	Guns, germs, steel... http://www.nomura.com/research/GetPub.aspx?spid=6393
28-July-2010	Greater China Inc. (V) and the convertibility of the RMB (II) http://www.nomura.com/research/GetPub.aspx?spid=6393
26-July-2010	Do analysts dream of outperforming stocks? (XI) http://www.nomura.com/research/GetPub.aspx?spid=6341
23-July-2010	The return of the Spice Route (X): Sri Lanka (III) http://www.nomura.com/research/GetPub.aspx?spid=6319
22-July-2010	Vietnam: Sunrise and Non Bai Tho http://www.nomura.com/research/GetPub.aspx?spid=6298
21-July-2010	China A share markets: an underground bull market that investors appear to have missed http://www.nomura.com/research/GetPub.aspx?spid=6275
19-July-2010	Great oaks from little acorns grow (II) http://www.nomura.com/research/GetPub.aspx?spid=6231
15-July-2010	What if they had a stock market but nobody traded? (IV) http://www.nomura.com/research/GetPub.aspx?spid=6189

Source: Nomura research

Investible themes and baskets

Nomura's investible themes and baskets are listed on Bloomberg at **NMRA<Go>** for global ideas and **NMCS<Go>** for Asian recommendations. We show live tradable prices for these themes.

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Dividend Products 9) Index Dividend Swaps 10) Nikkei Dividend Swaps		Information 17) Disclaimer 18) Contact Details	
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Nomura International (Hong Kong) Limited Tel: +852 2536 1111
30/F Two International Finance Centre, 8 Finance Street, Central, Hong Kong Fax: +852 2536 1820

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