

Trends shaping the future of the steel industry

Implications for manganese

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Hatch Beddows

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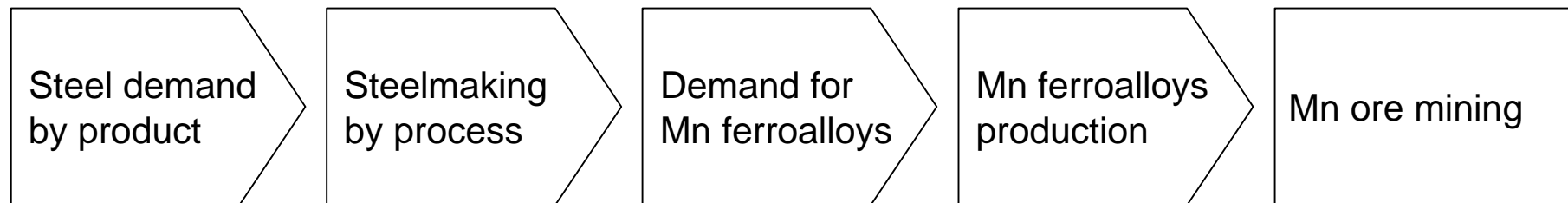
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INTRODUCTION

In order to understand the manganese industry it is essential to understand the steel industry since it is the major consumer of manganese units

“Consumption is the sole end and purpose of all production”

Adam Smith, 1776



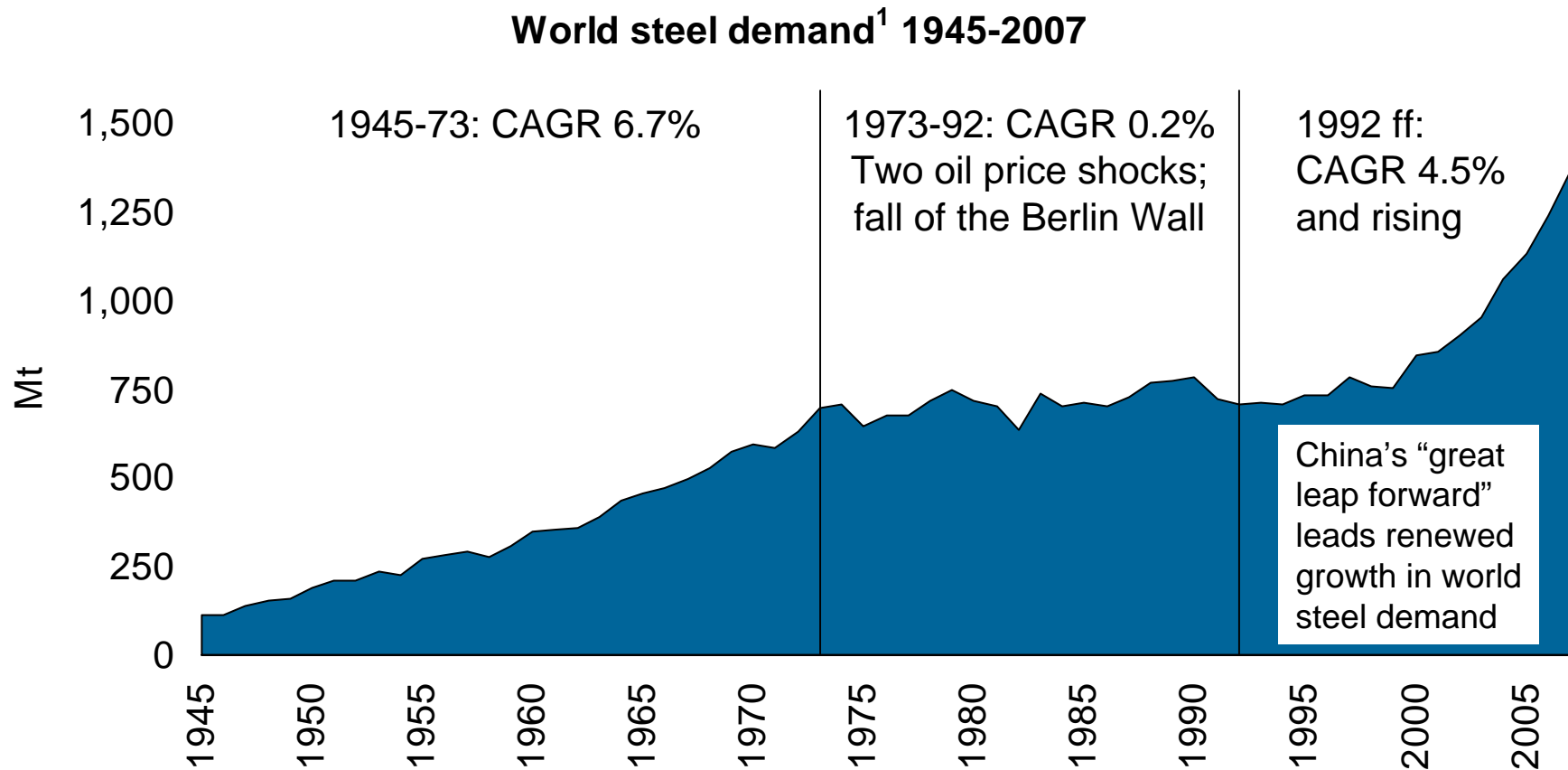
The steel industry consumes over 90% of all manganese units

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SETTING THE SCENE

Focusing on the years since 1945 we find three distinct phases of growth in world steel demand



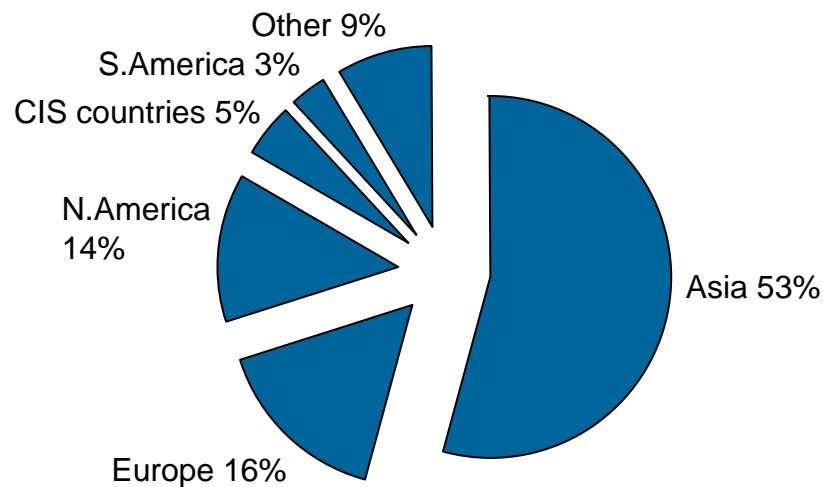
Data: Hatch Beddows, IISI. Note: 1. Measured by crude steel production. CAGR – compound annual growth rate



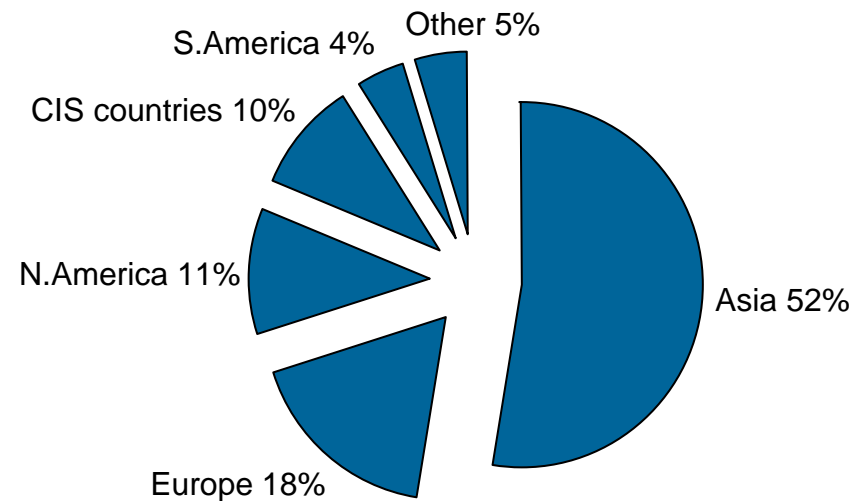
World steel demand and supply by region today

- Asia accounts for over half of world steel consumption, and China alone over one-third
- Asia also dominates world steel production; China is the largest producer country

World steel consumption by region¹



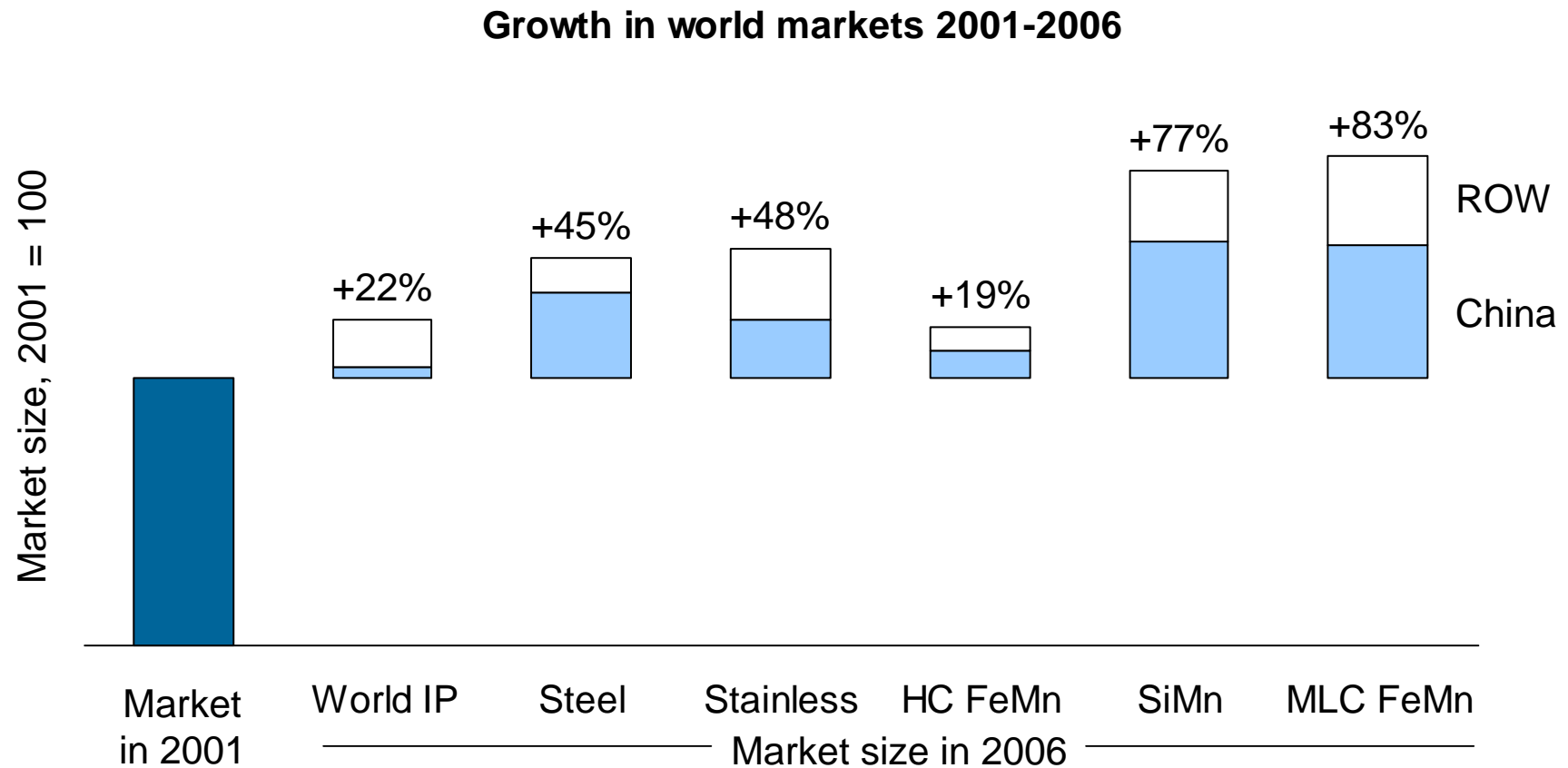
World steel production by region²



Data: Hatch Beddows, IISI, WSD. Note: 1. Finished steel. 2. Crude steel. 2005 data. N.America includes Mexico. Other is Africa, M.East and Turkey

SETTING THE SCENE

World steel output has increased at more than double the rate of industrial production and demand for Mn alloys has risen faster still in recent years



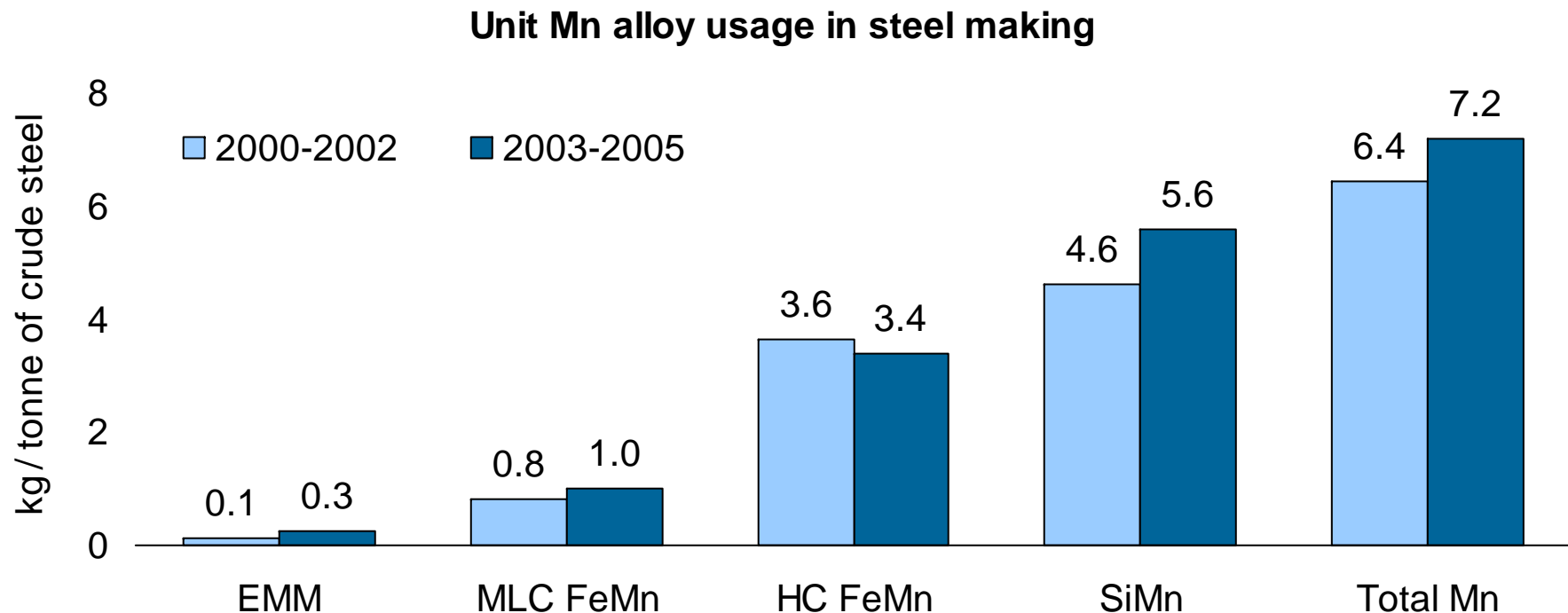
Data: Hatch Beddows, IISI, IMF, IMnI, ISSF. Note: Steel indices based on production. Mn alloys indices based on gross weight consumption



SETTING THE SCENE

Faster growth in demand for Mn alloys is a function of increasing intensity of Mn use in steelmaking

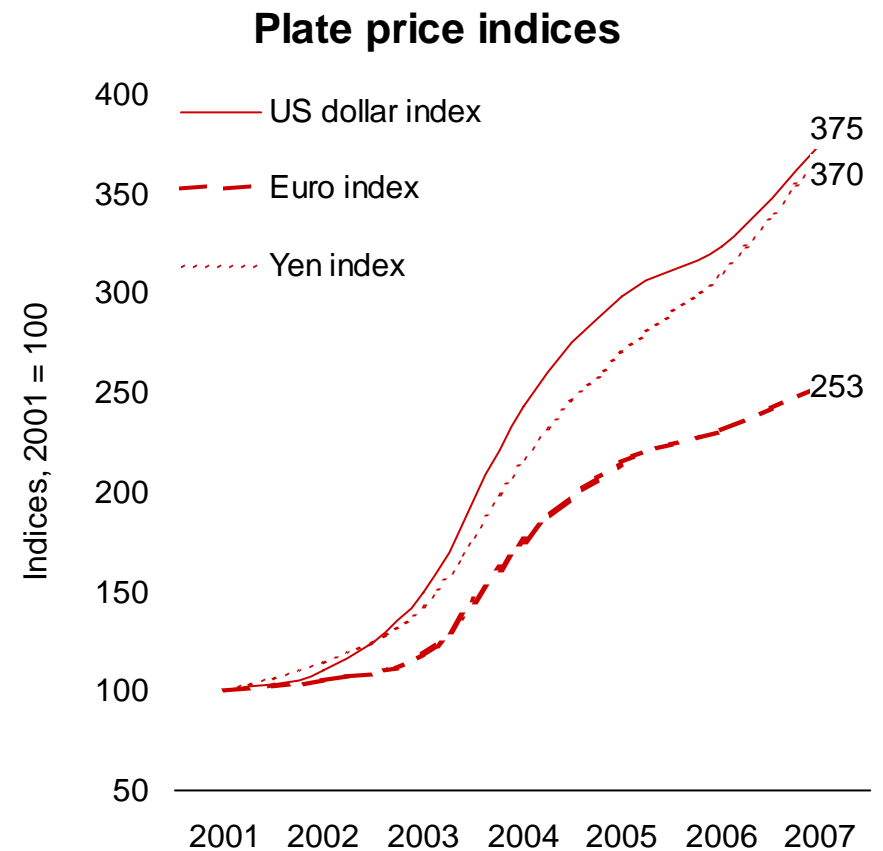
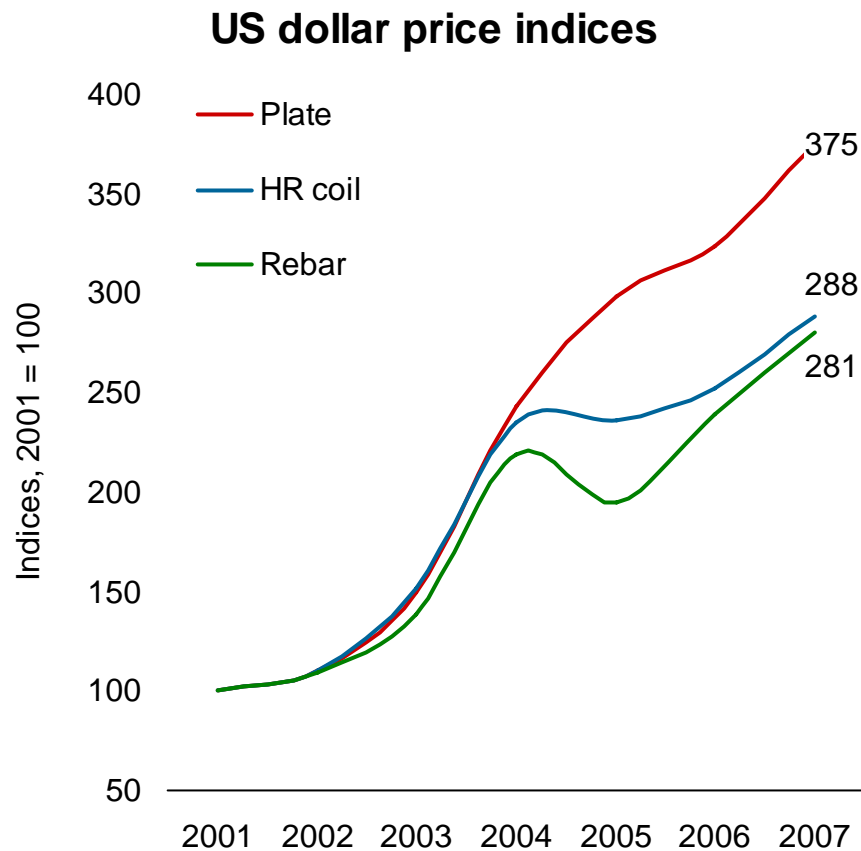
- The volume and type of Mn alloys used in steelmaking will be a function of three factors:
1. Steel product chemistry. 2. Steelmaking process and practice. 3. Mn alloy costs



Data: Hatch Beddows, IISI, IMnI, ISSF. Note: Data are world averages for stated time frames based on apparent consumption. Unit alloys usage is calculated on a gross weight basis. Total Mn is metal contained in alloy and consumed per tonne of crude steel produced, exc. direct-charged Mn ore

SETTING THE SCENE

Responding to strong demand growth, steel prices have risen to historically high levels ... but don't forget the dollar



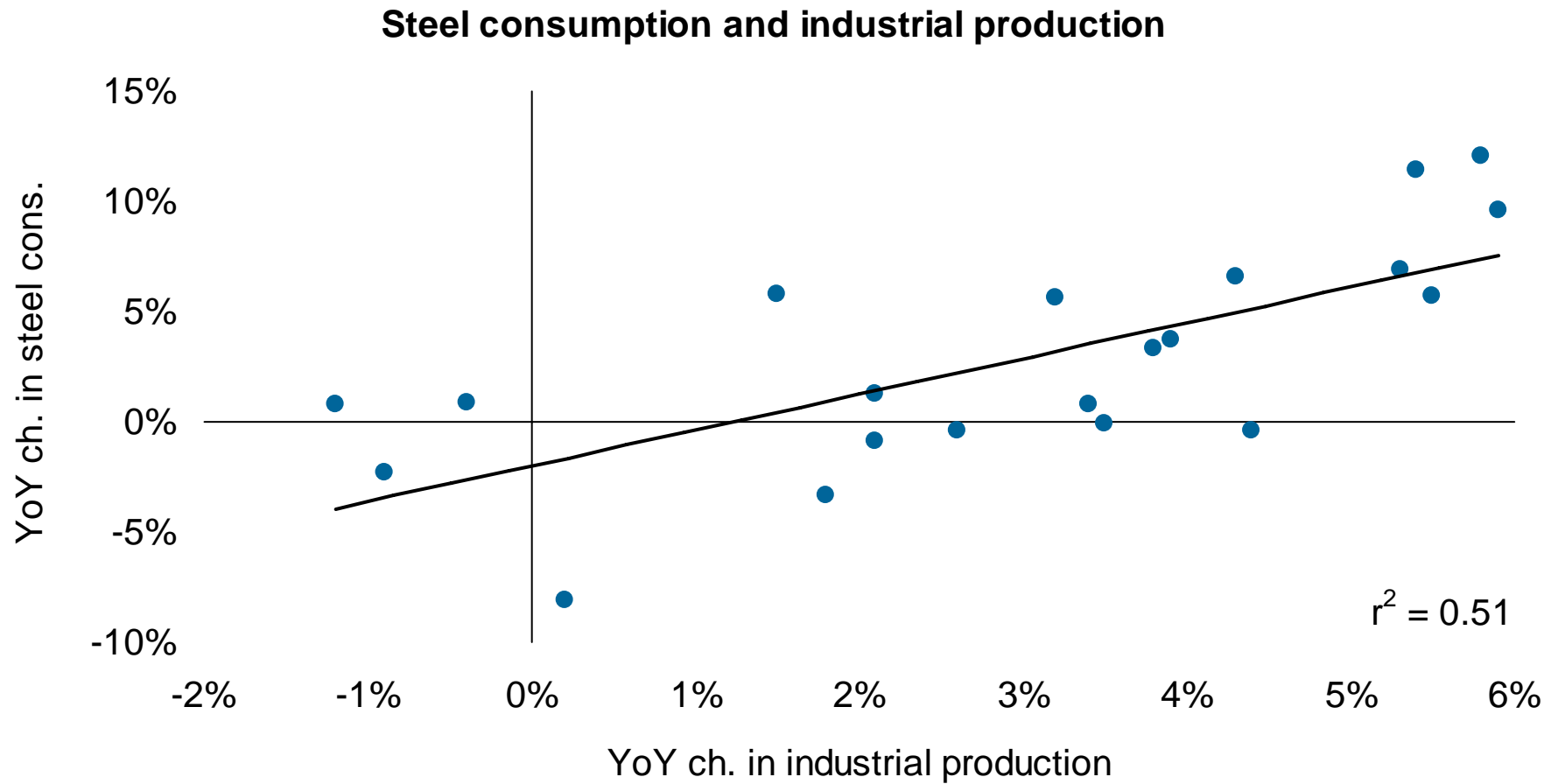
Data: Hatch Beddows, SBB, www.oanda.com. Note: Indices are based on European domestic prices, ex-works for flat products and delivered for rebar



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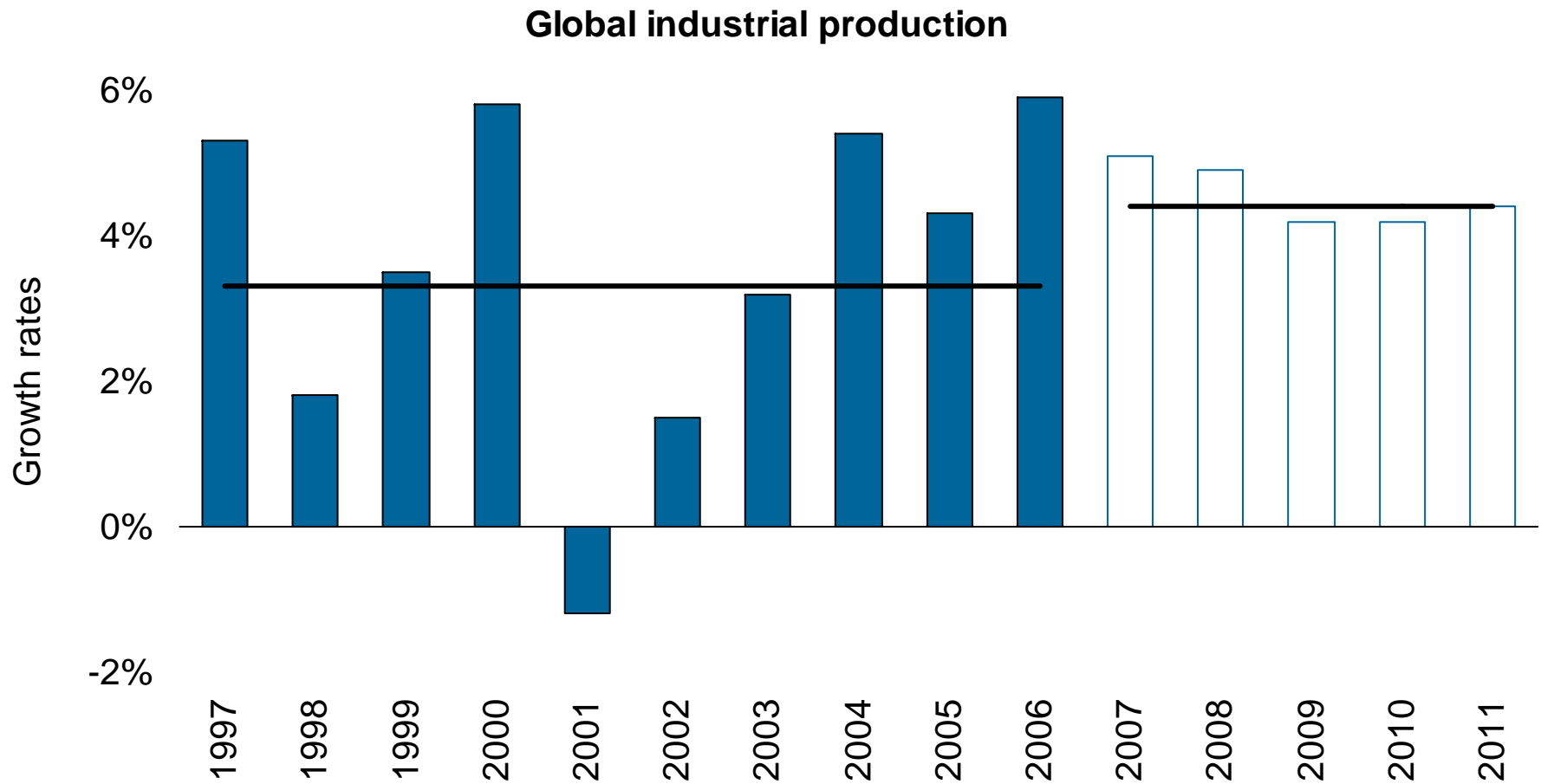
There is a clear correlation between growth in industrial production and steel consumption



Data: Hatch Beddows, IISI, OEF. Note: annual data from 1986-2006

FUTURE OUTLOOK: STEEL DEMAND

The rate of growth in global industrial production over the next five years is forecast to be faster than the average of the last decade

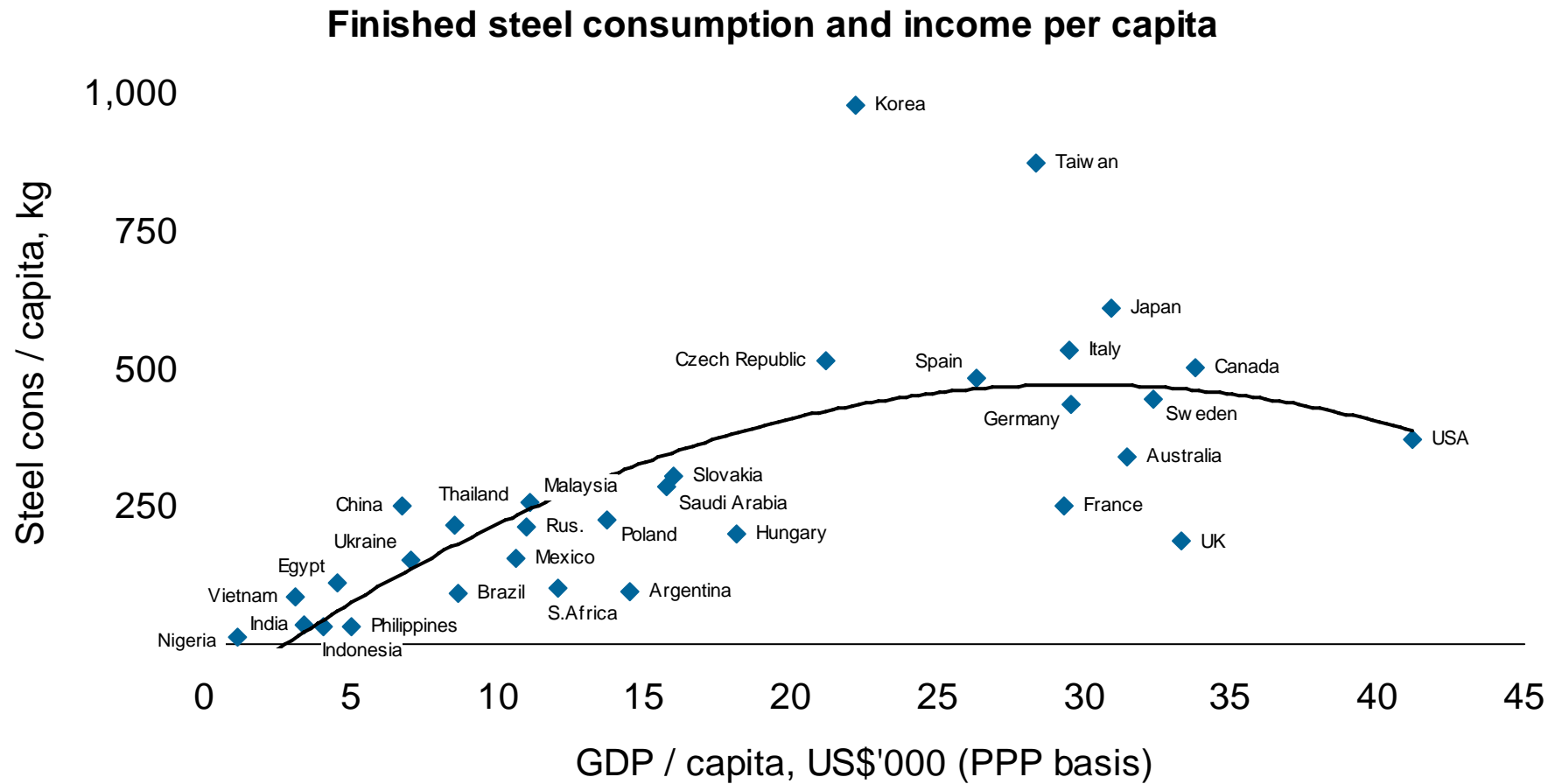


Data: Hatch Beddows, OEF



FUTURE OUTLOOK: STEEL DEMAND

There is a close relationship between average income levels and finished steel consumption per capita...

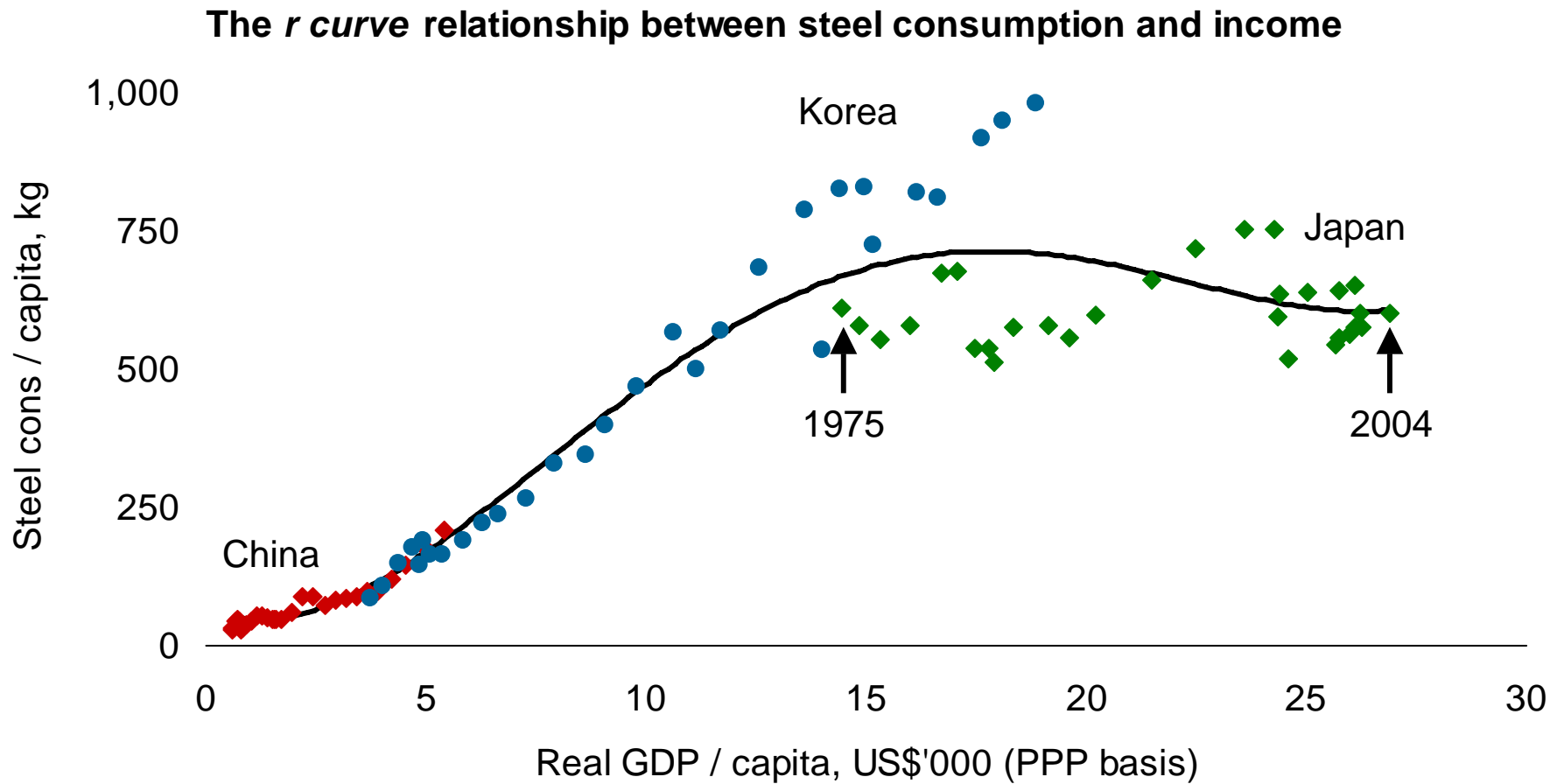


Data: Hatch Beddows, IISI, IMF. Note: 2005 data



FUTURE OUTLOOK: STEEL DEMAND

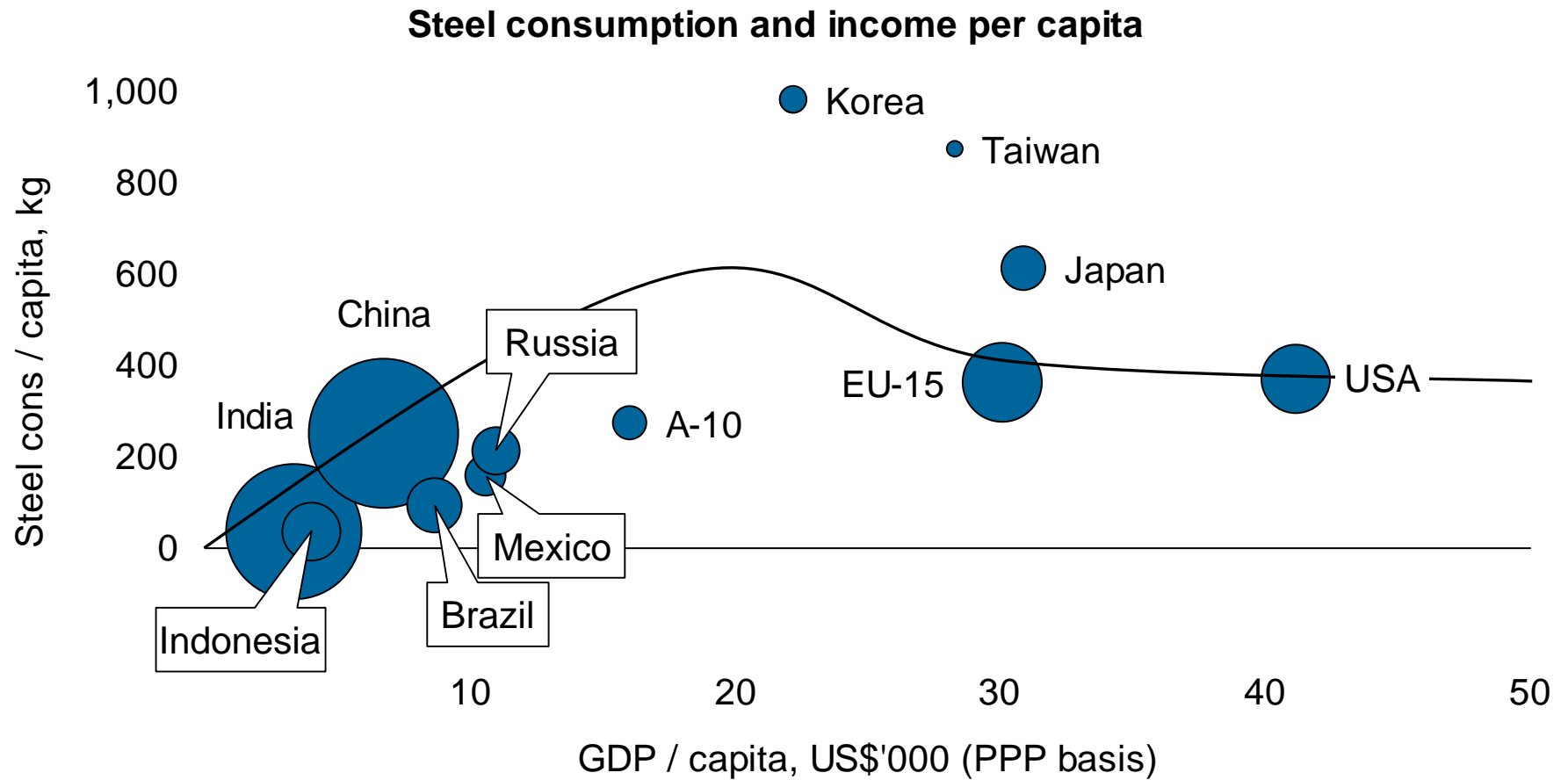
This relationship is sustained over time and as average incomes rise steel consumption per capita tends to increase



Data: Hatch Beddows, IISI, IMF



Adding another dimension underscores potential for growth in steel demand. Half of the world's population lives in high growth, developing countries



Data: Hatch Beddows, IISI, IMF. Note: 2005 data. Size of bubbles is proportional to population in each country or region

FUTURE OUTLOOK: STEEL DEMAND

**The potential for long-term growth in steel demand is substantial.
Maybe ~500Mt of finished steel in the next ten years or so...?**

Long-term outlook on steel demand¹, Mt

Region	2006	LT CAGR ²	~2016	Key differences
North America	143	1.7%	170	
South America	34	3.9%	50	
Europe	173	0.7%	185	
CIS	53	3.5%	75	
China	351	4.3%	535	184
India	44	9.6%	110	66
Japan	109	0.1%	110	
Other Asia	121	7.7%	255	134
Rest of world	107	4.7%	170	
World total	1,135	3.9%	1,660	525

Data: Hatch Beddows, IISI. Note: 1. Finished steel consumption. 2. CAGR – compound annual growth rate. N.America includes Mexico. Rest of world includes Africa, Middle East and Turkey

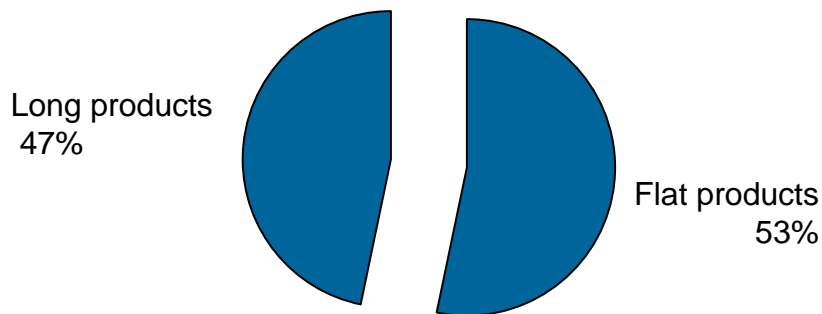


FUTURE OUTLOOK: STEEL DEMAND

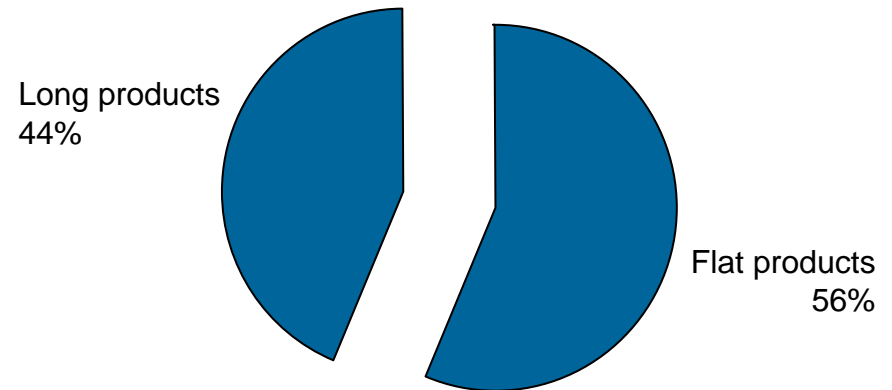
As well as the world steel market growing substantially in size over the next ten years the product mix is expected to change

- Demand for flat products is forecast to grow faster than for long products
- This has important implications for the product form of future Mn alloys demand

World steel demand¹ in 2006



World steel demand¹ ~2016



Data: Hatch Beddows, IISI. Note: 1. Finished steel



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Future patterns of steel production will reflect a number of factors

- Distribution of steel demand
- Costs of iron and steelmaking
- Supplies of raw materials and energy
- De-integration of steelmaking and rolling
- Consolidation of ownership and control
- Backward integration by steelmakers into raw materials
- Impact of environmental controls and government industrial policies
- Introduction of new technology in iron and steelmaking, casting and rolling

Where steel is wanted is *not* necessarily where it will be made

Costs of steelmaking vary widely by region with important implications for decisions on the location of new production and capacity

Cross-matrix comparison of indicative regional slab production costs¹

	Brazil	Russia	India	US EAF	China	Japan	E.Eur	W.Eur	US BOF
Brazil	-	-15	-25	-55	-70	-85	-90	-95	-105
Russia	15	-	-10	-45	-60	-70	-75	-85	-95
India	25	10	-	-30	-45	-60	-65	-70	-80
US EAF	55	45	30	-	-15	-25	-35	-40	-50
China	70	60	45	15	-	-15	-20	-25	-35
Japan	85	70	60	25	15	-	-5	-15	-20
E.Eur	90	75	65	35	20	5	-	-5	-15
W.Eur	95	85	70	40	25	15	5	-	-10
US BOF	105	95	80	50	35	20	15	10	-

Data: Hatch Beddows, WSD. Note: 1. 2005 data. Calculations are based on regional average costs. Table reads left to right and a negative number signals a comparative cost saving and competitive advantage

Trade in semi-finished steel is rising both in volume terms and as a proportion of total steel production



Data: Hatch Beddows, IISI, ISSB

Key factors of production in high-growth steel markets and low-cost steelmaking locations tend to favour the BF / BOF process route

EAF steelmaking

- EAF steelmaking has certain advantages over BF / BOF steelmaking; notably, lower capital cost. Also, advances in electric steelmaking practice have improved product quality and so market access
- However, scrap supply is expected to remain structurally tight for the next 10-20 years, until China starts to recycle significant volumes of obsolete scrap from its recently increased levels of steel consumption, while DRI / HBI plants remain limited in scale and there are certain raw materials constraints

Brazil

- Huge, low cost, high grade iron ore reserves
- No met. coal nor local scrap
- Advantage BF / BOF steel

Russia

- Huge iron ore and met. coal reserves
- Low cost energy and local scrap, but scrap fund falling
- Advantage tilting toward BF / BOF steel

China

- Low grade iron ore reserves
- Large met. coal reserves
- No local scrap, limited energy
- Advantage BF / BOF steel

India

- Huge high grade iron ore reserves
- Limited met. coal
- Some sponge iron but no local scrap
- Advantage BF / BOF

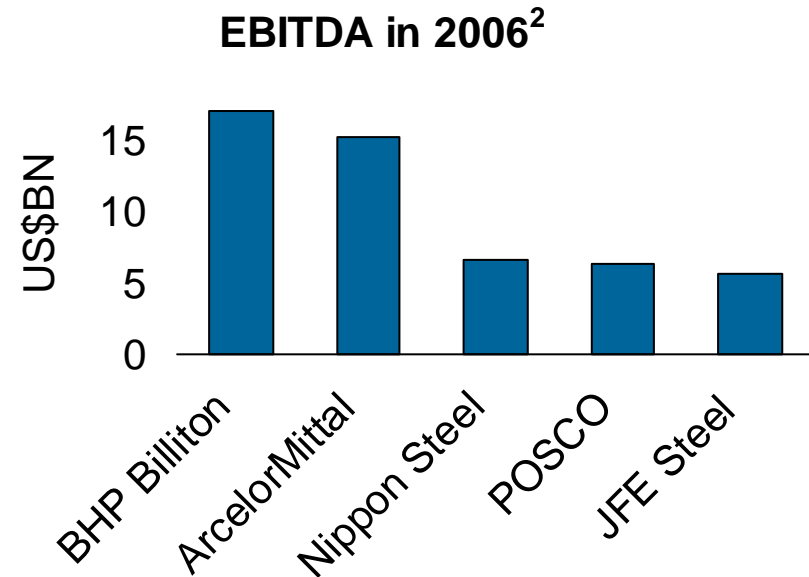
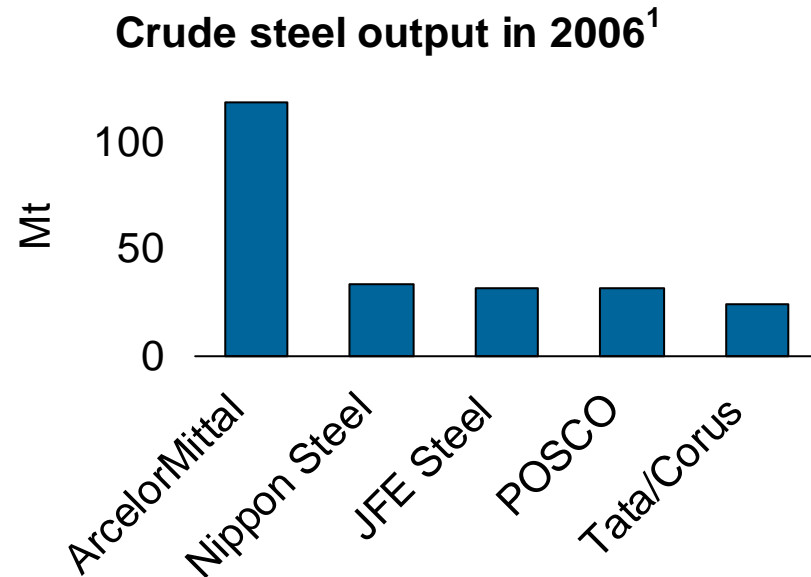
SE Asia

- Limited iron ore
- Some met. coal reserves
- No local scrap and little DRI
- Factors balanced

Data: Hatch Beddows

The Arcelor-Mittal merger creates a steel company on an entirely new scale...

- In 2006, ~120Mt crude steel produced, almost four times that of its nearest rival
- 2006 EBITDA ~US\$15BN, which rivals the earnings of the biggest mining company and is greater than the total revenues of many other steelmakers



Data: Hatch Beddows, ArcelorMittal, Factiva, IISI. Note: 1. Although Tata only acquired Corus in March 2007, the chart shows their combined output to illustrate the impact of the acquisition. 2. FYs ending Jun. 2006 BHPB, Dec. 2006 ArcelorMittal and POSCO, and Mar. 2007 Nippon Steel and JFE Steel

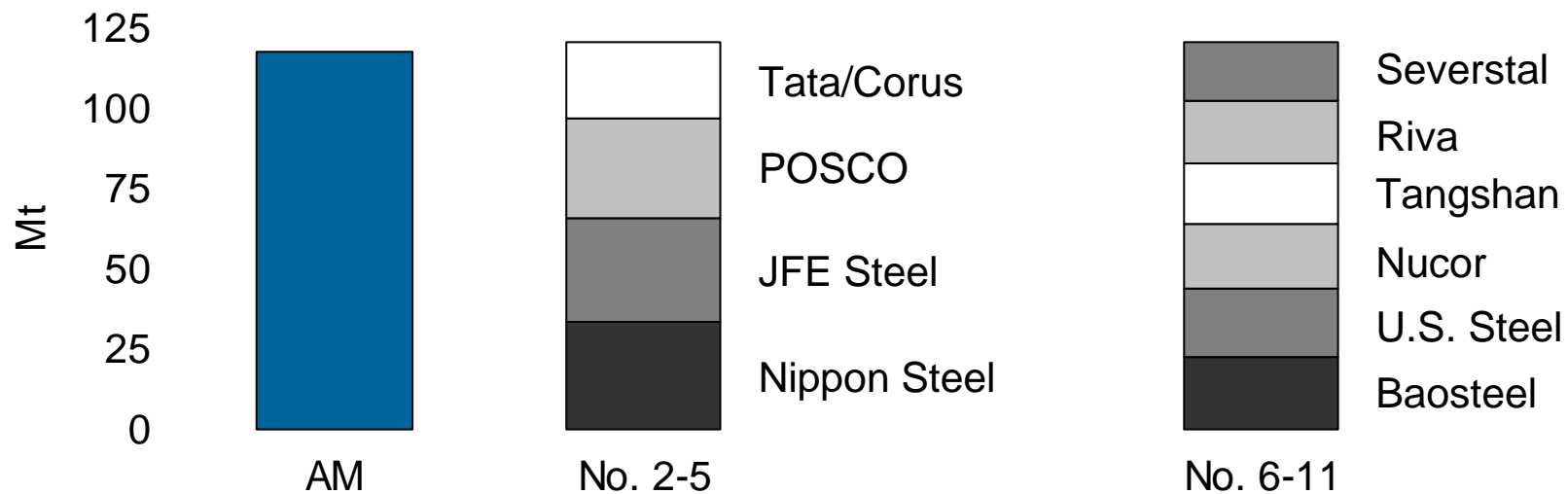
With significant strategic consequences for the ongoing consolidation of the steel industry

- ArcelorMittal is close to 50% self-sufficient in iron ore and 20% in coking coal and continues to seek opportunities to increase its coverage
- Steelmakers self-sufficient in iron ore and partially in coking coal command a clear advantage over their competitors and are likely to become increasingly dominant
 - Steelmakers in Russia, most in India, some in Brazil and Ukraine, and maybe ArcelorMittal
- Probable strategic responses to this challenge
 - BOF steel producers backward integrate into iron ore and coking coal
 - Non-integrated BOF producers push for price reductions from suppliers
 - Steelmakers seek new commercial relationships with suppliers
 - Consolidation continues

ArcelorMittal has opened the final chapter in the consolidation story as the steel industry goes global

- Regional consolidation is reaching its limits in many product markets in Europe and USA
- If consolidation is to continue it must involve leading companies integrating internationally
- Strong companies will attract capital to become stronger; weaker ones will be acquired

World's leading steel producers¹ 2006



Data: Hatch Beddows, IISI. Note: 1. Crude steel production. AM is ArcelorMittal

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CONCLUSIONS: FOR STEELMAKERS

If recent years have been good for growth in steel demand the future may be even better, which will present new challenges – but there are risks

- Steel demand is running at record levels; nominal prices are at or near historic highs
- Consensus forecasts are for faster growth in industrial production over the next five years
- A powerful development-driven demand dynamic in populous industrialising / urbanising countries underscores potential for further substantial long-term growth in steel demand
- As well as growing, steel markets will see continuing change in product mix over time
- Steelmakers face a supply-side challenge to invest in new production and capacity to meet demand growth but need to see the potential for positive returns
- In the past, the principal challenge to steelmakers was in selling production profitably. In future, the principal challenge may be in sourcing raw materials competitively
- Consolidation and backward integration, possibly extending to ferroalloys, will continue
- However, risks of an economic shock(s) remain, which would undermine steel demand

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CONCLUSIONS: FOR MANGANESE SUPPLIERS

The overall outlook for manganese demand is good but beware the detail. Appropriate responses require a clear understanding of the customer

- Mn is essential in steelmaking and demand has been rising even faster than steel production in recent years. Prospects for strong growth in steel demand point to the potential for further strong growth in Mn alloys demand
- Future Mn demand will, of course, be a function of total steel production. It will also be affected by other factors, with impacts which will change over time
 - Product mix and steel chemistries
 - Steelmaking process and practice
 - Cost of alternative alloying additions
- Future patterns of Mn demand growth will reflect location decisions for increased steel production and capacity – Asia-Pacific basin expanding share, Atlantic basin contracting
 - De-integration means where steel is wanted is *not* necessarily where it will be made

The steel industry consumes over 90% of all manganese units

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Our organisation

- Hatch supplies business, process and technology consulting, design and engineering and construction, operations and project management to the mining and metals, energy and infrastructure industries worldwide
- Established 1955 and employee owned
- 7200 highly skilled people serving clients worldwide
- US\$16BN of projects now under management in 60 countries

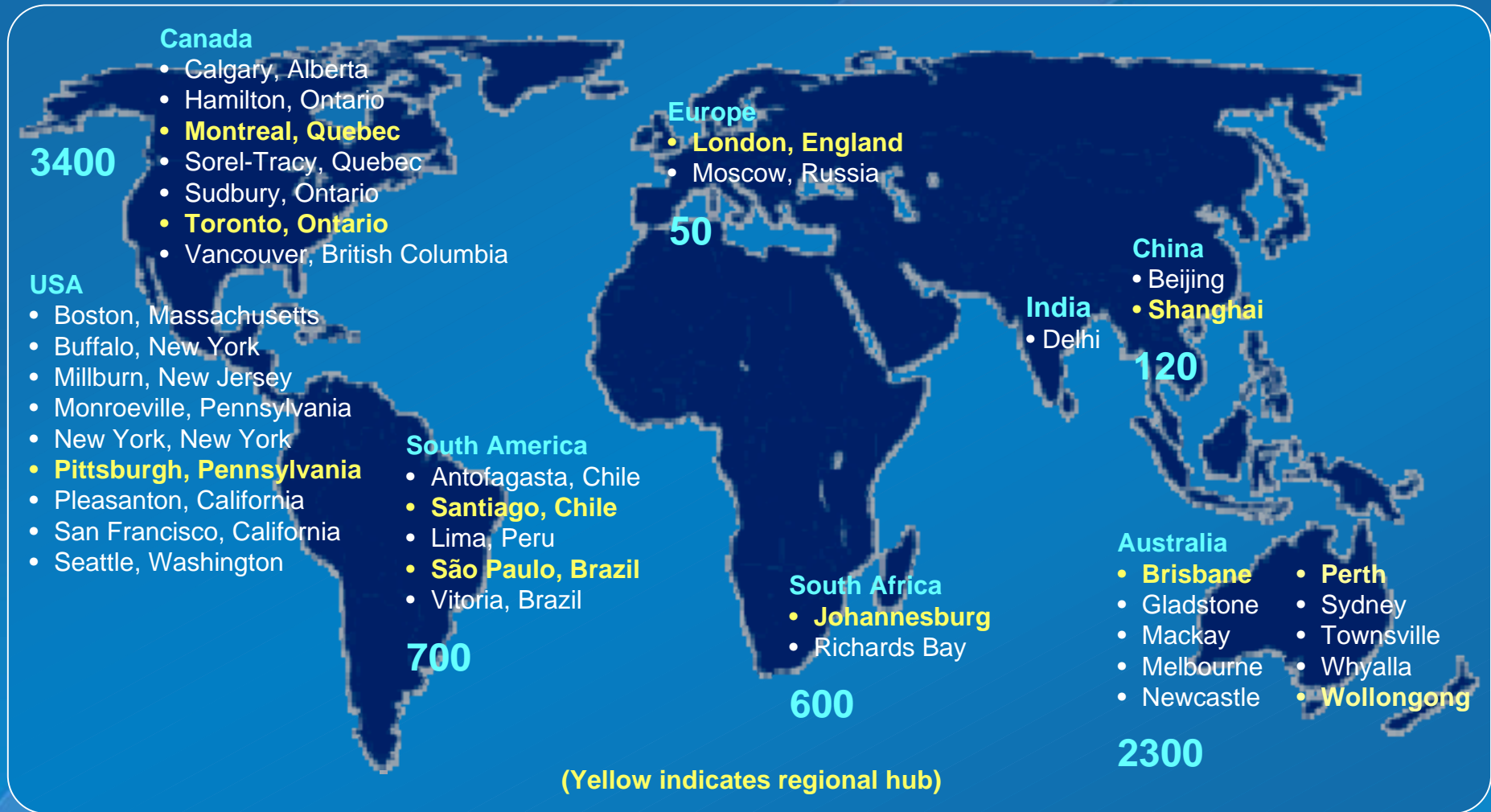
Our values

- Safety
- Quality
- Innovation
- Sustainable development
- Effective risk management

We deliver unprecedented and sustained results for our clients

Global reach and resources

7200 people – June 2007

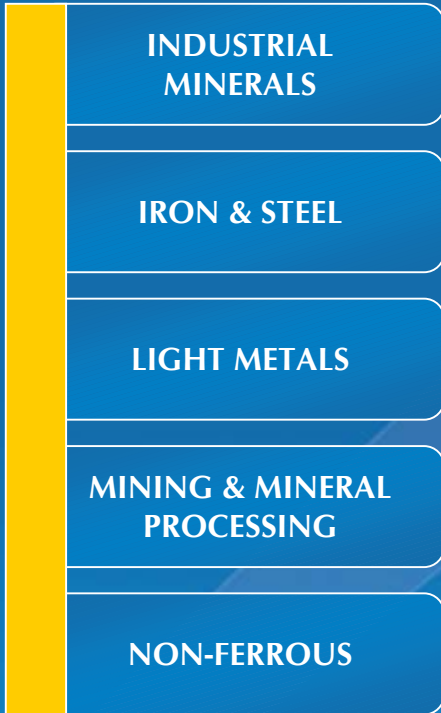


(Yellow indicates regional hub)

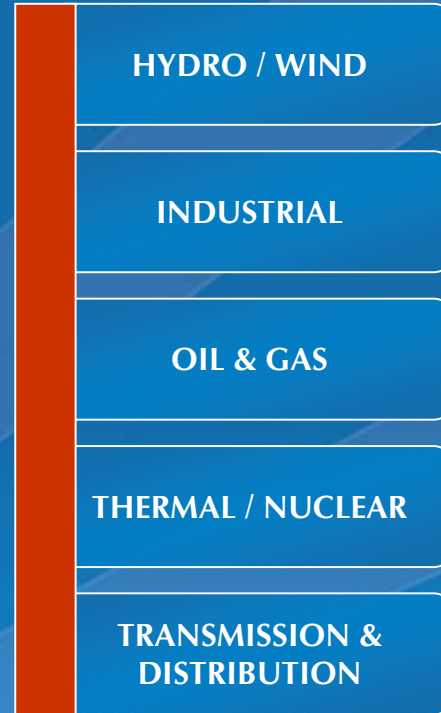


HATCH
Hatch business units

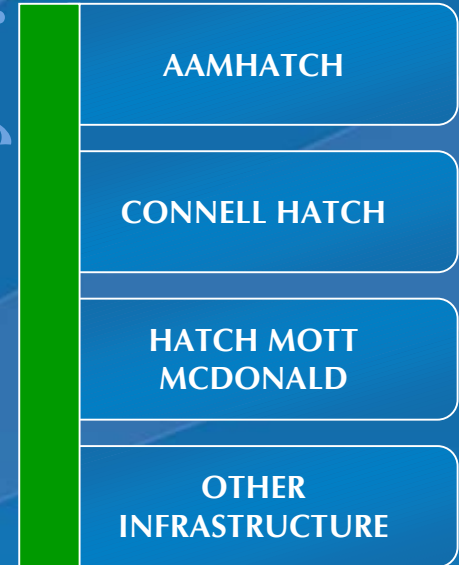
metals



energy



infrastructure



Hatch Consulting is the leading management consultancy dedicated to the mining and metals industries

- **Hatch Consulting** is the world's leading management consultancy specialising in the mining and metals industries and provides high level support services, ranging from corporate and business strategy development through strategic market studies to implementation of new technologies, management and operating practices
- Hatch Consulting is organised into specialised practices by industry and service, combining to provide precise solutions, expertly delivered to the exact needs of each individual client
- **Hatch Beddows** is the strategy and market development practice, specialising in steel and ferroalloys industries, and providing strategy development and implementation services
- **Investment and Business Planning** (IBP) provides economic, environmental and technical evaluations of minerals properties and processing facilities, due diligence, pre-feasibility and feasibility studies and related investment planning and appraisal services
- **Hatch Corporate Finance** (HCF), a FSA-regulated joint venture company, provides corporate finance advisory and transaction execution services

Hatch counts many of the world's major manganese, mining and steel companies among its core client base

Alcan	ENRC	Nucor
Alcoa	Evraz Group	QIT
Algoma Steel	Gerdau Group	POSCO
Anglo American	Glencore	Privat Group
ArcelorMittal	Impala Platinum	Rio Tinto
Assmang	Lonmin	Severstal
BHP Billiton	Mechel	Shougang
BlueScope Steel	Metalloinvest	Tata Group (Corus)
Celsa	Minera Autlan	ThyssenKrupp Stahl
Century Aluminium	MMK	TMK
Commercial Metals	Newmont Mining	United Company RUSAL
CVRD (Inco)	Noranda	U.S. Steel
De Beers	Norsk Hydro	Xstrata (Falconbridge)



TRENDS SHAPING THE FUTURE OUTLOOK OF THE STEEL INDUSTRY
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