15th Global iron ore and steel forecast
March 21st 2012 Perth WA

China, India and the world market balance

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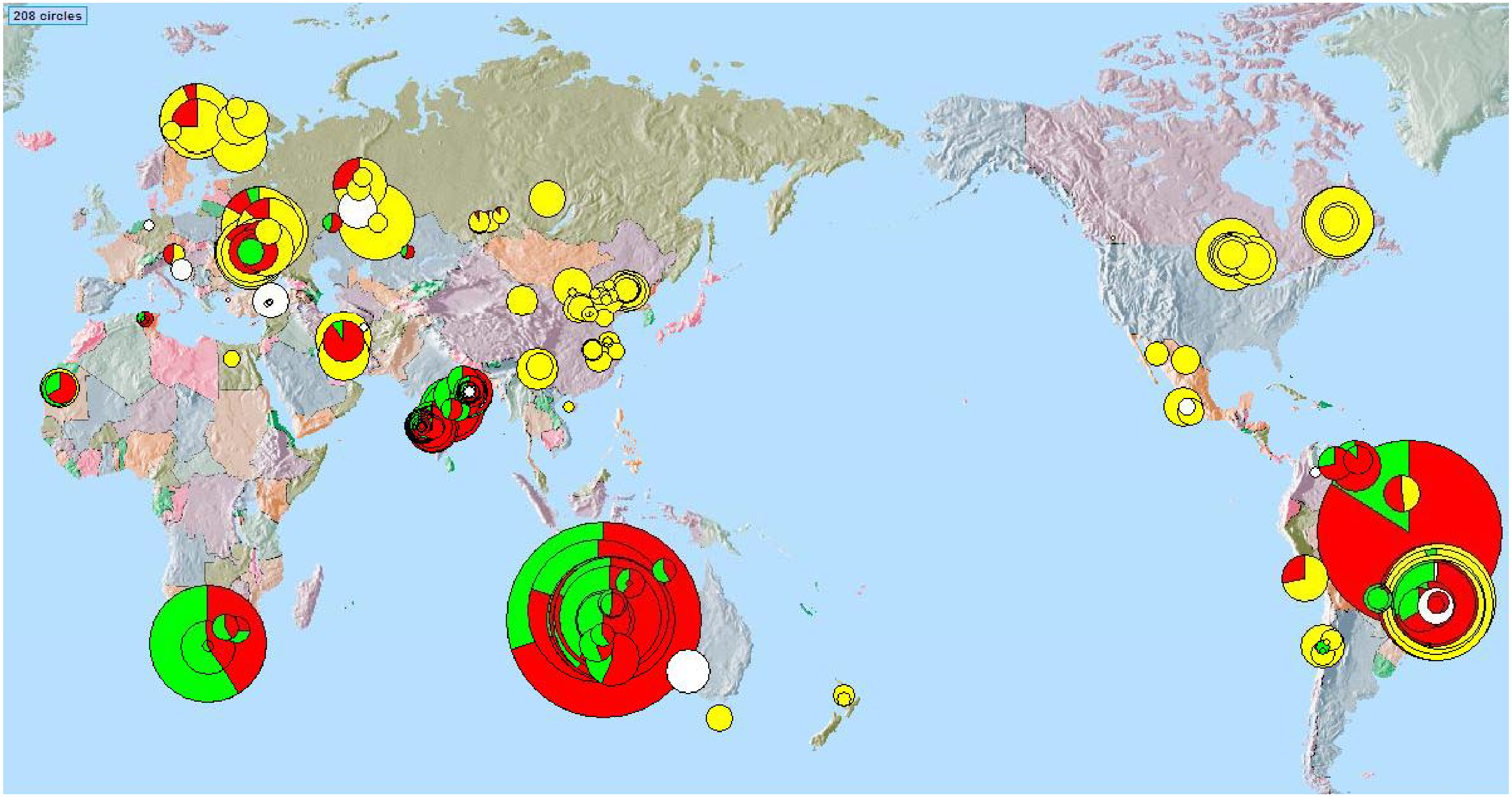
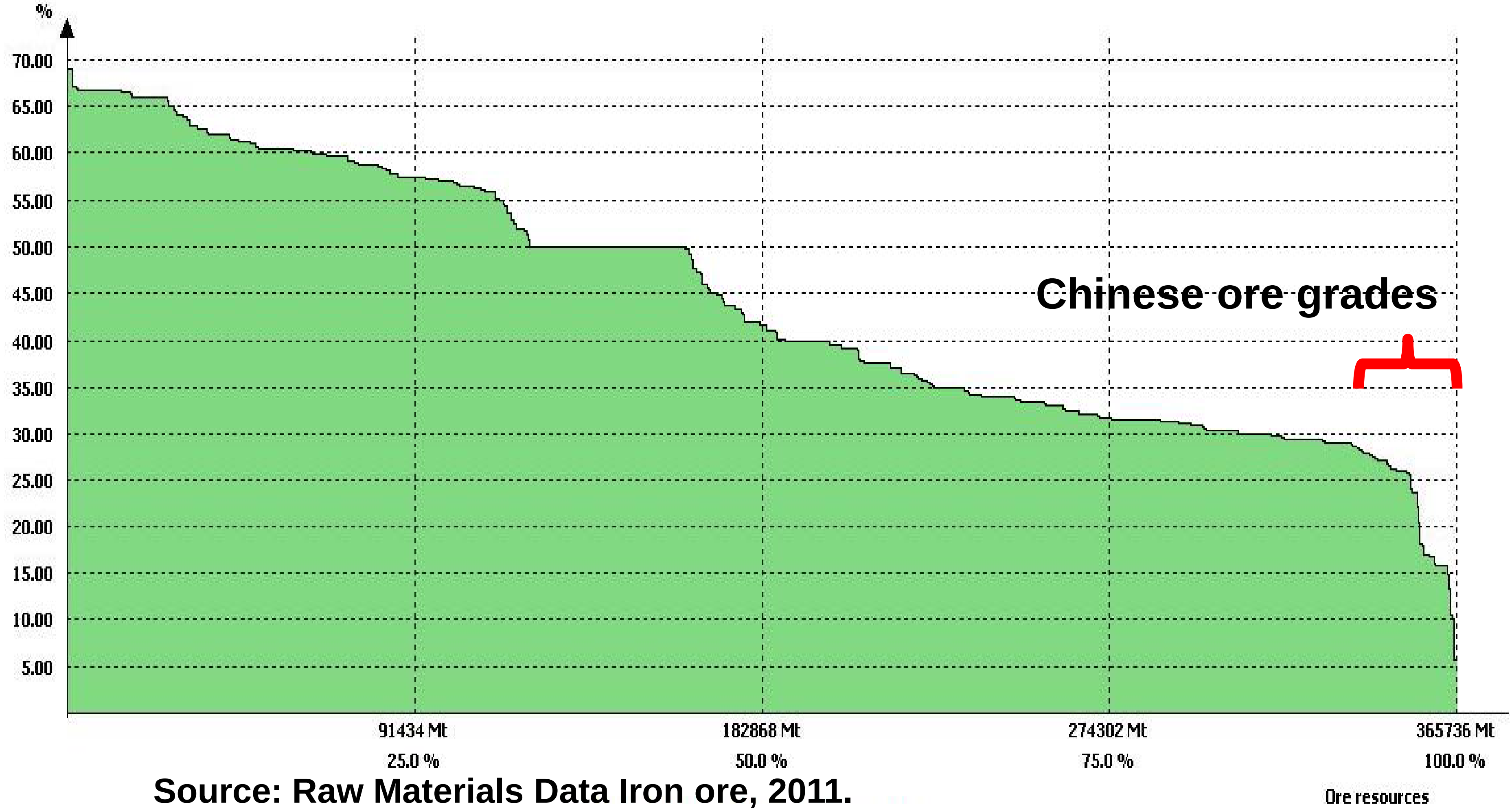
Raw Materials Group

Global iron ore production



Source: Raw Materials Data Iron ore, 2011.

Global iron ore grades



Source: Raw Materials Data Iron ore, 2011.

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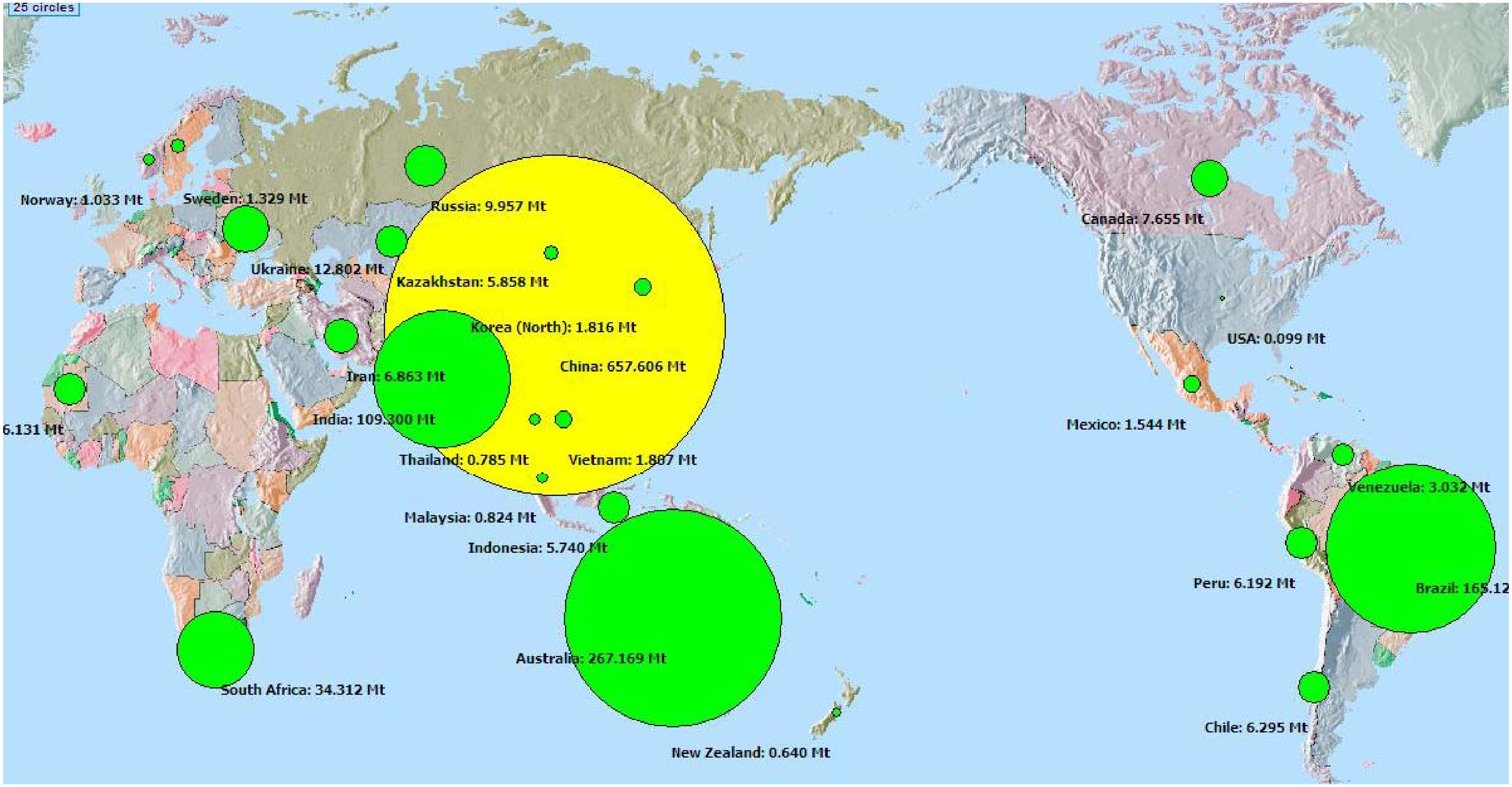
Chinese iron ore imports



Source: Raw Materials Data Iron ore, 2011.

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Global steel growth 2030

Country/Region	2000	2010	Av. Growth, % 2000 - 2010		2015	2020	2025	2030		av. Growth, % 2010 - 2030
China	127 236	625 658	17.51		902 671	1 152 062	1 322 640	1 518 473		4.1
India	26 924	66 848	9.96		102 854	158 254	243 493	374 644		9.0
Japan	106 444	109 600	1.02		121 007	121 007	121 007	121 007		0.5
South Korea	43 107	58 453	3.47		64 853	69 518	73 064	76 791		1.4
Emerging Pacific Rim	28 169	40 304	3.91		49 036	62 584	79 874	112 028		5.3
North America	135 353	111 798	[illegible]		[illegible]	[illegible]	114 969	114 969		0.1
South America	39 110	43 775	[illegible]		[illegible]	[illegible]	86 753	121 676		5.3
Europe	184 925	176 982	[illegible]		[illegible]	[illegible]	176 982	176 982		0.0
C.I.S	98 489	108 425	1.23		119 710	132 169	138 911	145 997		1.5
MENA incl. Turkey	30 074	57 413	6.65		79 020	100 851	127 489	155 109		5.1
					5.00	5.00	4.00	4.00		5.10
RoW (Africa & Oceania)	16 690	16 839	0.48		17 264	22 034	28 657	40 193		4.5
Total World	836 521	1 416 095	5.47		1 799 577	2 177 489	2 513 840	2 957 870		3.3

4 % China

9 % India

Source: Raw Materials Data Iron ore, 2011.

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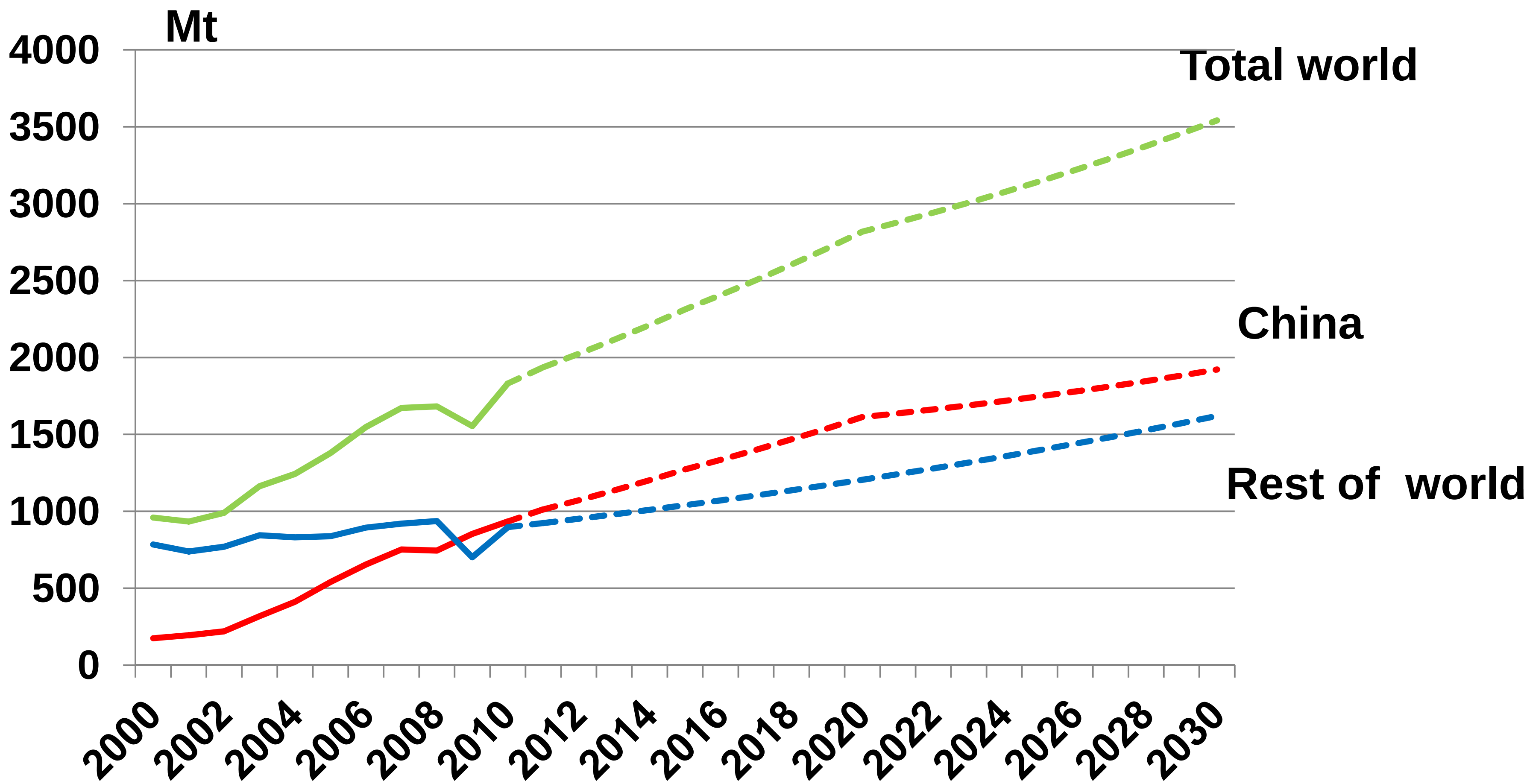
Global iron ore demand



Source: Raw Materials Data Iron ore, 2011.

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- Raw Materials Data, Metals/Coal/Iron Ore
- Strategy development
  - Mining companies, equipment & service providers
- Mineral policy, investment promotion
  - Governments, International organisations
- Pre-feasibility/Feasibility studies
  - Financial institutions, companies
- Merged with Intierra to form IntierraRMG

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Outline

- India.
- China
- Conclusions.

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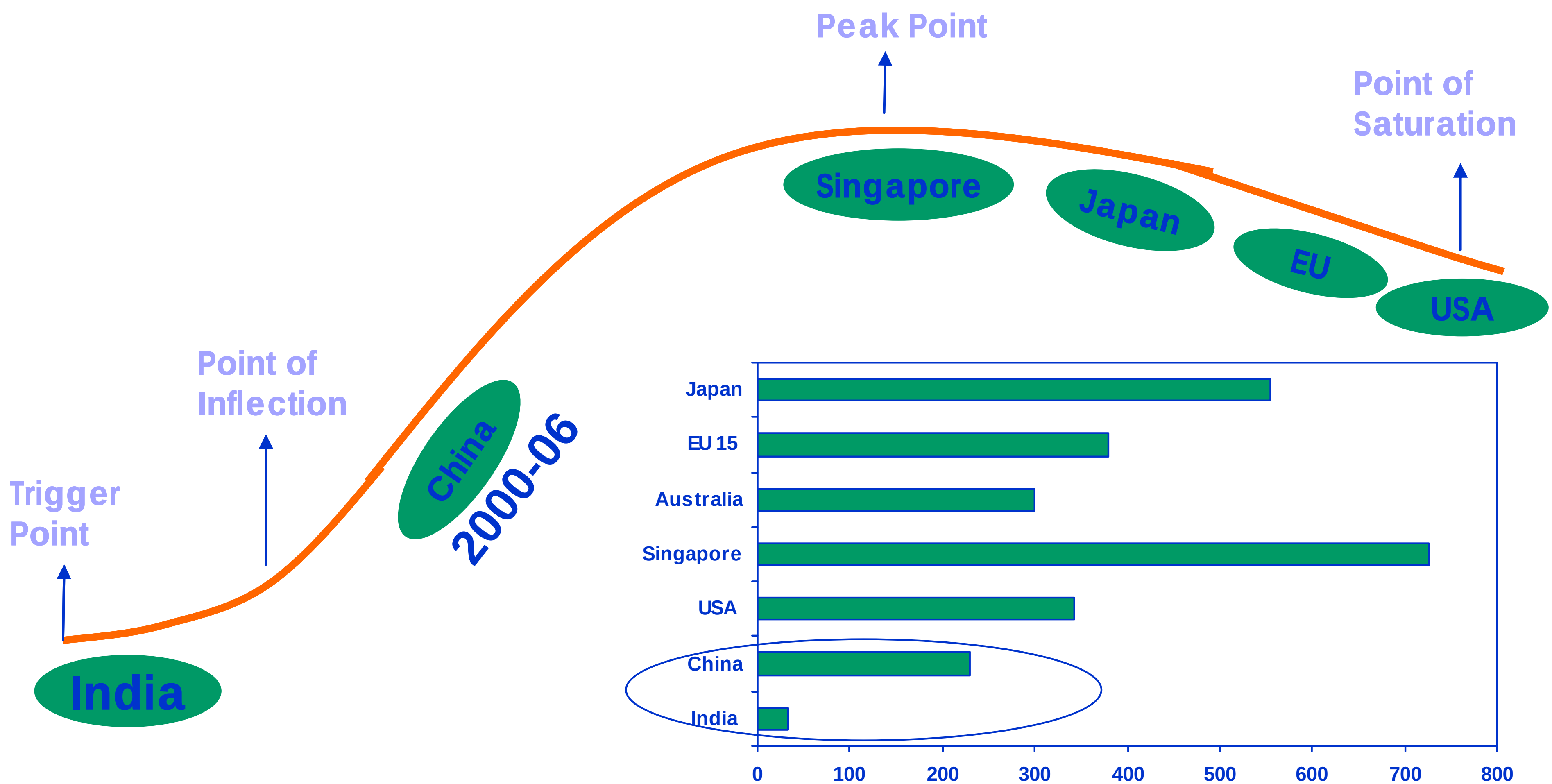
India

Rare earths drawing: Kaianders Sempler.

Indian steel stages



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India steel industry evolution

	2009	2020	2030
Steel production (Mt)	56.6	110	222
Iron ore demand (Mt)	142	175	355
Iron ore production (Mt)	257	411	832
Population (million)	1 210	1 480	1 800
Steel use per capita (kg)	47	74	123

Indian problems

- Sinking ore grades.
- Increase operation scale.
- Logistics.

- High alumina problems in BF.
- Beneficiation of magnetites.
- Iron ore exporters vs steel companies.

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China

- Exploration
- Structure
- Production
- Projects

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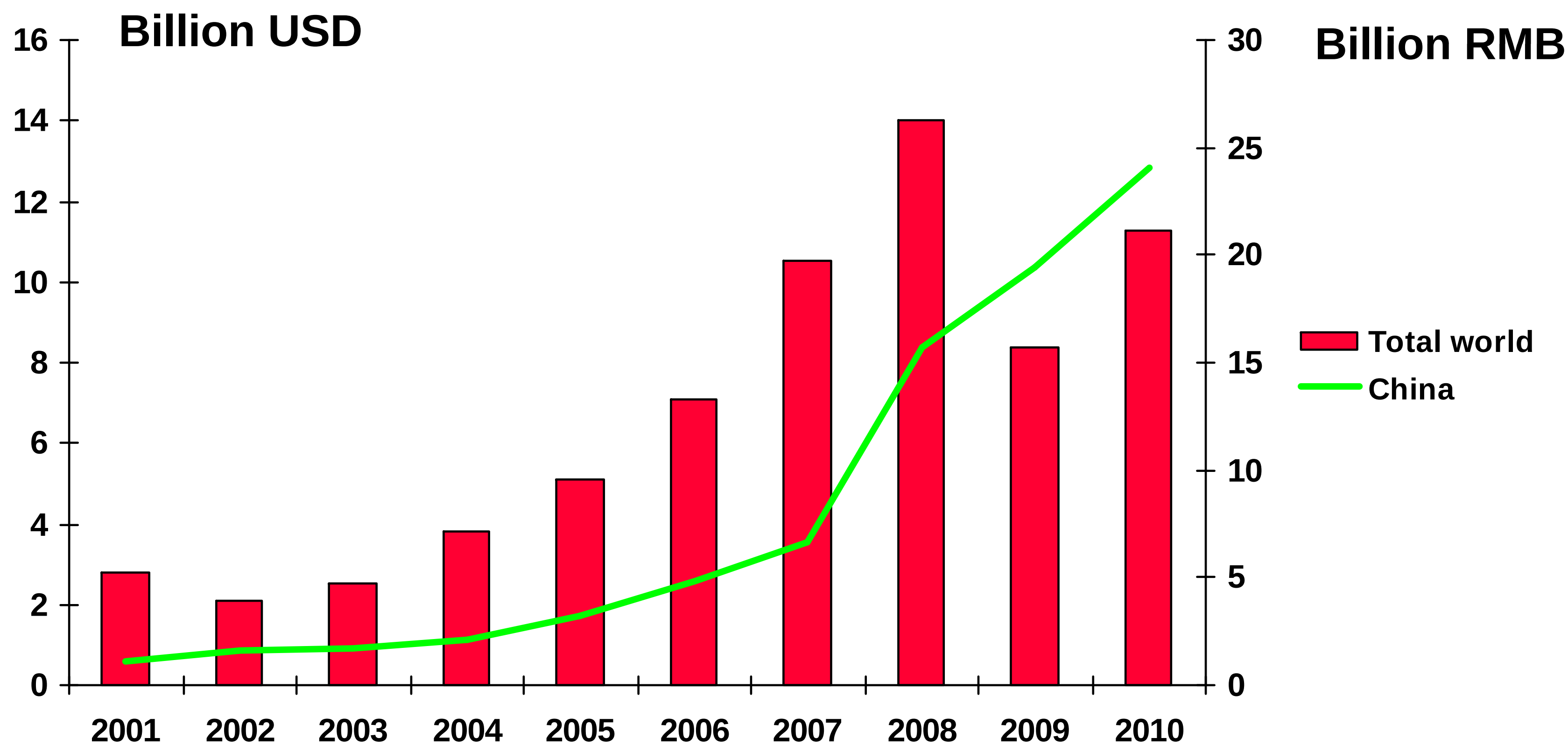
Global exploration



Sources: Total world MEG, China Ministry of Land and Resoruces.

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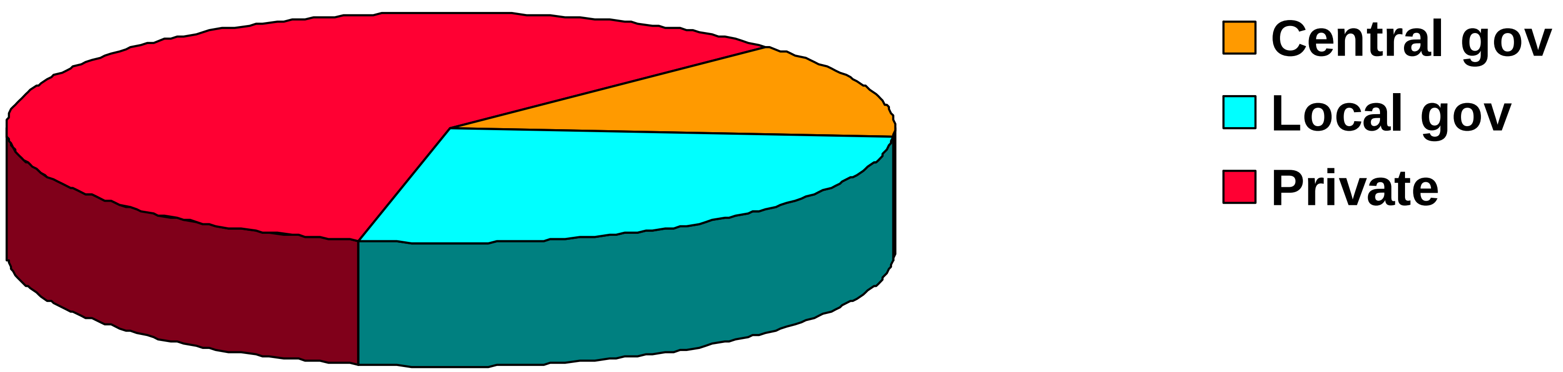
Chinese exploration 1

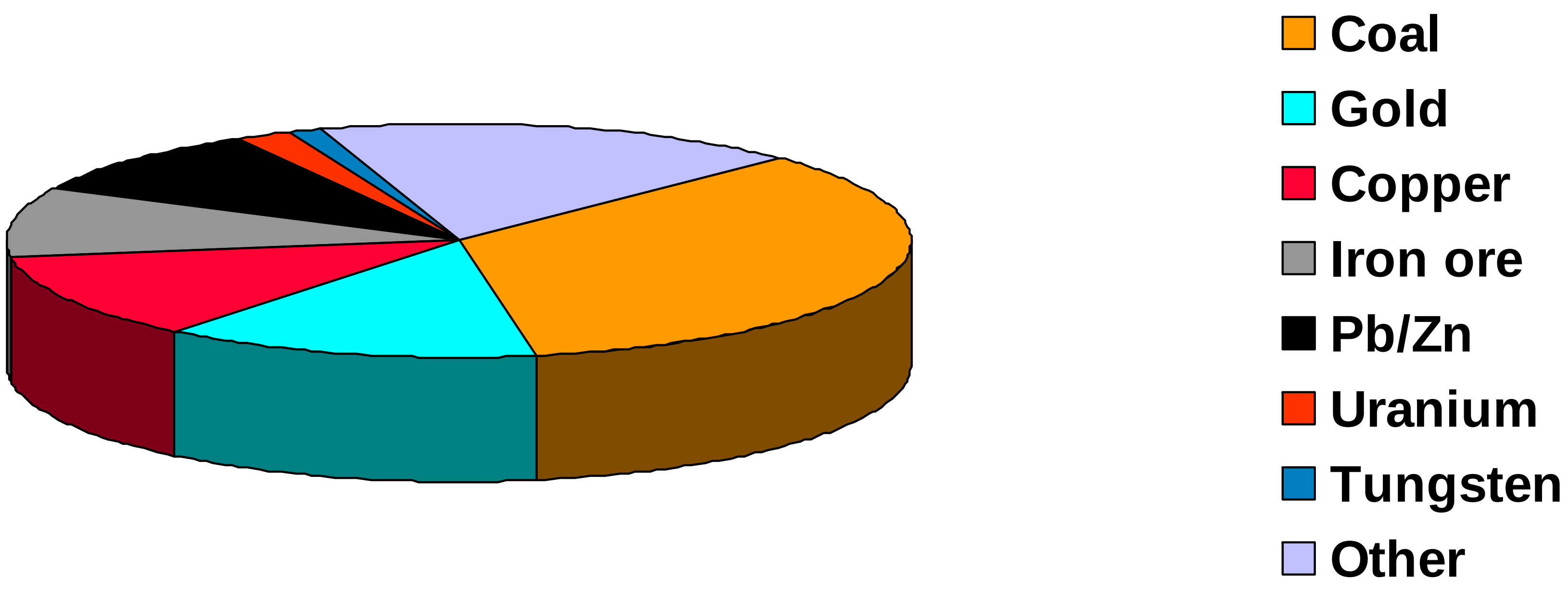
Year 2009 total 30.30 billion RMB



Source: MOLAR 2010.

Chinese exploration 2

Year 2009 total 26.11 billion RMB

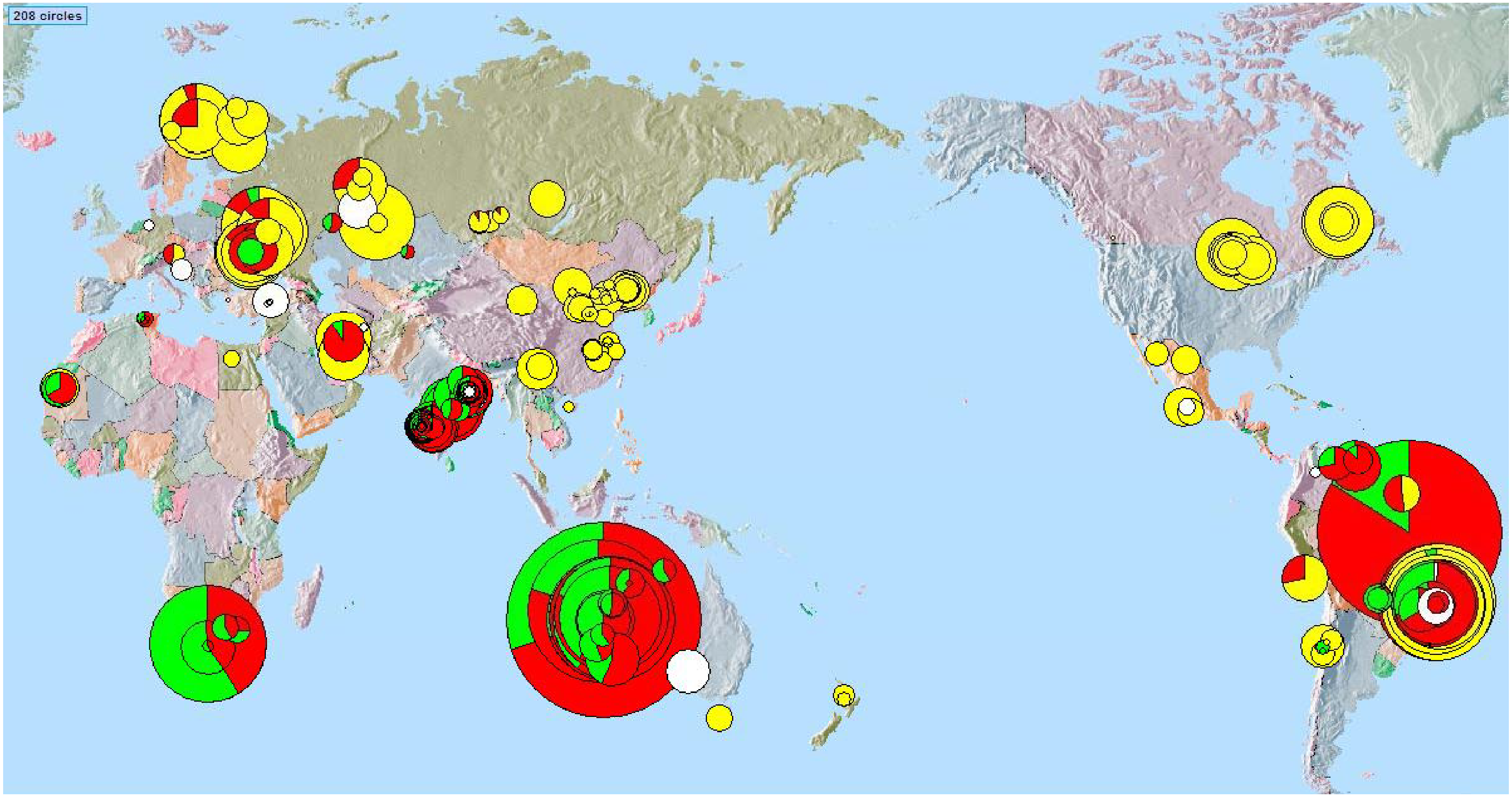


Source: MOLAR 2010.

Chinese exploration

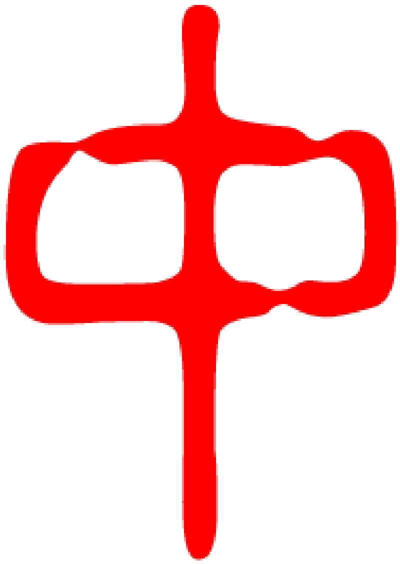
- Major exploration efforts.
- World's largest exploration spender.
- 400 MUSD iron ore 2009.
- No great results.

Global iron ore production



Source: Raw Materials Data Iron ore, 2011.

Chinese structure



- Fragmented structure.
- Many small mines.
- Low grades, under ground.
- Vertical integration.

Iron ore production costs

	Type of mining	Efficient open pit	Difficult open pit	Efficient open pit	Difficult open pit
Costs (USD/t)		**5-12**	**10-20**	**5-12**	**10-20**
	Type of ore	High grade DSO	High grade DSO	Beneficiation necessary	Beneficiation necessary
Costs (USD/t)		**5-12**	**5-12**	**15-20**	**15-20**
Total range FOB (USD/t)		10-24	15-32	30-56 *	60-105 **
Freight to China (USD/t)		20-30	20-30	20-30	20-30
Cost CFR China		**30-55**	**35-65**	**50-85**	**80-135**

Source: Jacques Astier, Mineral Economics 2011, forthcoming.

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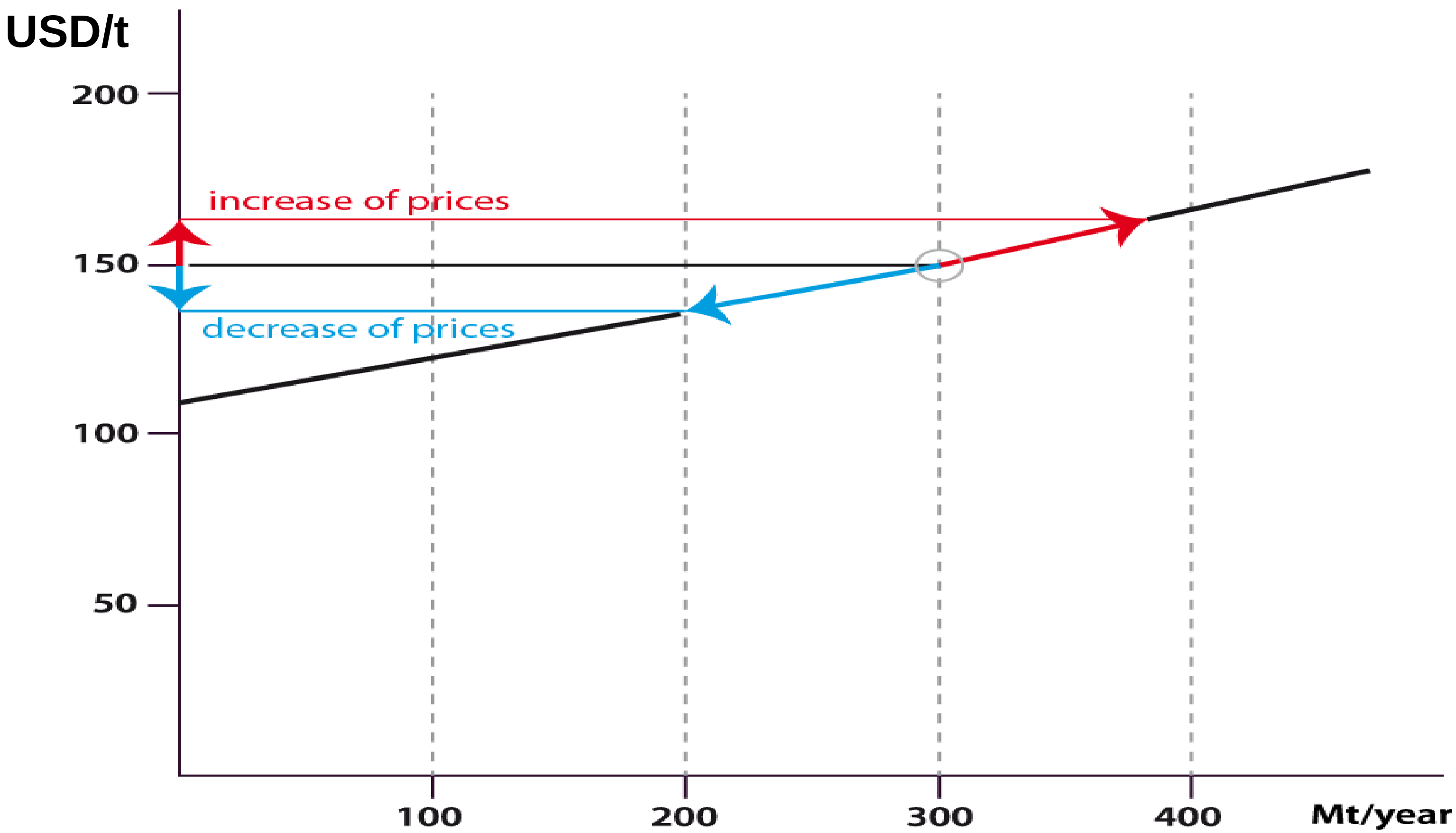
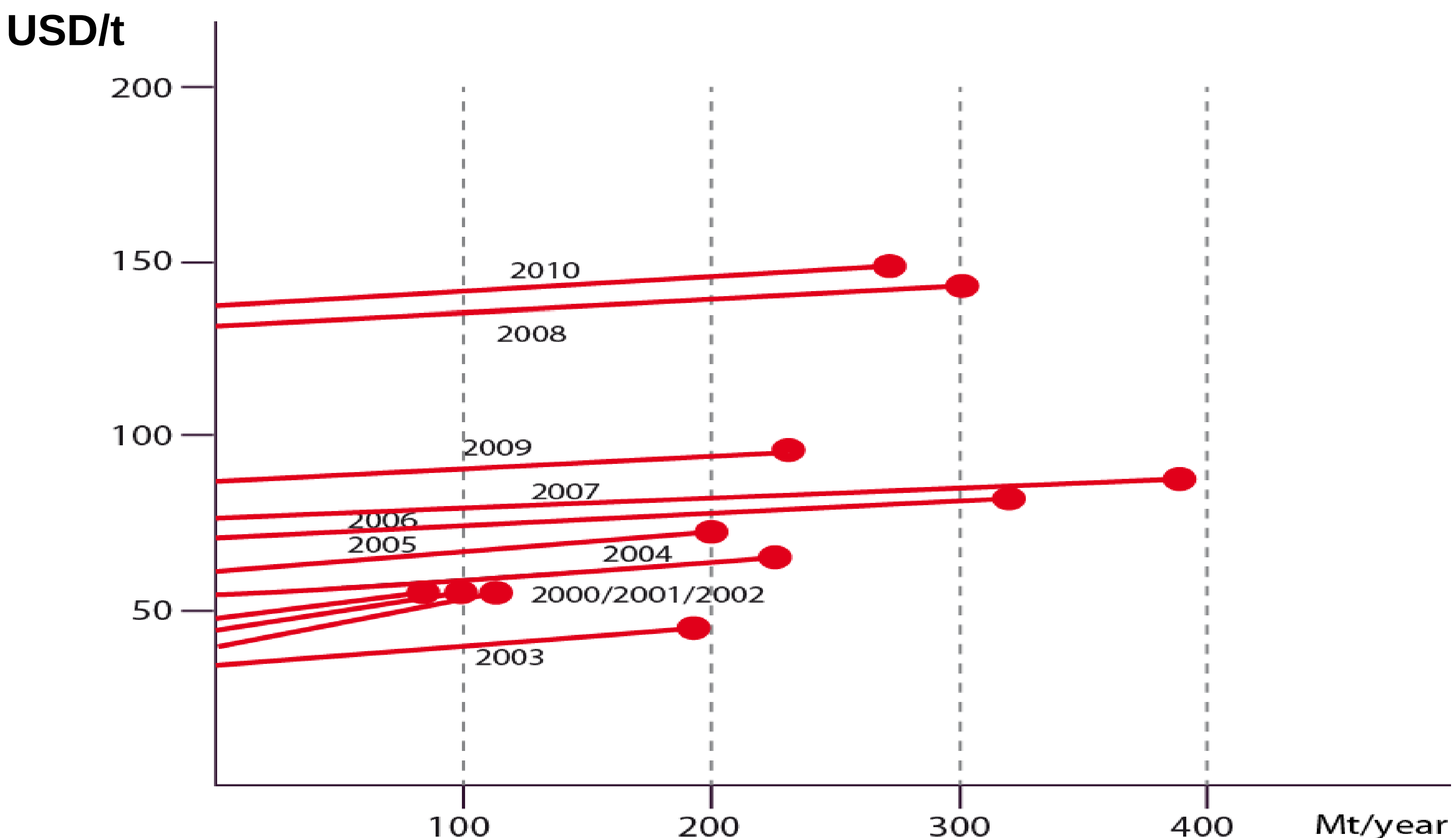
Chinese production volumes

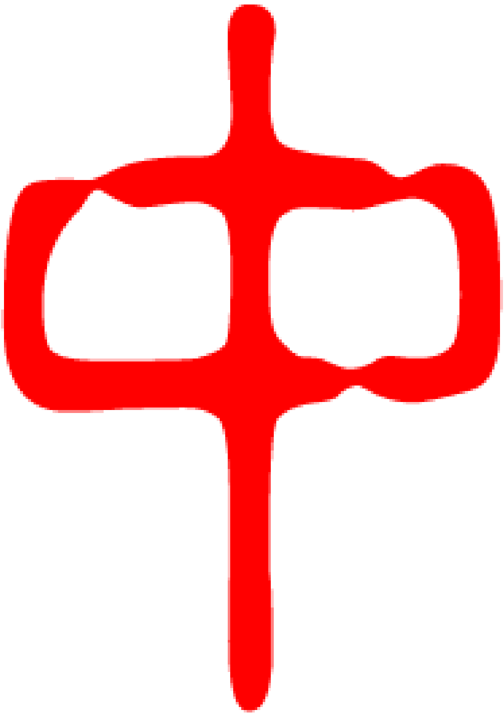


Sources: J. Astier, RMG.

Chinese cost curves



Sources: J. Astier, RMG.



Chinese production costs

- Small mines most < 0.5-1 Mt.
- Max total volume

  300- 400 Mt.
- Marginal cost of production

  >140-150 USD/t
- Deeper underground.

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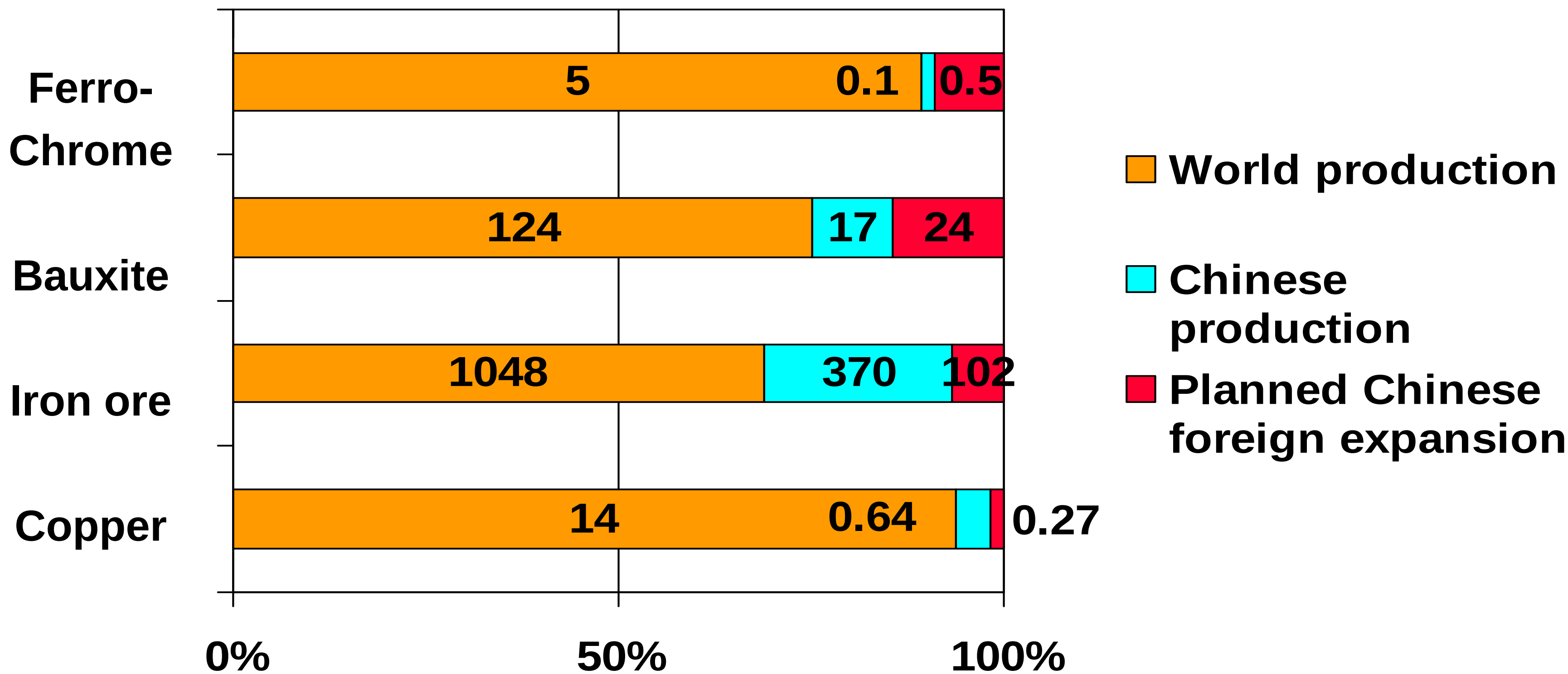
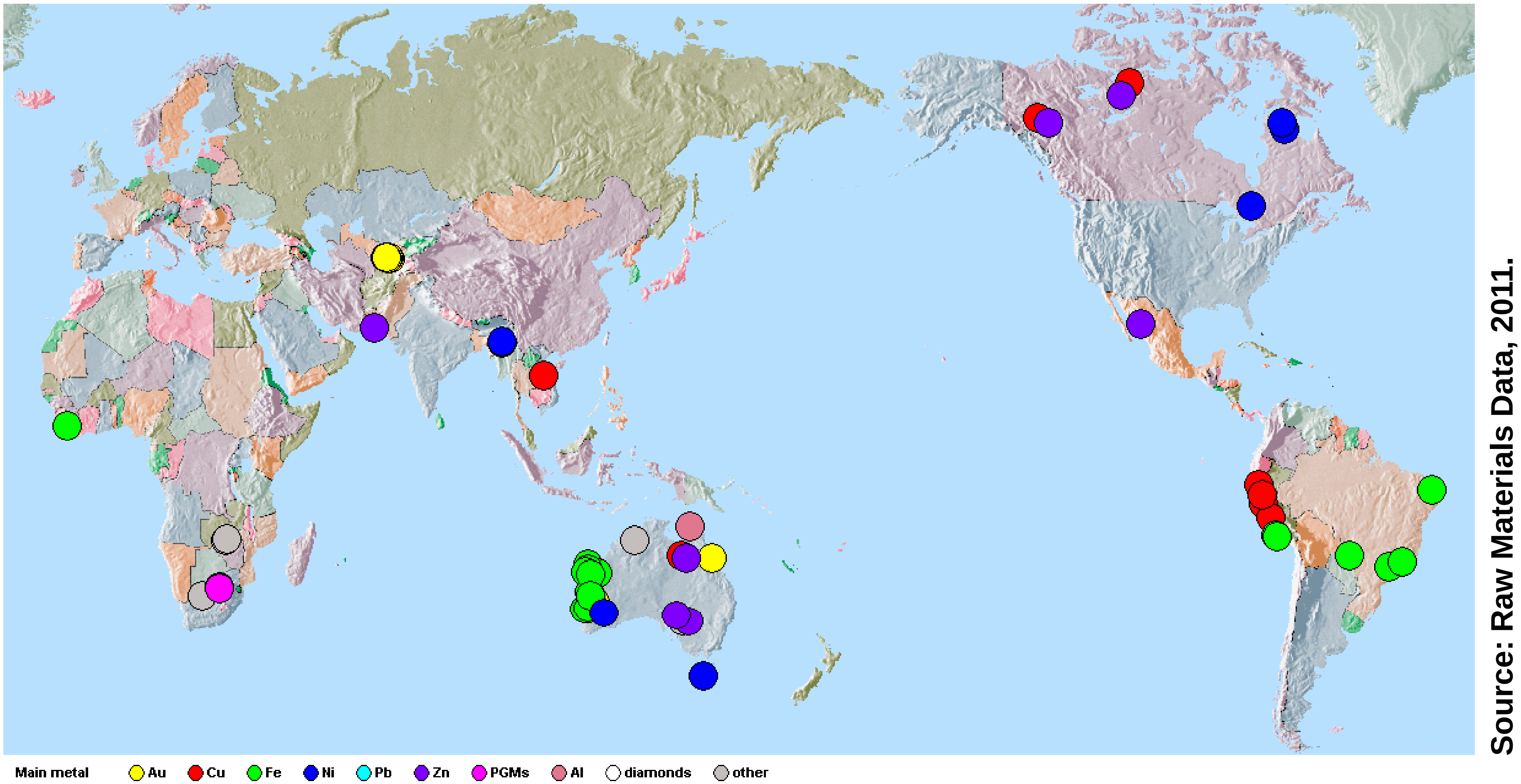
Chinese foreign expansion



Source: BGR 2007.

Chinese foreign projects



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Iron ore projects

• **Operating mines**		
Australia	19.3	
Peru	7.0	
Brazil	1.7	
Canada	0.8	28.8
• **Projects**		
Australia	65	
Peru	10	
Sierra Leone	3	78
Total	~ 110 Mt	

Source: Raw Materials Data, 2011.

Chinese projects in Africa

	Country	Metal	Company	Share %	Type
Awaso	Ghana	Baux	Bosai Min.	80	Oper.
Simandou	Guinea	Fe	Chinalco	45	Project
Forécariah	Guinea	Fe	China Int. F.	50	Project
Bong	Liberia	Fe	China Union	100	Project
Tonkolili	Sierra L.	Fe	Shandong	25	Project
Avantuur	South Afr.	Mn	Baosteel	11	Project
Dilokong	South Afr.	Cr	East Asia Met.	85	Oper.
Weziswe	South Afr.	PGM	JNMC	45	Project
Baluba	Zambia	Cu	CNMC	72	Oper.
Chambishi	Zambia	Cu	CNMC	85	Oper.
Gwabw/Njali	Zambia	U	JNMC	30	Project
Muliashi	Zambia	Cu	CNMC	72	Oper.
Munali	Zambia	Cu	CNMC	50	Oper.
Lalapnazi	Zimbabwe	Cr	Sinosteel	100	Oper.

Source: Raw Materials Data, 2011.

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Chinese FDI

- Foreign expansion slow - not continuous.
- Will increase in the future.
- Long term serious problem for China.
- Focus control over imports .
- Not reach internal goals of control over imports.

China

- Largest miner –

many small, high cost mines.

- Engine of demand – reduced growth pace.

- Largest explorer since 2010. Poor results.
- Foreign expansion slow, not continuous.
- Continued high demand for quality ore.

World market

Selenium drawing: Kaianders Sempler.

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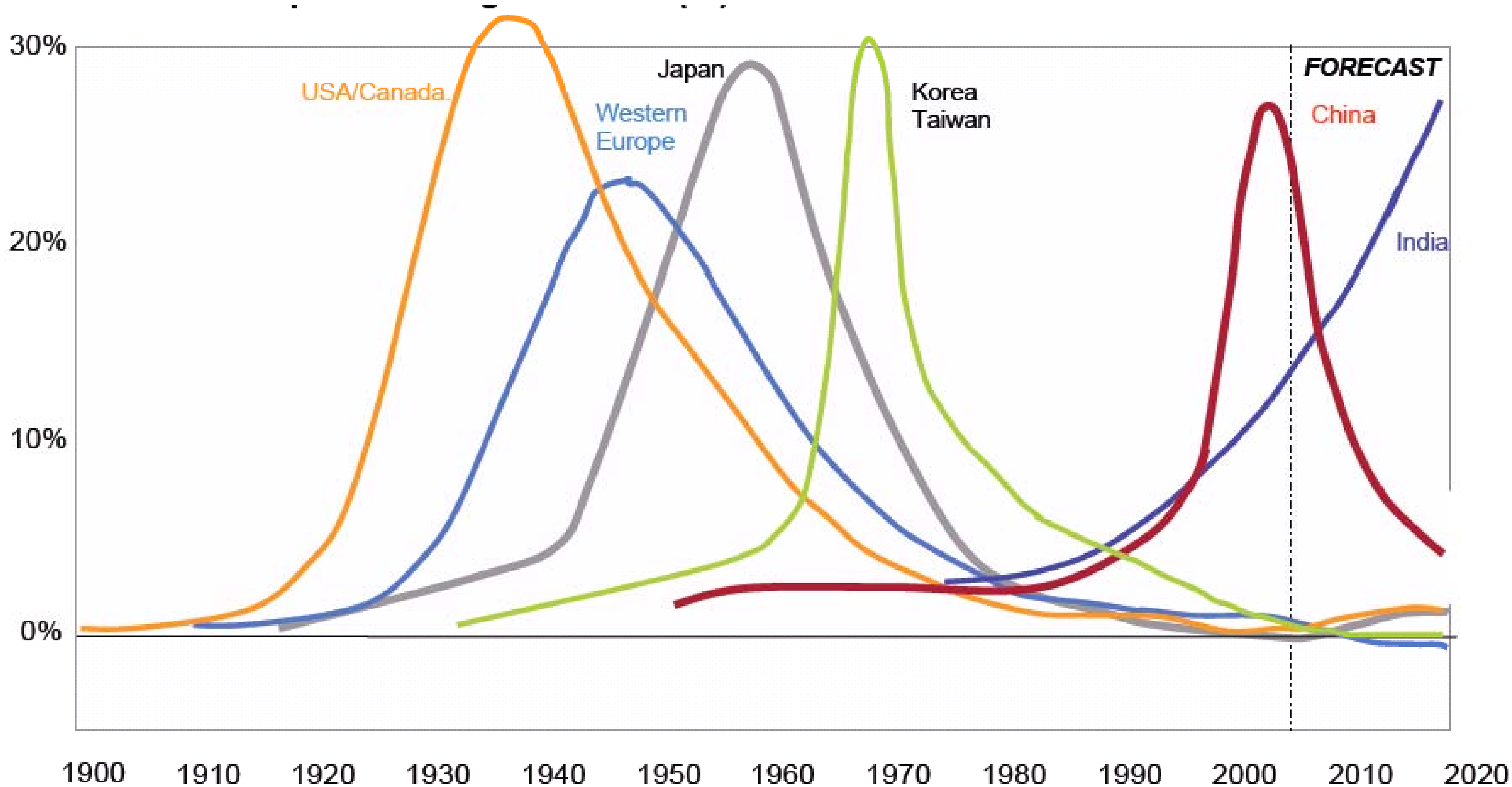
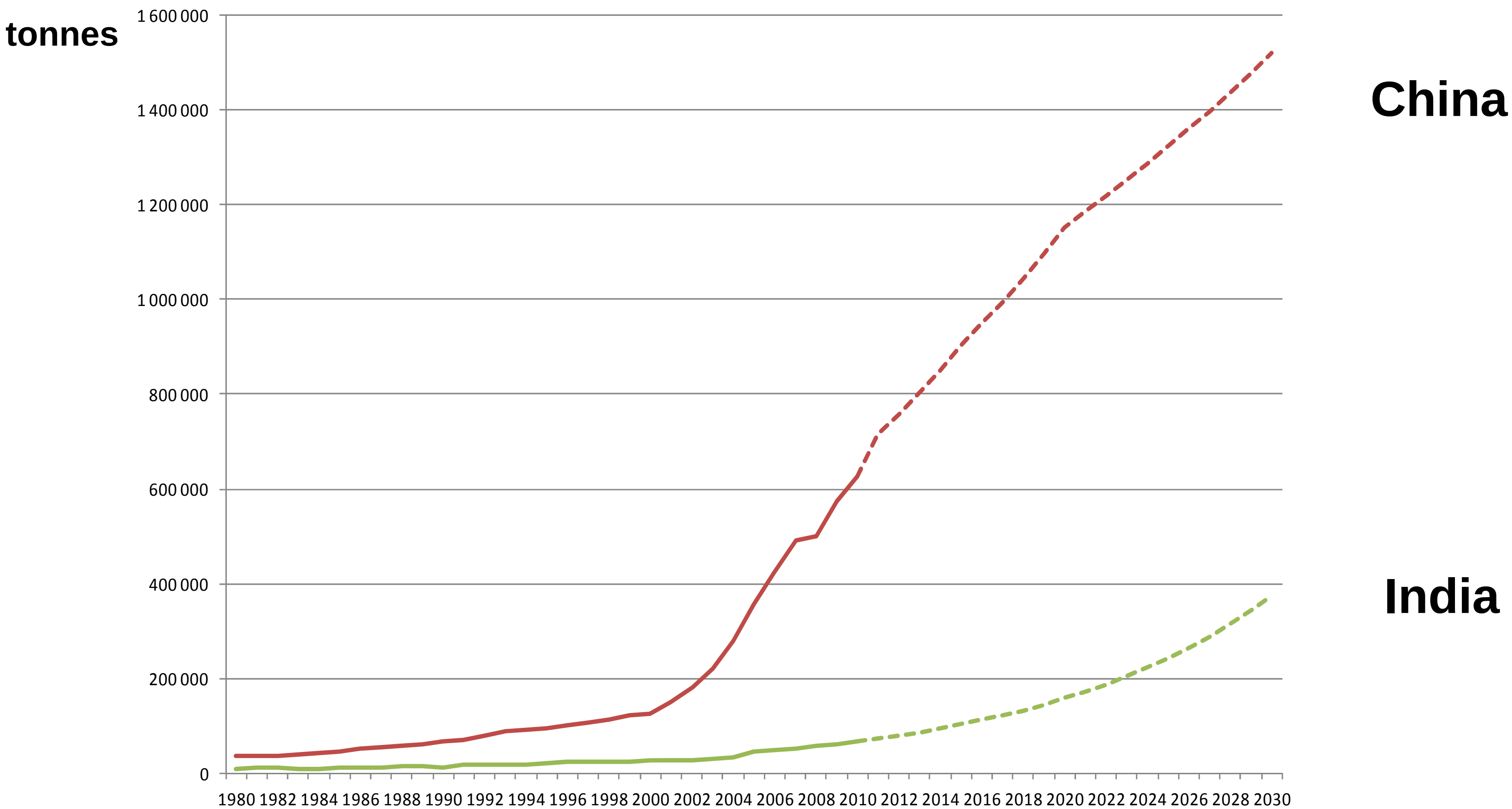
Crude steel growth pattern



Source: IISI, USGS, Laplace Conseil analysis

China and India steelproduction



Source: Raw Materials Data Iron ore, 2011.

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Steel: two key questions

- Where will China end up?
  - S. Korea: 974 kg/cap
  - USA: 203 kg/cap
- How fast will India grow?
  - As China 21 % /year (2000 – 2007)
  - Slower - faster

Restrictions in iron ore trade

- Exercised export duties
  - India: 10 % lump, 20 % fines
  - China: 10 %
  - Viet Nam: 20 %
  - Argentina: 10 %
- Exercised quantitative restrictions:
  - India: state trading enterprises
  - Malaysia: non-automatic export licence

Source: Universität Bonn

Conclusions

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- Demand outlook still strong.
- China, later India will drive demand.
- Supply constraints increasing.
- India reduced exports.
- China overseas expansion.
- Prices will fall but remain on a high level.
- Rare earths not a problem – Chinese import dependency for iron ore and copper is!

REE drawing: Kaianders Sempler.

Thank you !

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