

Report to the USW

Aluminum Industry Dynamics

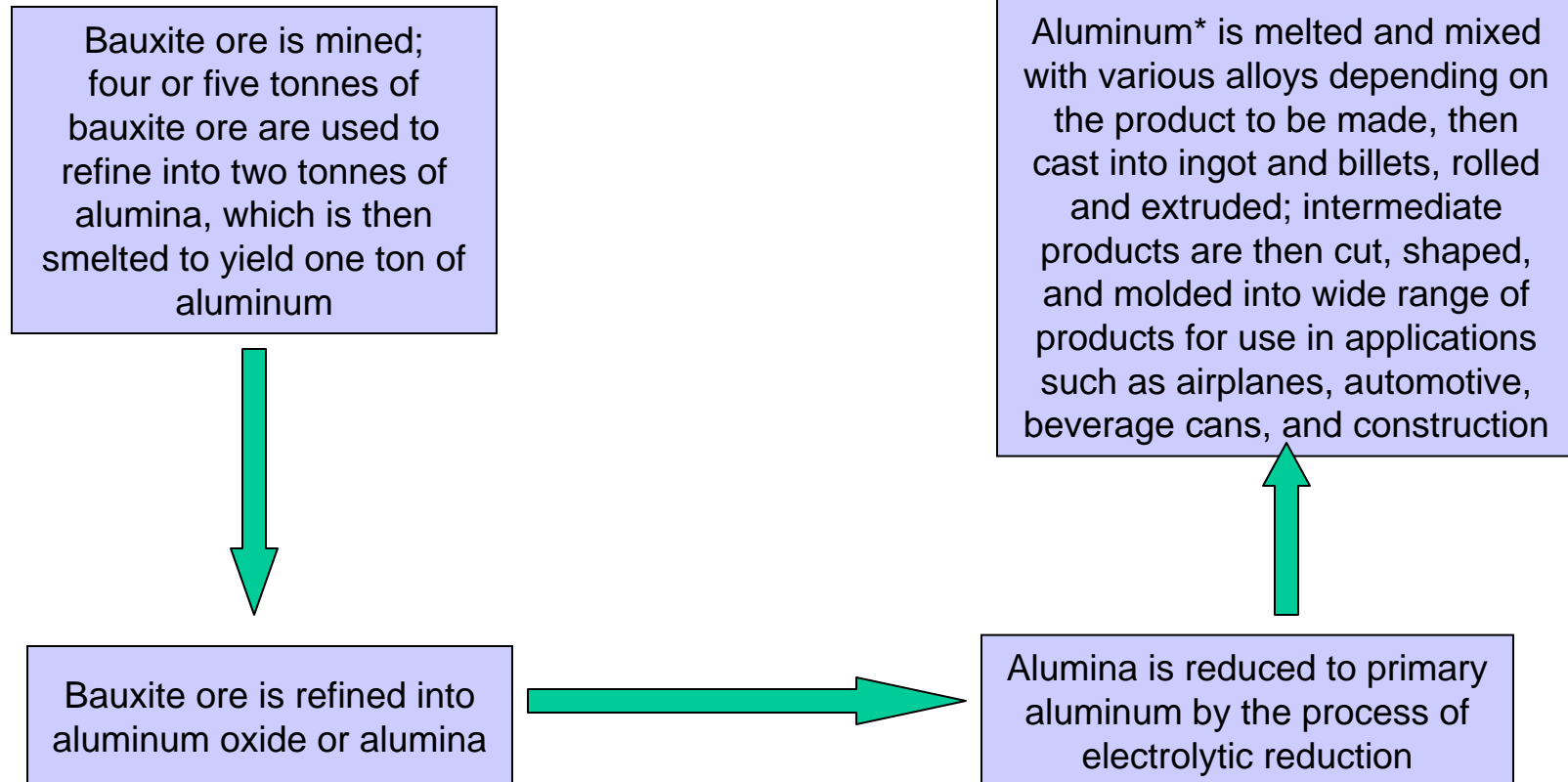
Global Update

October 2005

Table of Contents

<u>Slide #</u>	<u>Section</u>
3	Production Cycle
4 - 6	End Products
7 - 14	Consumption
15 - 19	Alumina/Bauxite
20 - 25	Aluminum Capacity/Market Balance
26 - 34	Industry Cost Structure
35 - 43	Value Chain/Competitors
44 - 53	Appendix - China Overview
54 - 55	Sources

Aluminum Production Cycle



* In addition to primary aluminum, recycled aluminum from “old scrap” is used to produce aluminum ingots. Old scrap is derived from finished products (beverage cans, automotive parts and construction, etc.) as compared to “new scrap” generated during the production process. Recycled old scrap is approximately 20% of global primary aluminum production.

Aluminum End-Products – Global Uses

- Transportation and construction applications account for more than one-half of global demand
- Aluminum usage differs by region and state of economic development
 - In developed economies, the greatest demand is for transportation-based applications
 - In developing economies, construction-based applications (residential and commercial) are the largest source of demand
- Outlook
 - US automotive demand expected to be constrained in near term due to rising fuel costs.
 - China’s “urbanization” trend, expected to fuel infrastructure growth for the next decade, will maintain a strong construction-based demand
 - Chinese automotive-based demand, relatively light compared to the West, is expected to grow

Aluminum End-Product Segments

by Total and Selected Countries/Regions

	<u>USA</u>	<u>Western Europe</u>	<u>China</u>	<u>Japan</u>	<u>Total World</u>
Transportation	33%	38%	9%	38%	34%
Building & Construction	17%	23%	36%	18%	20%
Packaging	25%	14%	10%	11%	13%
Machinery & Equipment	6%	8%	10%	15%	10%
Electrical	7%	8%	16%	5%	10%
Consumer Durables	8%	5%	8%	2%	7%
Other	4%	4%	11%	11%	6%

Aluminum End-Products

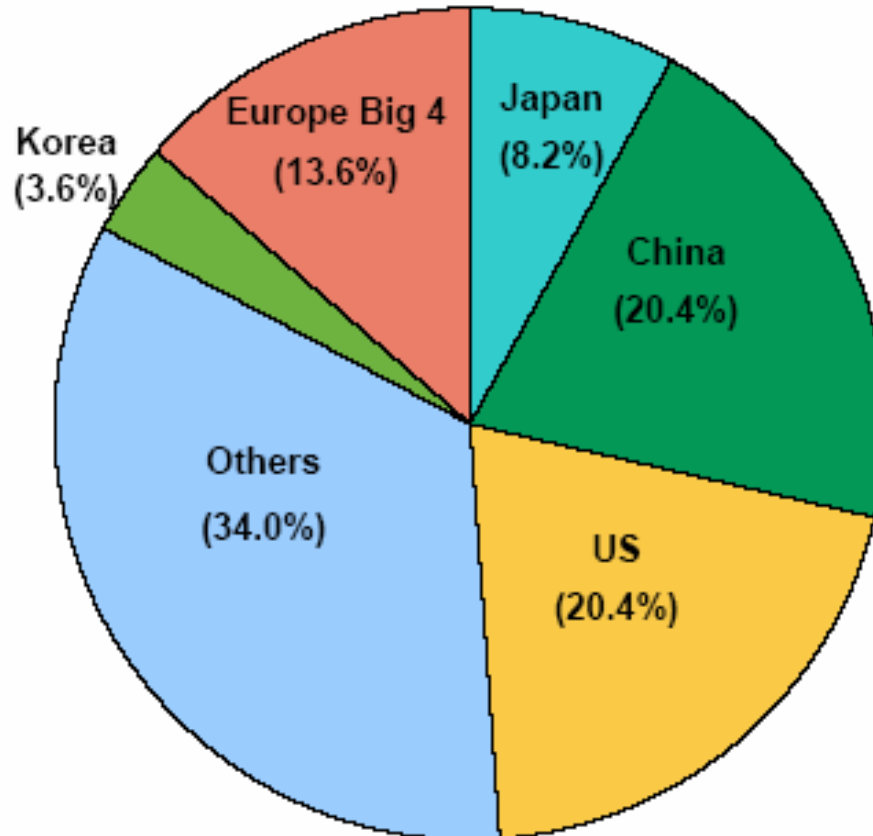
- Examples of end-products by segment
 - Transportation : aircraft, ships, automotive
 - Building & Construction : from screws, nails, and rivets, to siding, gutters, roofing, awnings, etc.
 - Packaging : soda cans and packaging for keeping food and cosmetics fresh
 - Electrical : aluminum conducts electricity almost as well as copper and has a cost advantage, electric transmission lines almost exclusively use aluminum
 - Machinery & Equipment : internal parts of large and small machines and household appliances, assorted tubes, fencing, etc.
 - Consumer durables : aluminum foil, containers, assorted other products

Aluminum Consumption

- Second most consumed metal in world
- Developed economies account for about 75% of global consumption
- Significant growth predicted in developing world
 - Overall GDP growth accompanied by increases in per capita aluminum consumption
 - China's significant growth is expected to continue
 - Per capita aluminum consumption in China is still very low compared to developed countries and is expected to follow their historic growth patterns
 - Other developing areas (including India, Eastern Europe and Latin America) also anticipate growth
- Growth also driven by the development of new and improved end-use applications

Aluminum Consumption – Top Consumers

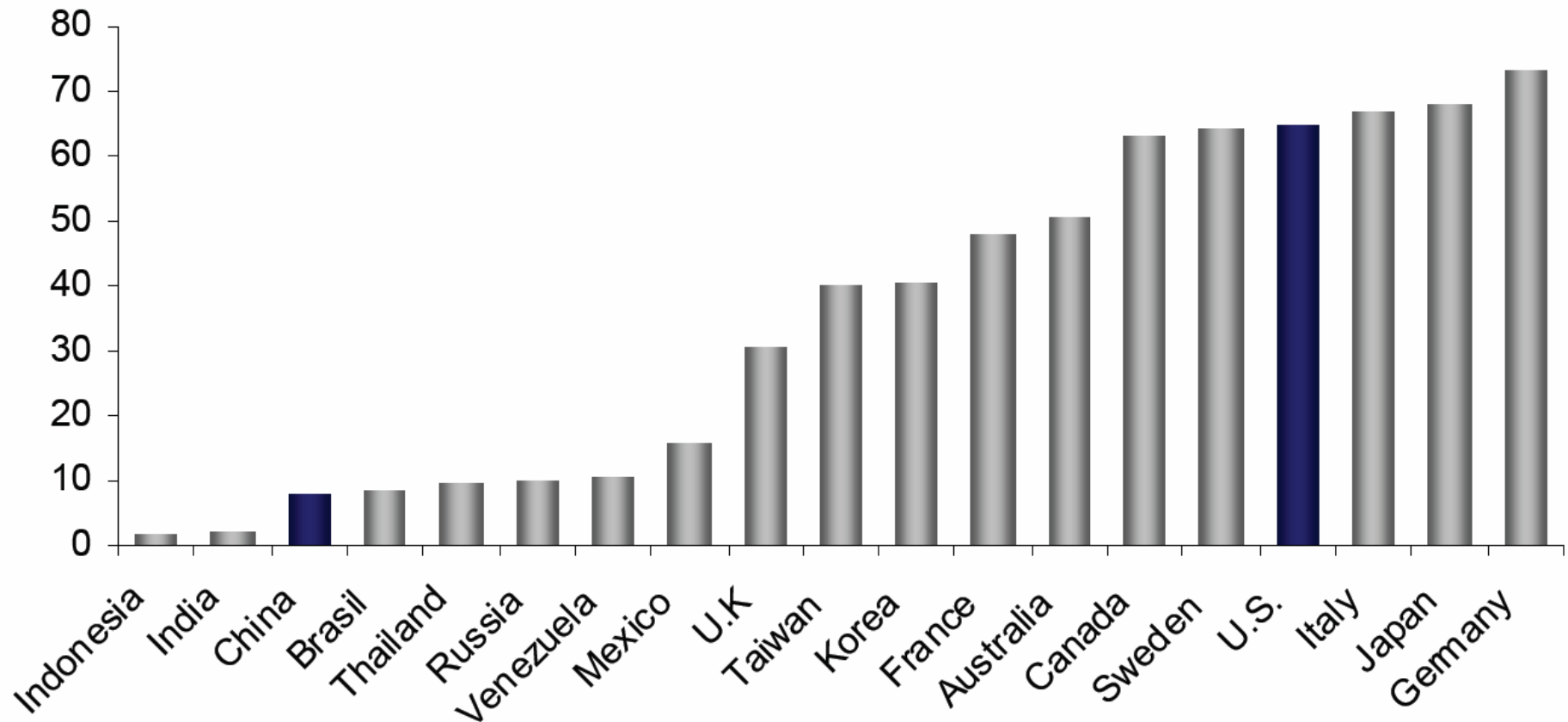
2004 Total Global Primary Consumption



Eight countries are responsible for 2/3 of total world primary consumption

Per Capita Aluminum Consumption

Per Capita Aluminum Consumption - 2003

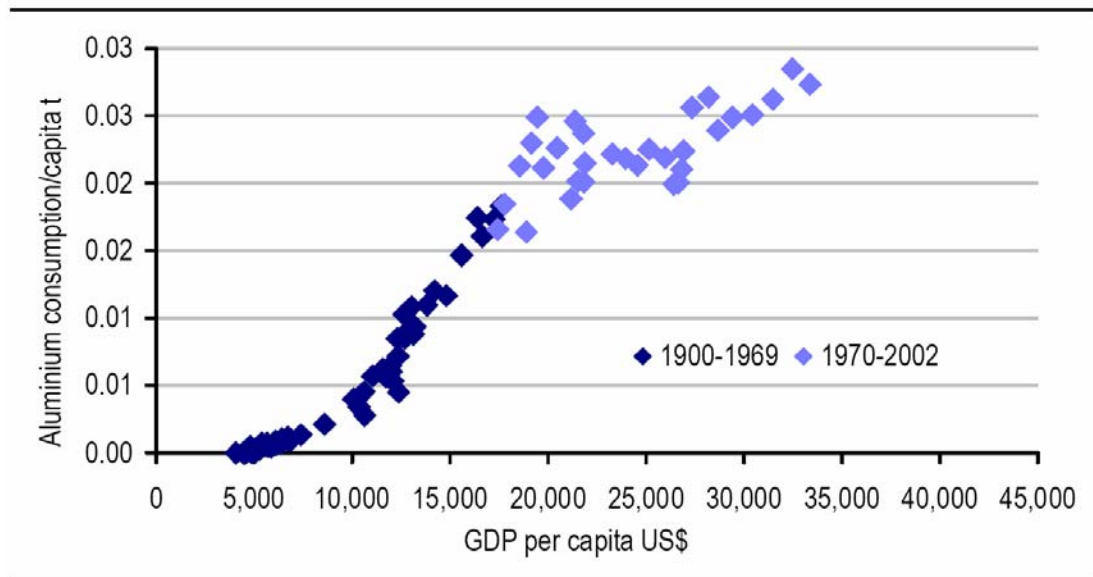


Developed countries exhibit higher per capita consumption of aluminum than emerging markets

Aluminum Consumption per Capita - US

- Increases in per capita GDP have consistently been accompanied by increases in per capita aluminum consumption– the US example

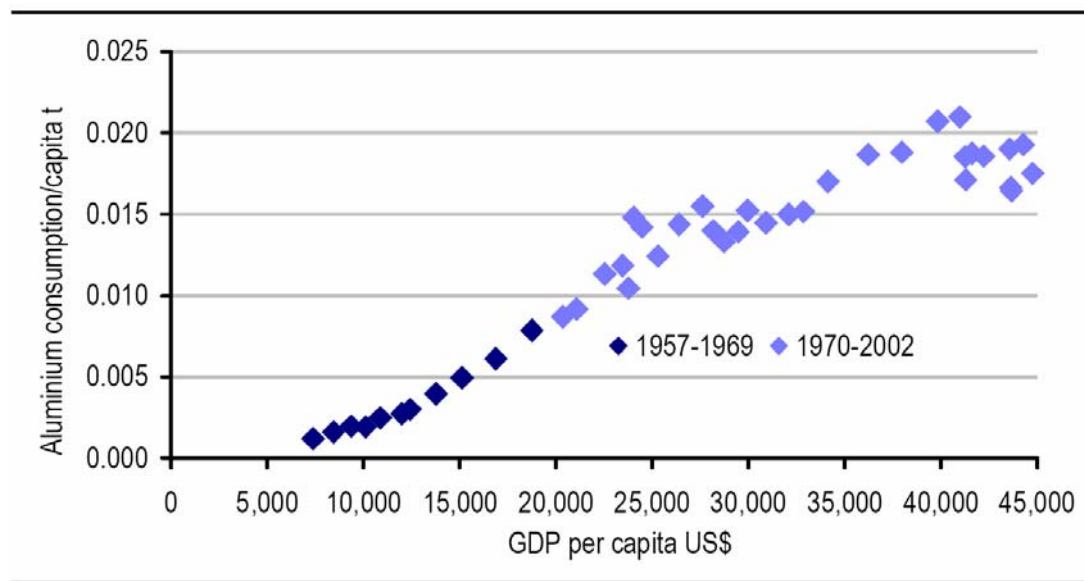
US Aluminum Consumption/Capita vs. GDP/Capita : 1900 - 2002



Aluminum Consumption per Capita - Japan

- Increases in per capita GDP have consistently been accompanied by increases in per capita aluminum consumption– the Japanese example

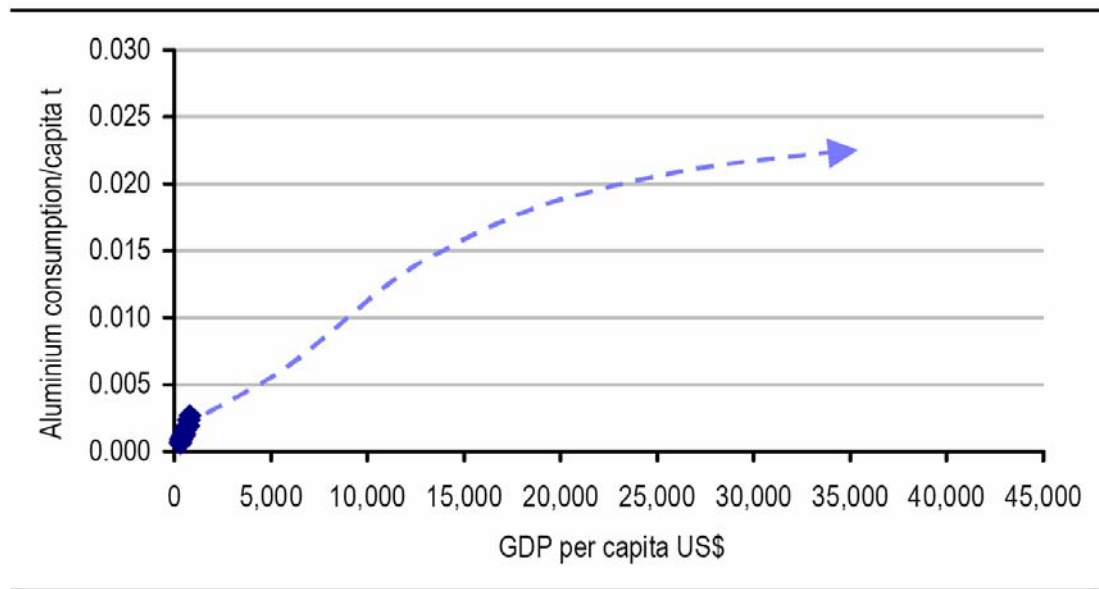
Japanese Aluminum Consumption/Capita vs. GDP/Capita : 1957 - 2002



Aluminum Consumption - China

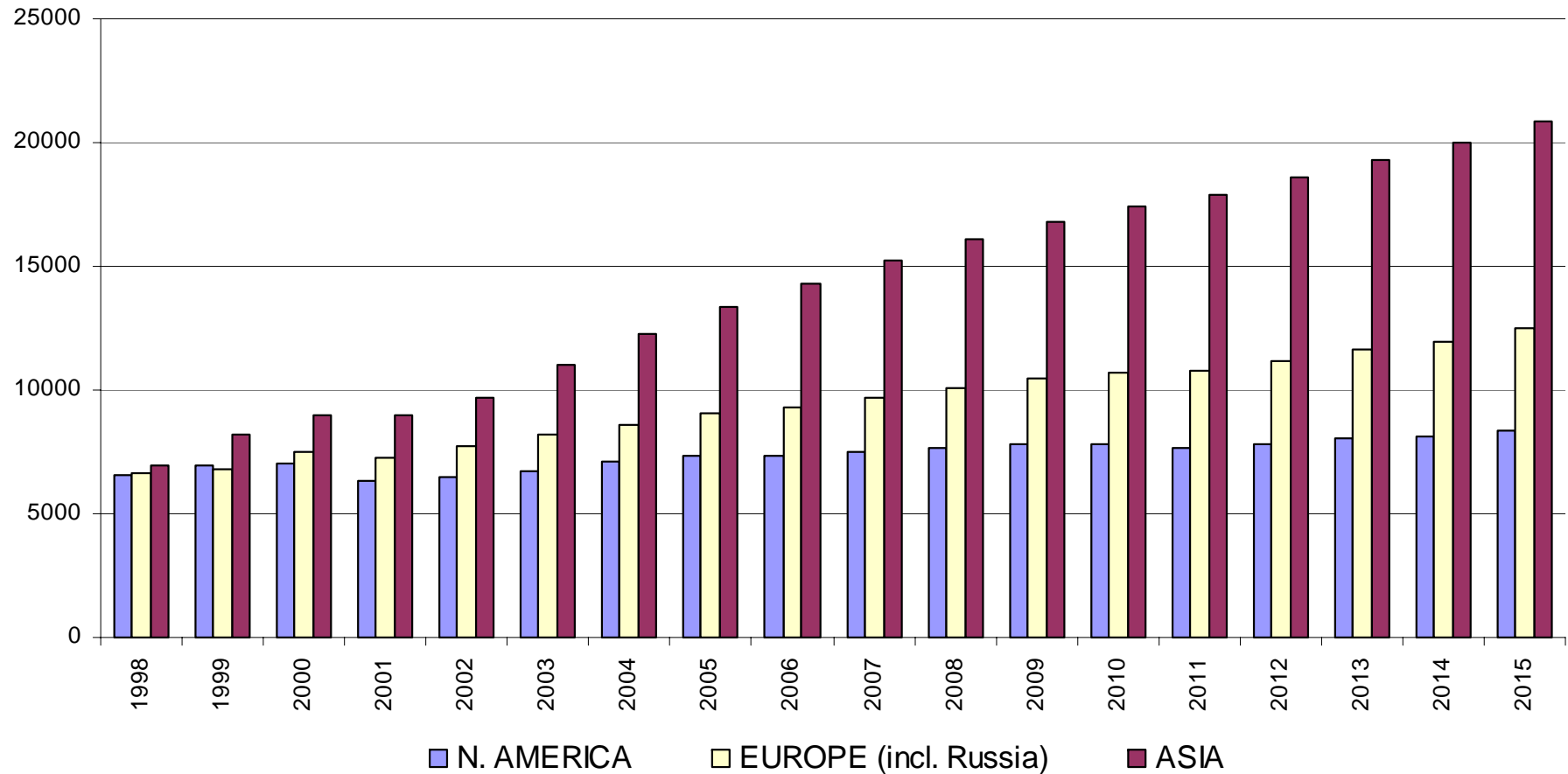
- China's aluminum consumption growth in relation to per capita GDP growth is expected to mirror the precedents in developed economies

Chinese Aluminum Consumption/Capita vs. GDP/Capita : 1988 - 2002

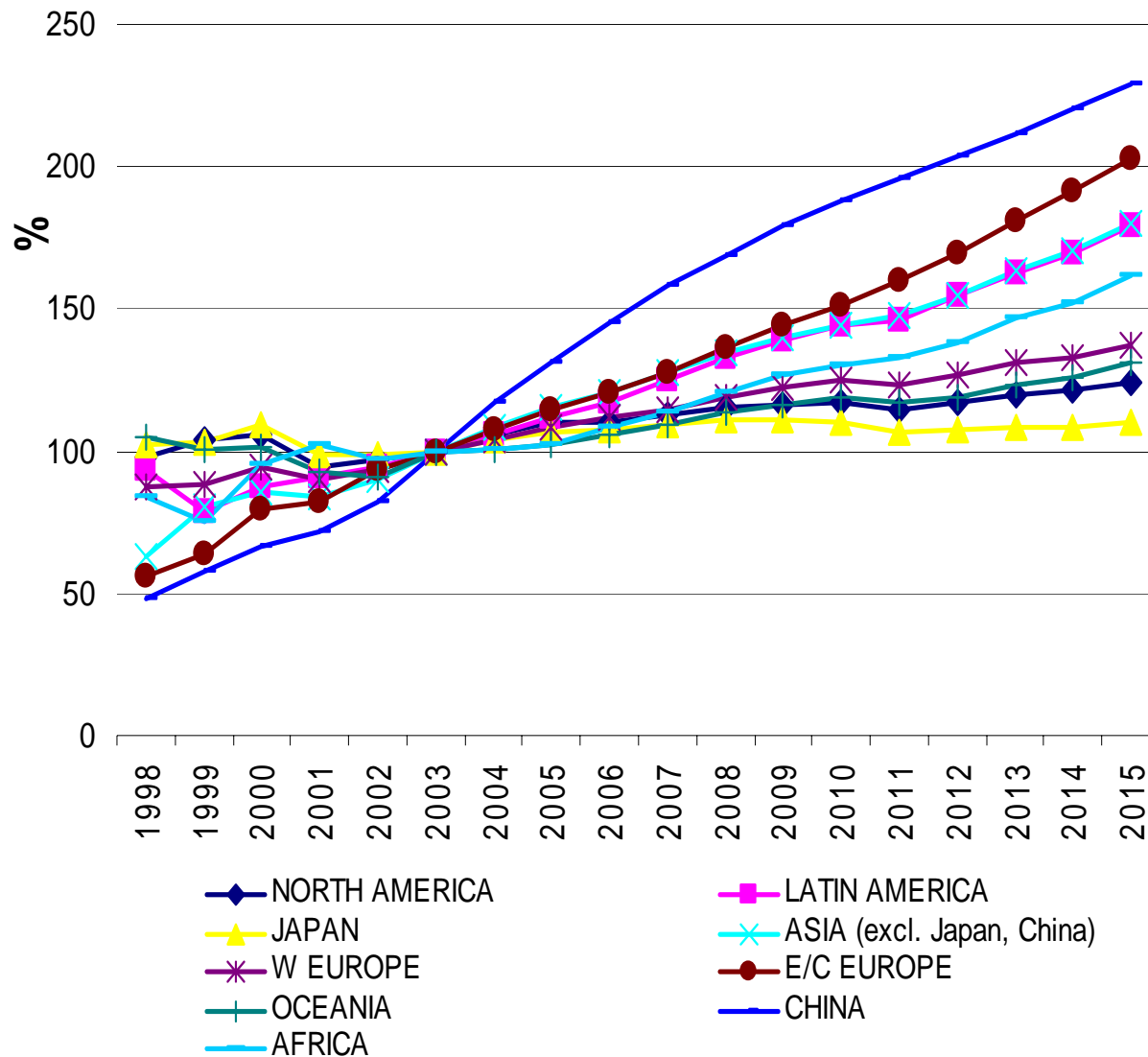


Aluminum Consumption

Primary consumption in major regions 1998-2015 (projected)



Aluminum Consumption – Indexed to 2003



- Demand growth in China will remain the “big” story according to estimates.
- Eastern Europe, Latin America, and other Asian countries also are projected to drive global demand growth.

Alumina/Bauxite

- Worldwide bauxite resources are estimated to be between 55 and 77 billion tons – 172 million tons were mined in 2004.
- 4 - 5 tons of bauxite typically produce about 2 tons of alumina.
- Over two thirds of the world's bauxite supply comes from four countries: Australia, Brazil, Guinea (Africa), and Jamaica
- US and Europe import nearly all bauxite requirements
 - 95% is converted to alumina
 - 5% is used in the production of nonmetallurgical products, including: abrasives, chemicals, and refractories.
- While global alumina production is about as geographically concentrated as is bauxite mining, the two industries do not exactly overlap.
 - North America & Western Europe produce a combined 21% of the world's alumina supply almost entirely from imported bauxite
 - Australia & Guinea respectively produce 36% and 12% of the world's bauxite, but only 26% and 0% of alumina.
- Total global production capacity of alumina is expected to catch up with demand by 2007, after several years of shortages.

Alumina/Bauxite – Distribution of Capacity

Global Bauxite Mining Capacity by Region

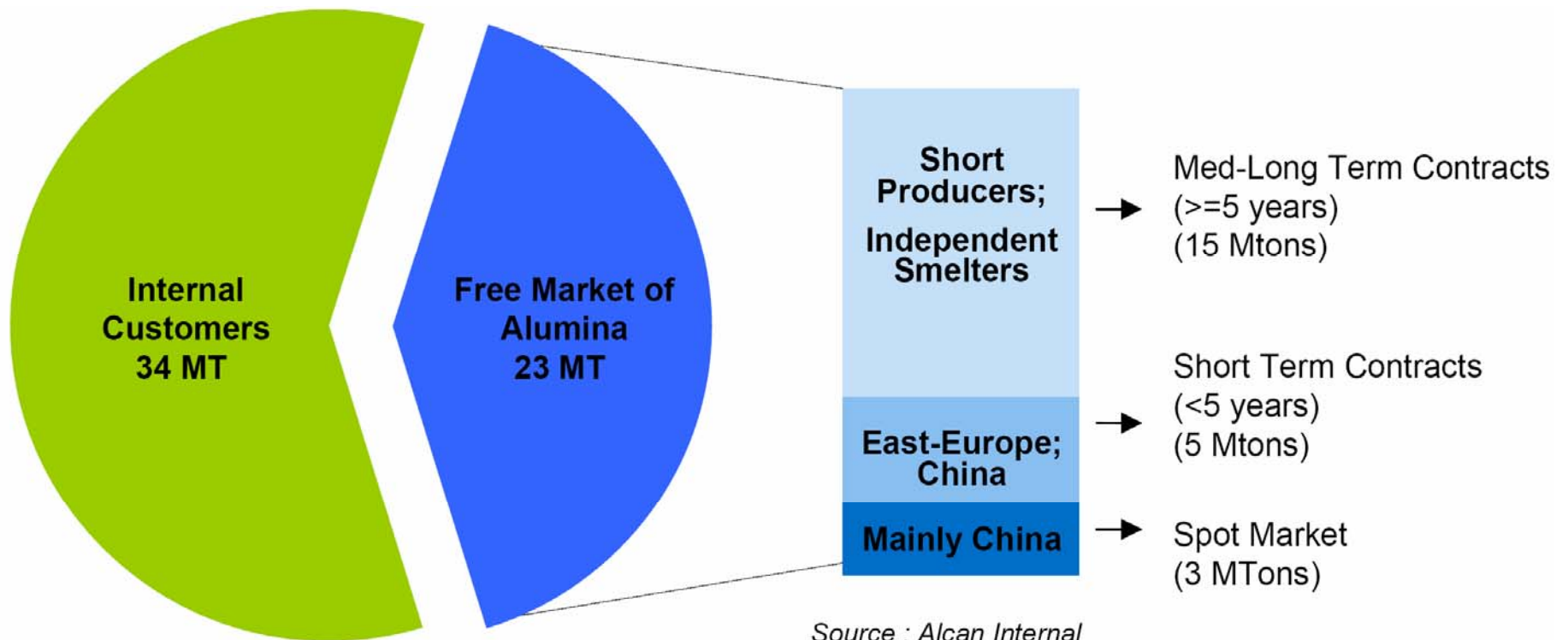
	Million Tons	Percent of Total
Australia	62	36%
Guinea	21	12%
Brazil	17	10%
Jamaica	17	10%
China	14	8%
India	10	6%
Russia	5	3%
Venezuela	5	3%
Kazakhstan	5	3%
Suriname	5	3%
Other	10	6%
Total	172	100%

Global Alumina Refining Capacity by Region

	Million Tons	Percent of Total
Australia	16.1	26%
Latin America	12.4	20%
North America	6.8	11%
China	6.8	11%
CIS	6.8	11%
Western Europe	6.2	10%
Eastern Europe	1.9	3%
Other Asia	4.3	7%
Africa	0.6	1%
Total	62.0	100%

World Alumina Market

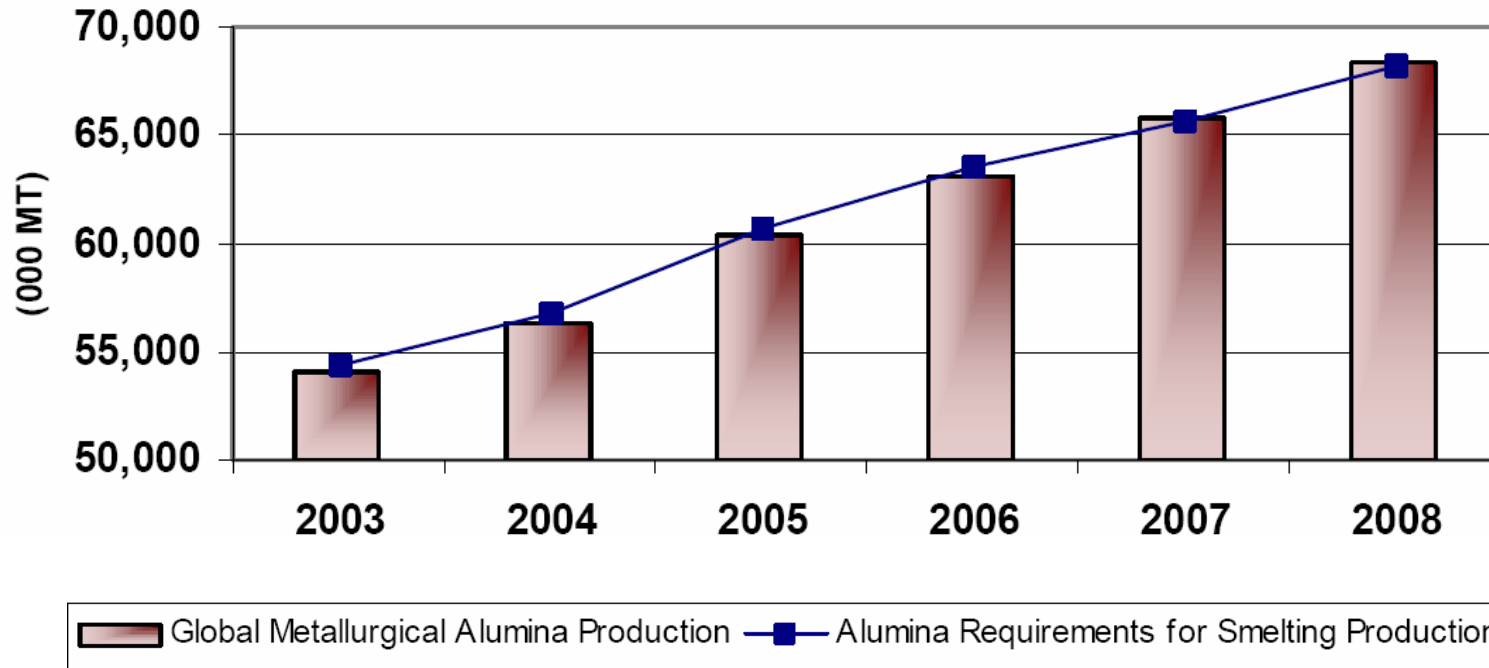
Metallurgical Production ~ 57 Mtons [2004]



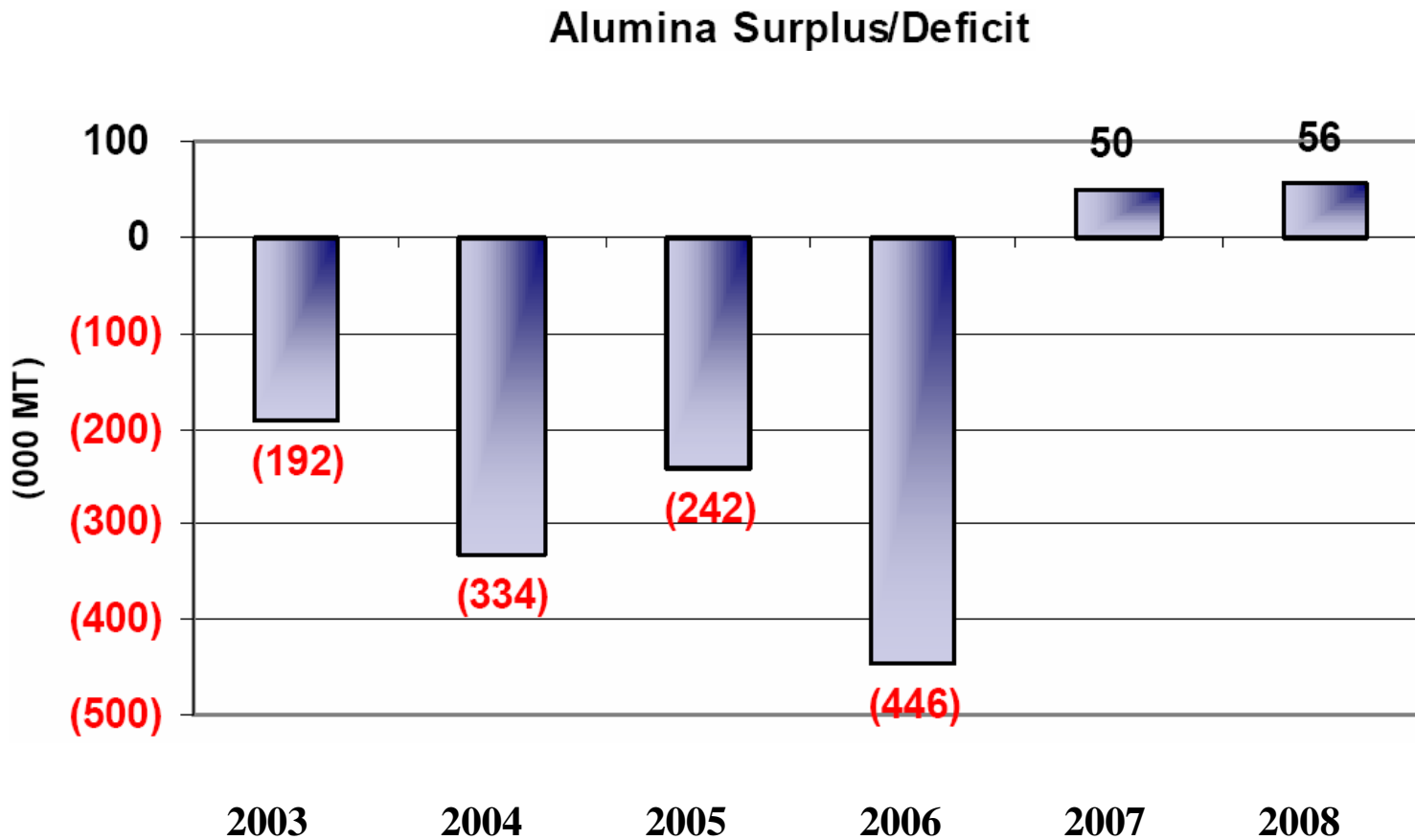
The spot market is a very small component of total market

Global Alumina Supply and Demand

Global Metallurgical Alumina Production vs. Requirements



Global Alumina Supply Balance

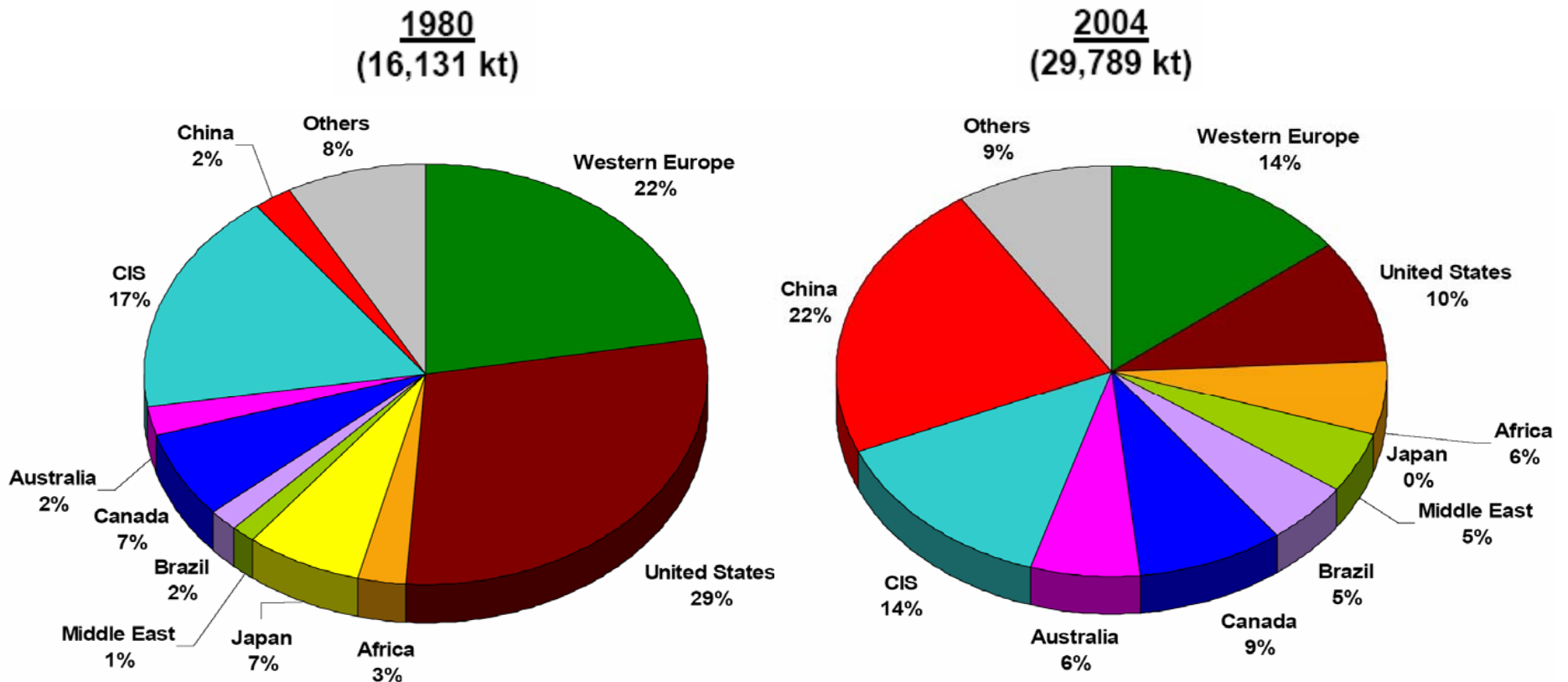


Aluminum Capacity/Market Balance

- Dramatic shift in location of productive capacity
 - Decrease in relative capacity for US, Western Europe, and Japan
 - Significant increase in relative capacity for China
 - Modest increases for Middle East, Africa, Brazil, & Australia
- Outlook for future
 - New capacity will follow the availability of power required in the smelting process
 - India & China expected to see near-term growth in production
 - Due to natural advantages in geothermal and hydro power generation, Iceland and the Persian gulf region are potential areas for capacity development.
- Idled capacity
 - Large US idle capacity - about 1.6 mT
 - Mostly in Pacific Northwest, resulting from power unavailability
 - Potential to weaken supply balance if significant capacity reopened

Capacity/Market Balance

Primary Aluminum Production by Region

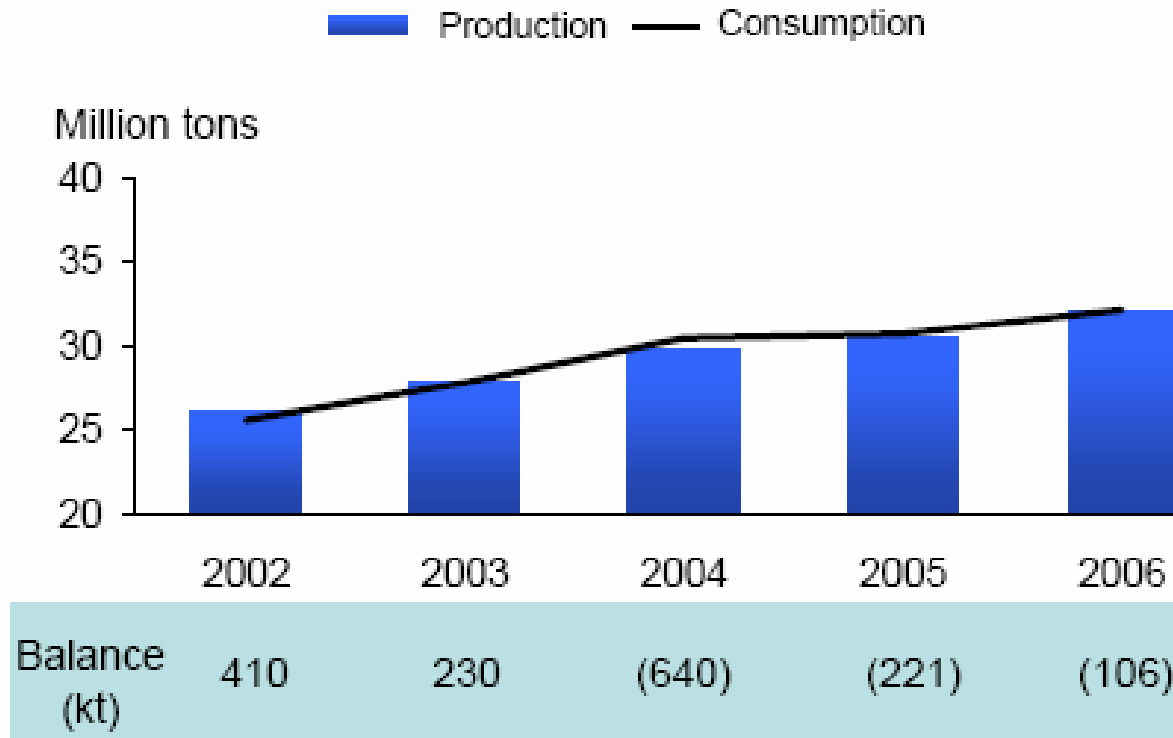


Over the past three years, China has represented 66% of the net increase in total production

Aluminum Capacity and Demand

- With primary aluminum consumption long-term growth of 3-4 % p.a., relative supply expected to remain tight

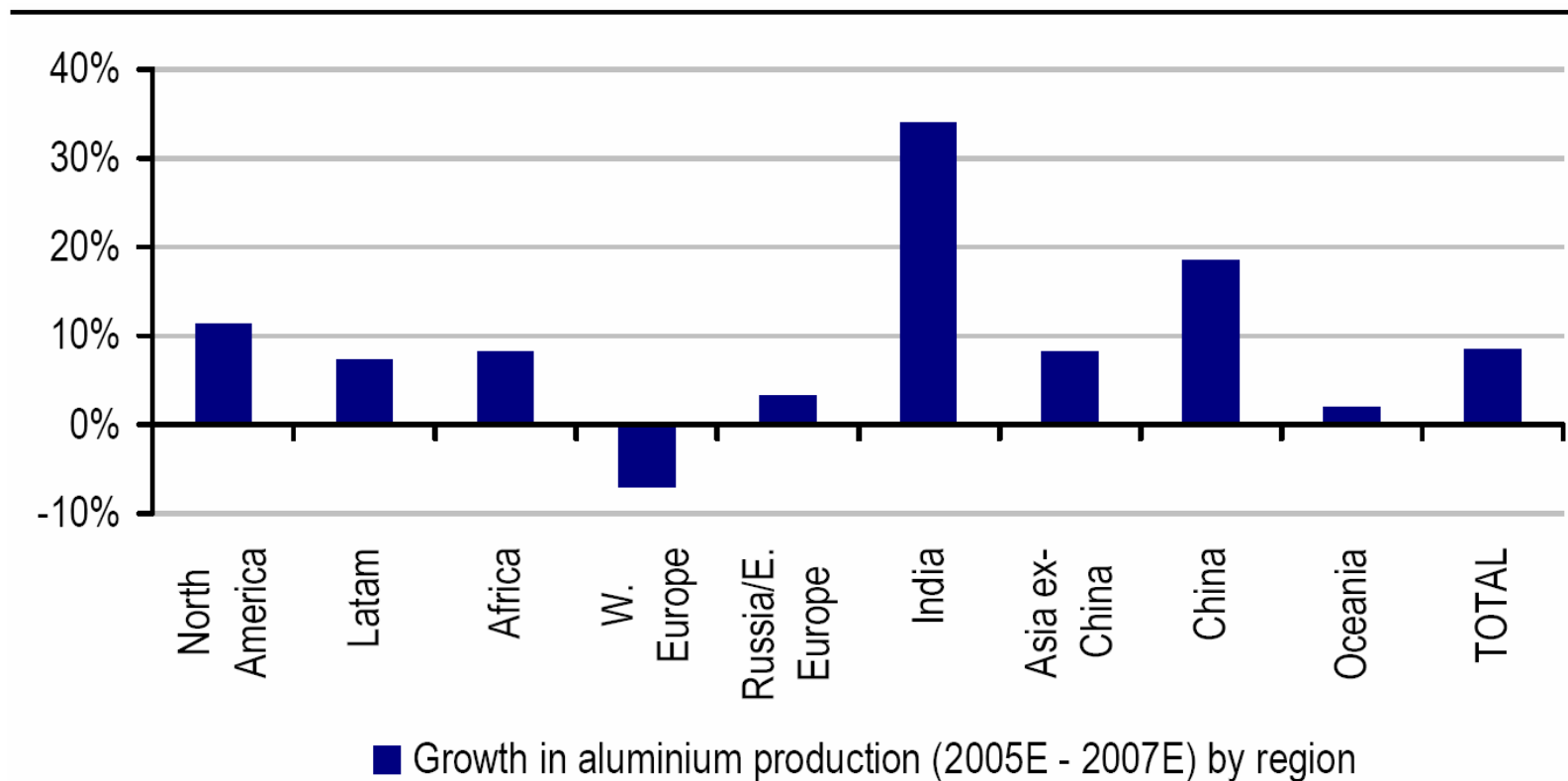
Supply and Demand Balance



Note: 2002-2004 Alcan, 2005-2006 CRU

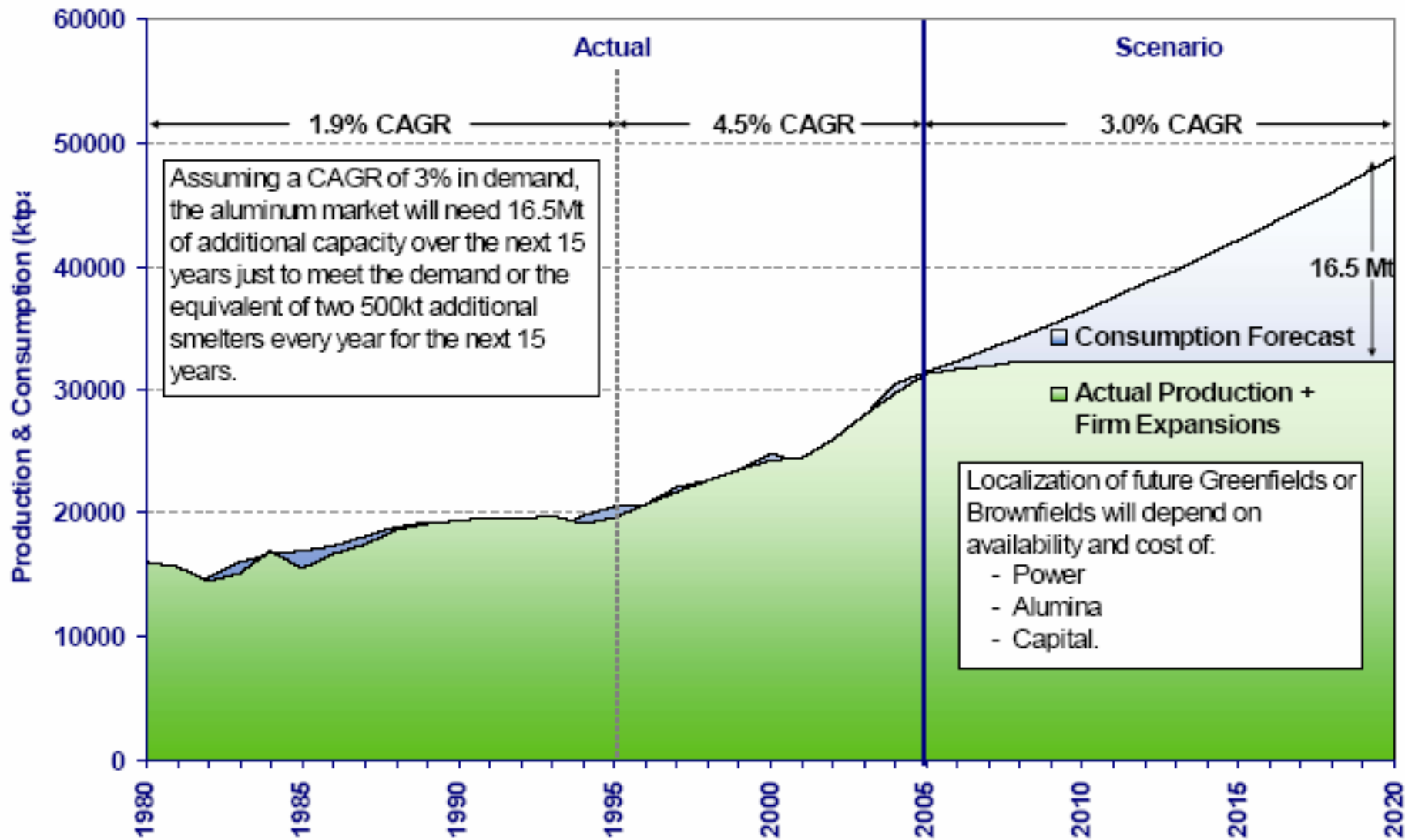
Capacity/Market Balance

Estimated Aluminum Smelting Growth by Region, 2005 - 2007



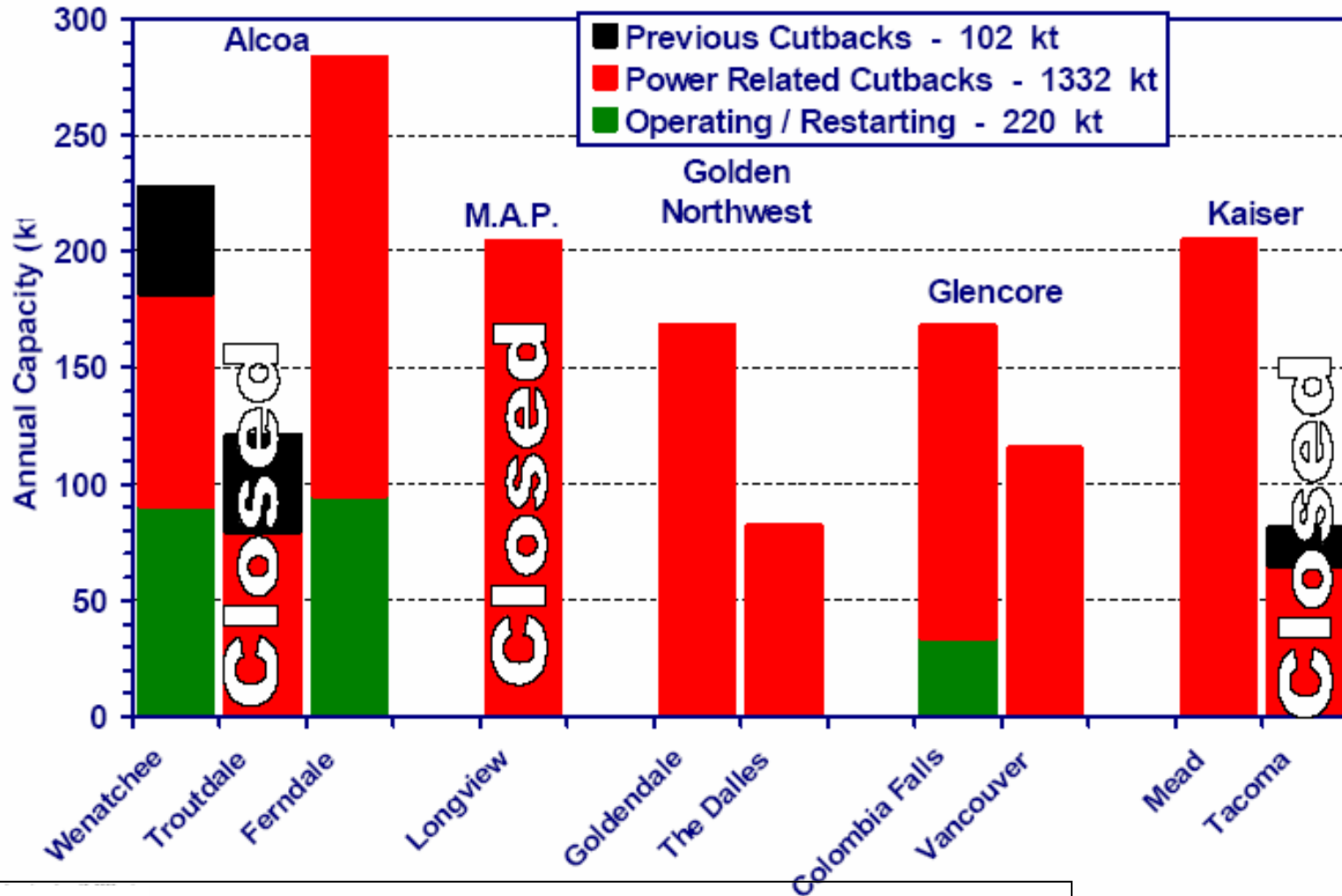
North American growth is a function of restarts in the US and expansions in Canada.

Total World Primary Aluminum Supply-Demand Balance



Capacity/Market Balance

Idled Capacity in the US Pacific Northwest



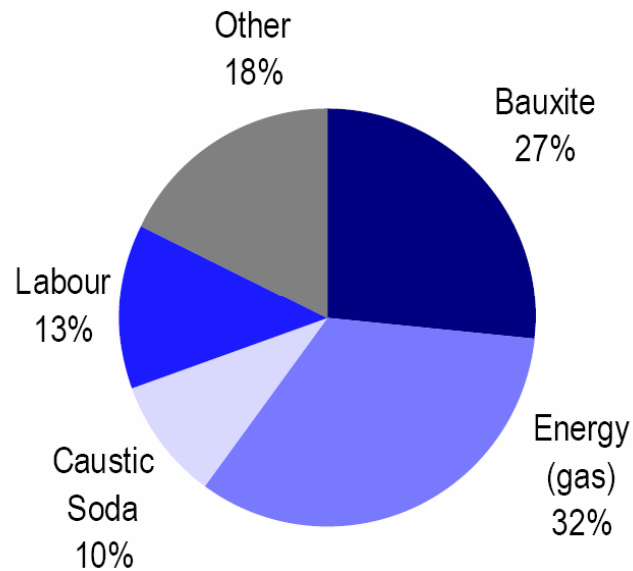
US idled capacity currently represents about 75% of worldwide idled capacity

Industry Cost Structure

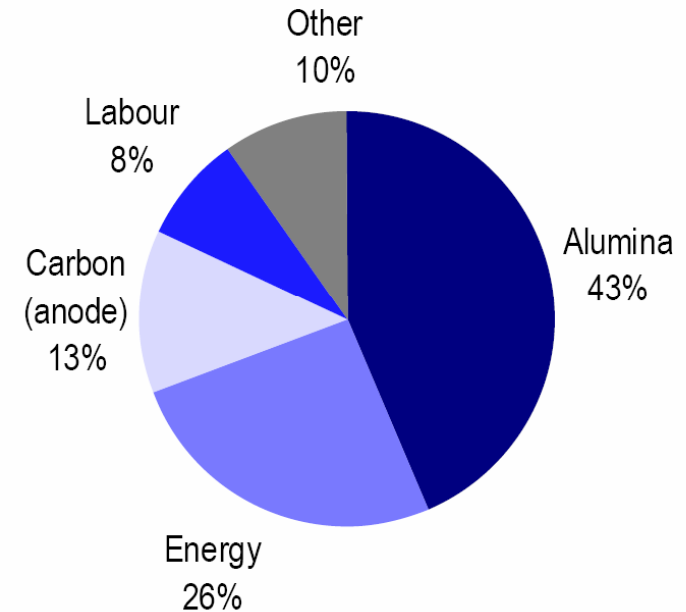
- Aluminum industry costs rose by 16% on average between 2003 and 2005
 - Includes an 18% increase in average power rates
 - Availability (and therefore cost) of power varies by region
 - Some regions, for example Russia/Siberia, can rely on extensive hydro-based power
 - Others, for example the Pacific northwest US, are hampered by regulatory limits
 - Includes a 40% increase in contract alumina prices
 - Annual production has been short of demand in recent years
 - Alumina refining has recently faced significant cost inflation
 - Caustic soda prices have risen approximately 120% in the last 12 months
- Labor costs in India, China, and southeast Asia are substantially lower than in developed countries.

Industry Cost Structure – Global Averages

Average Alumina Production Costs - 2004



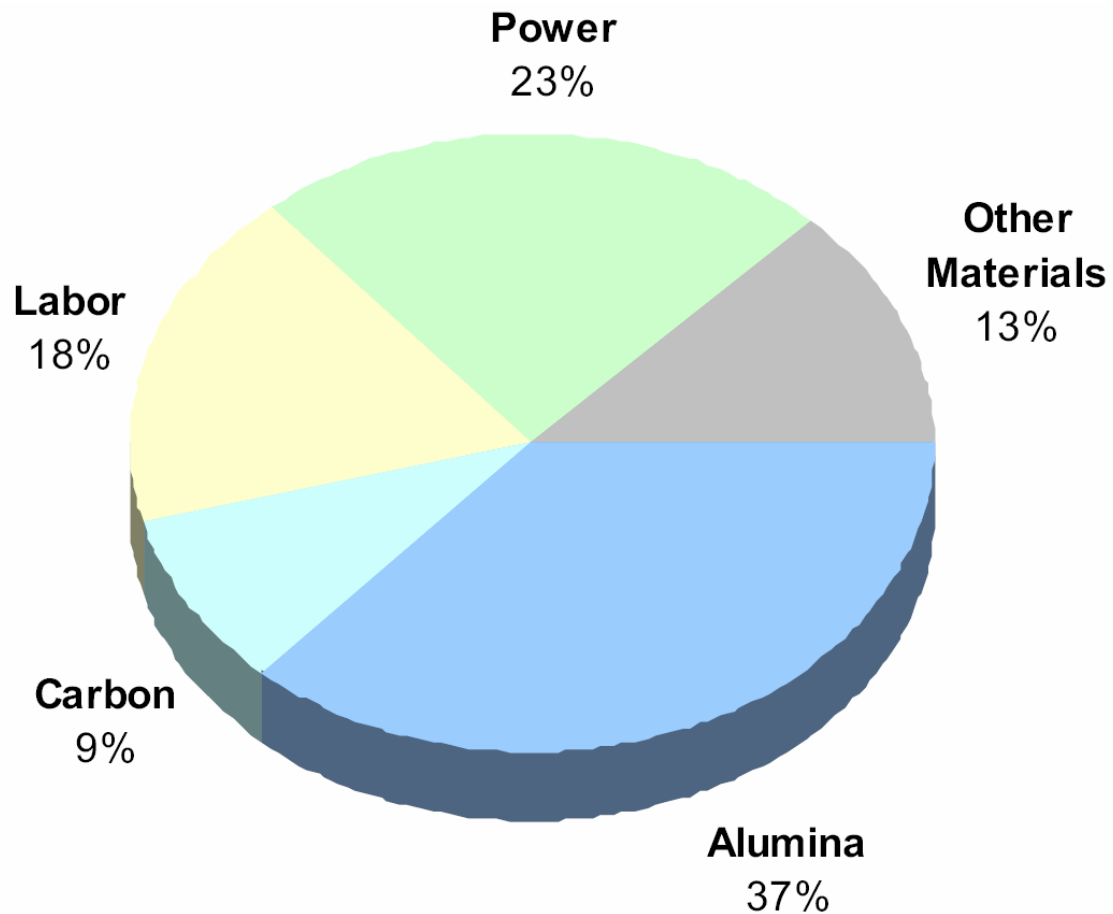
Average Aluminum Production Costs - 2004



Energy accounts for a significant portion of total aluminum costs, not just in refining alumina and smelting aluminum, but also in the production costs for carbon anodes

Industry Cost Structure – Aluminum

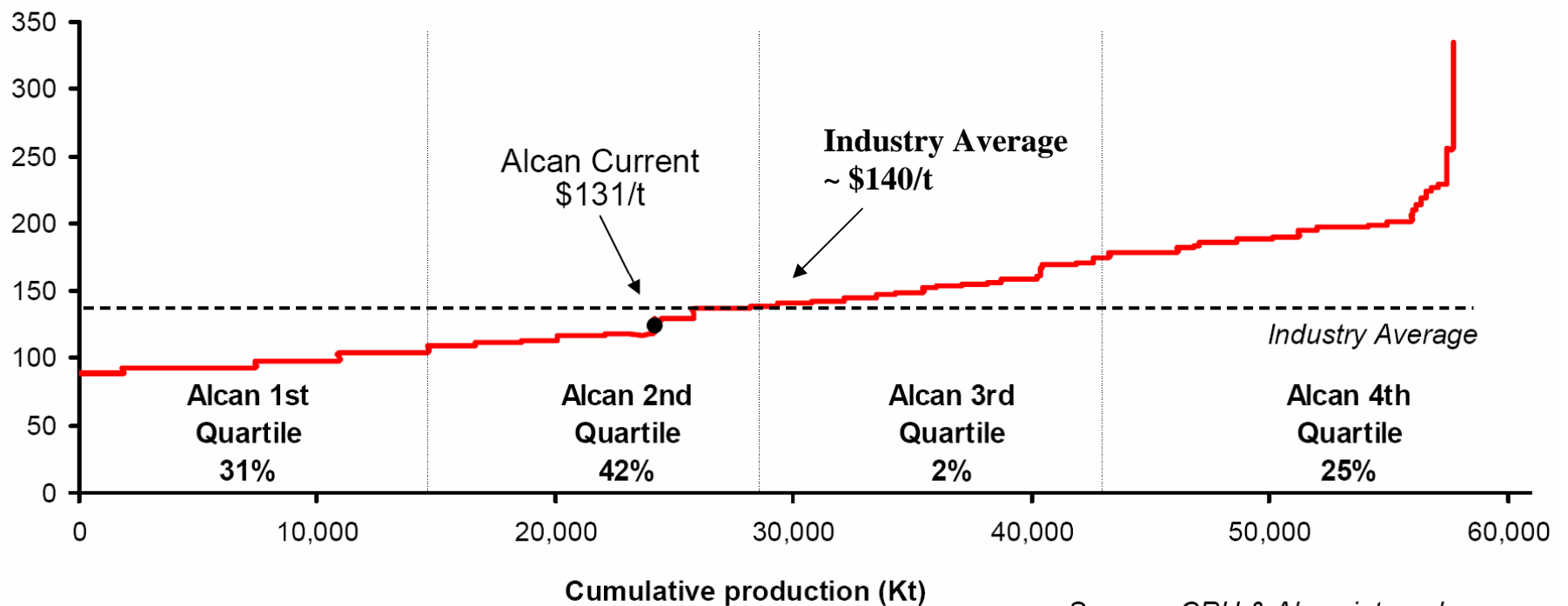
Alcoa North American Smelting Cost Breakdown - 2003



Alumina Cost Structure – Industry and Alcan

World Alumina Cost Curve

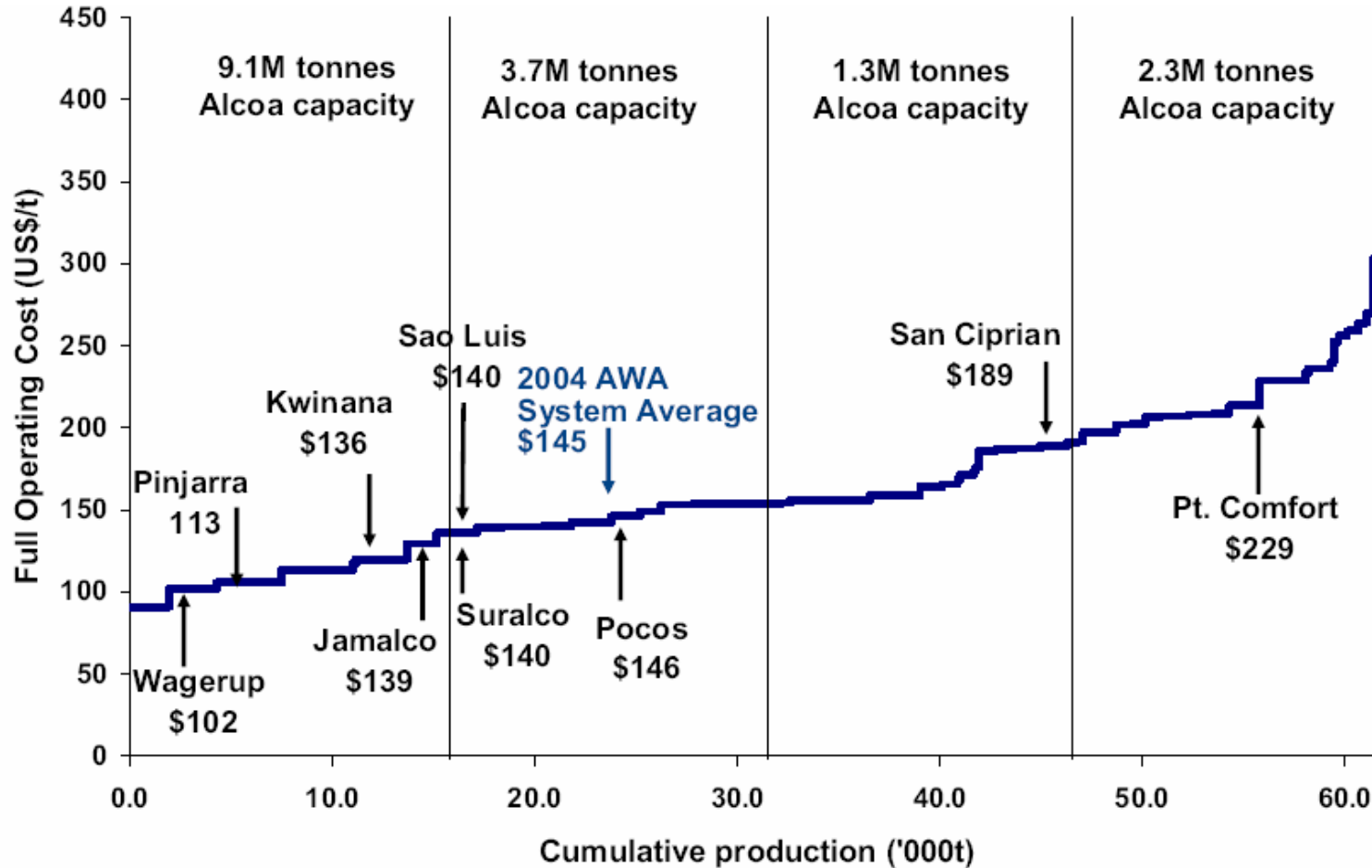
Operating Cost (US\$/t)



Source: Alcan "A New World of Opportunity" May 25, 2005

Alumina Cost Structure – Industry and Alcoa

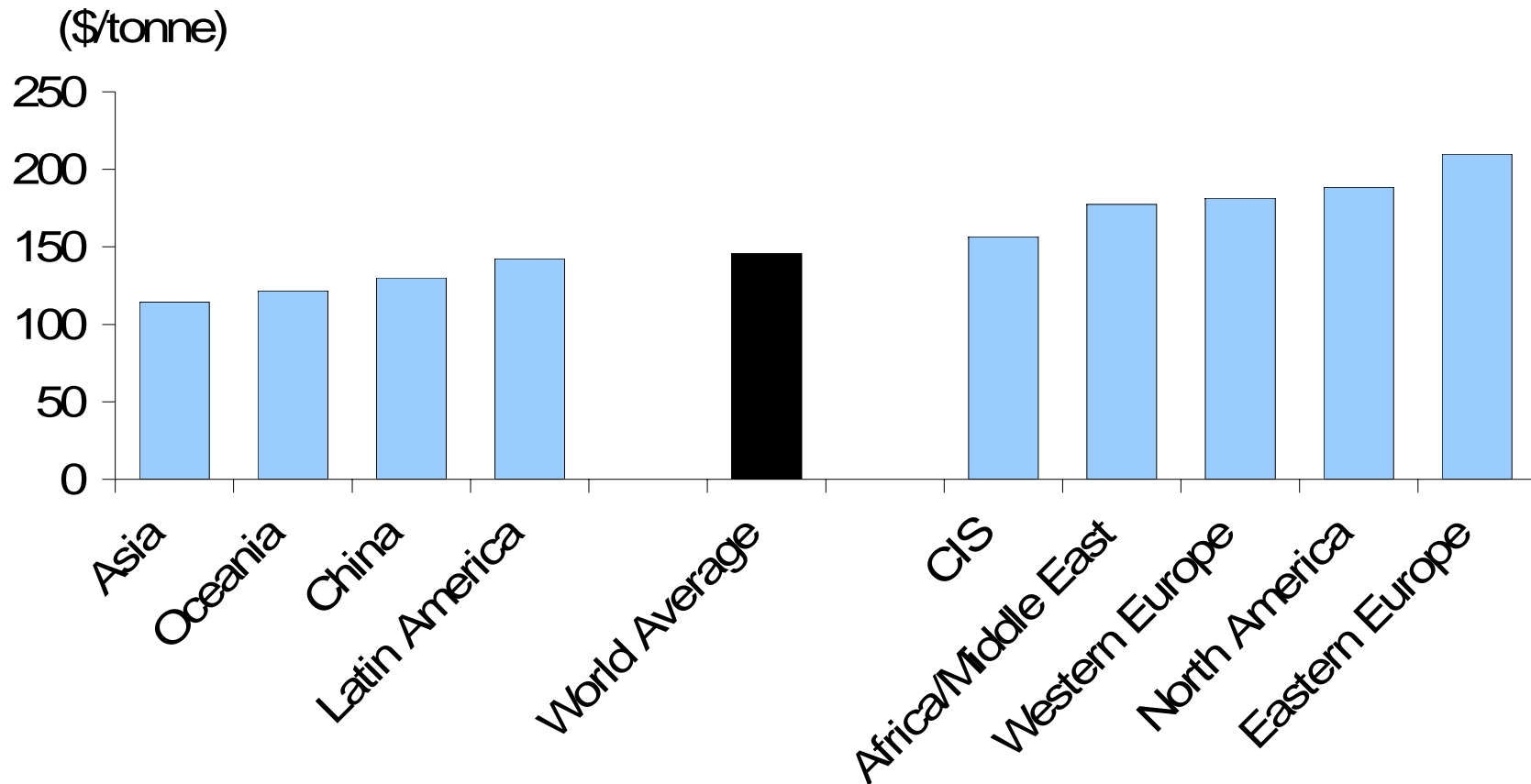
Alumina Refining Worldwide Operating Costs - 2004



Source: CRU Group

Alumina Cost Structure – by Country

Average Costs per Country

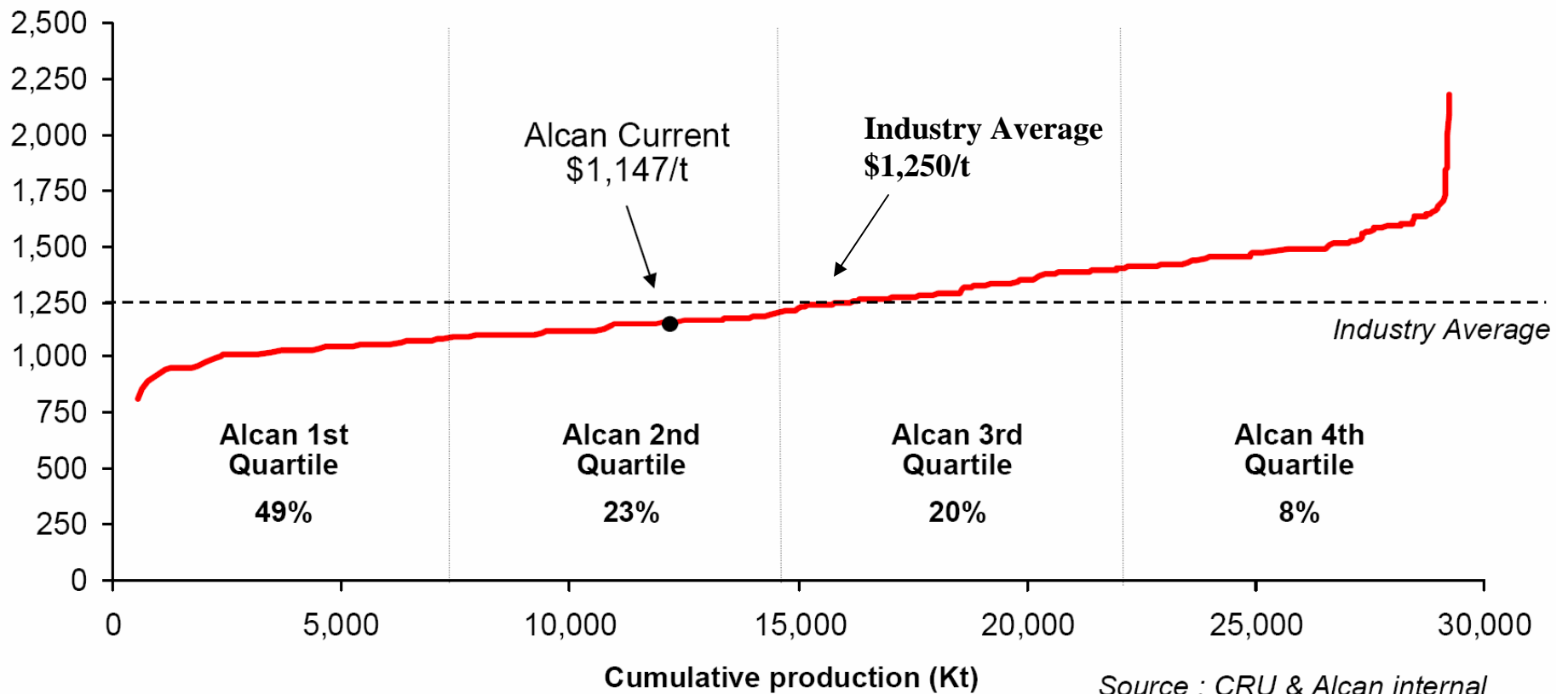


Represents corporate operating costs by country/region
Source: CRU presentation, 2003.

Industry Cost Structure – Aluminum

World Aluminum Cost Curve

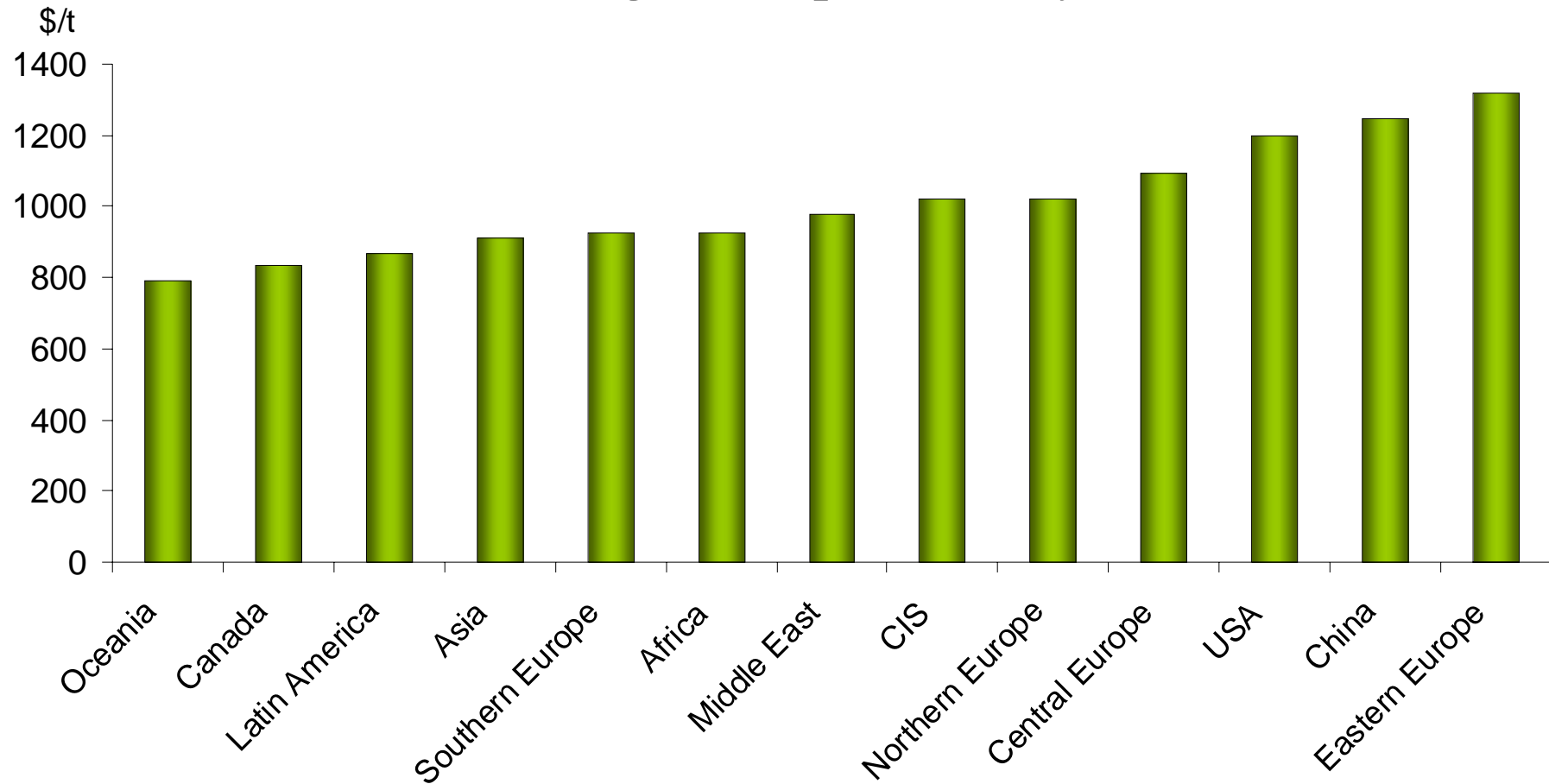
Operating Cost (US\$/t)



Source: Alcan "A New World of Opportunity" May 25, 2005

Aluminum Industry Cost Structure

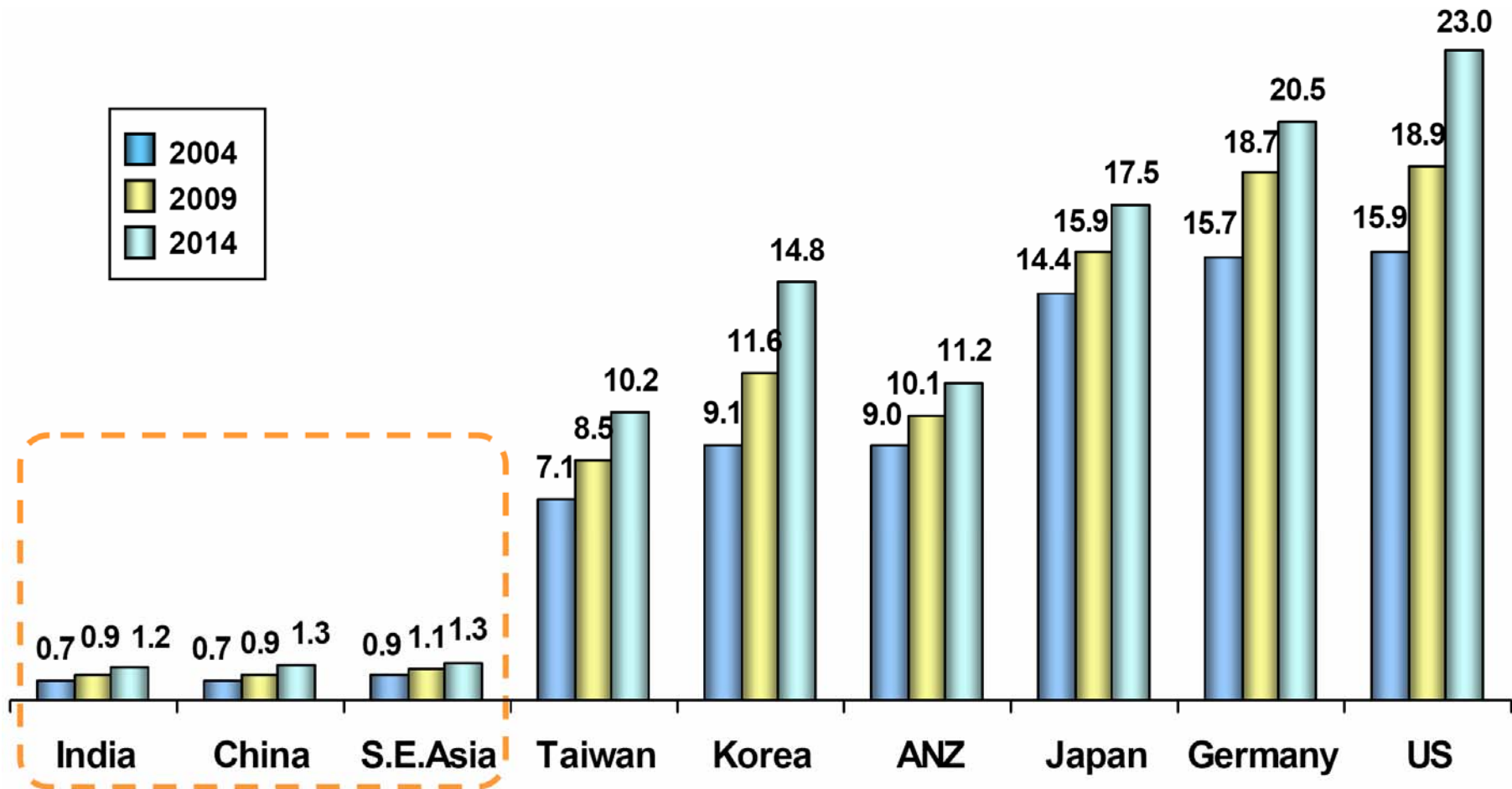
Average Costs per Country



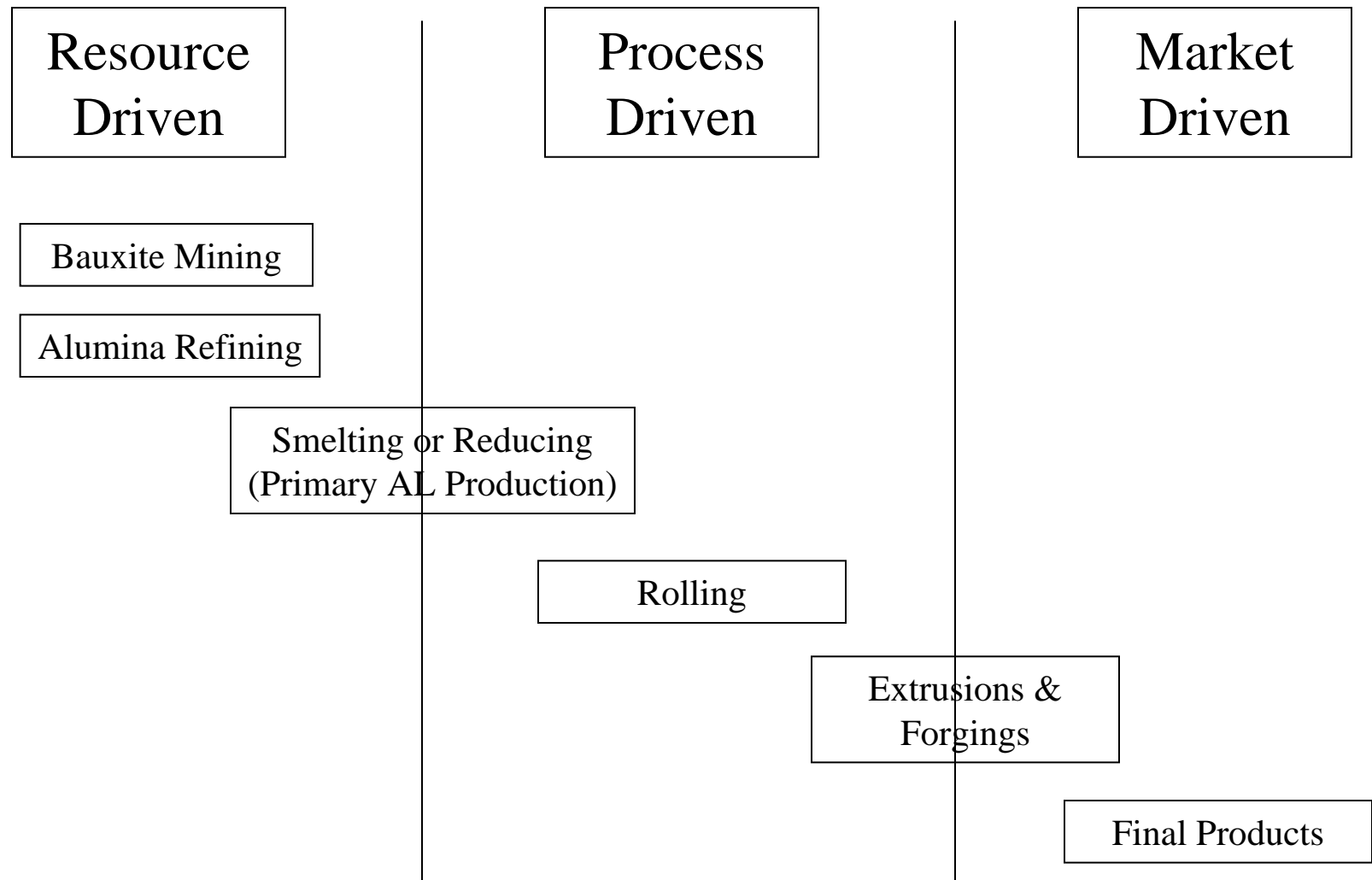
Source: CRU presentation, 2003.

Aluminum Industry Cost Structure

Forecasted Labor Costs: 2004 – 2104 (\$/hr)



Aluminum Value Chain - Competitive Drivers



Each segment of the value chain has its own competitive dynamics

Competitive Drivers

Resource Driven

- Exploration and reserve acquisition
- Development of new extractive technology
- Managing political risk
- Managing environmental and social risk
- Cyclically opportunistic asset purchases

Process Driven

- State-of-the-art technology implementation
- Economies of scale and optimization of product mix
- Avoidance of over-capitalization
- Logistics and distribution
- Hedging and margin management

Market Driven

- Product life cycle management
- Product differentiation and branding
- Pricing the product to reflect value to the customer
- Market share and reputation
- Creation or maintenance of entry barriers

Aluminum Value Chain Competitors

Selected World Competitors by Market Segments

<u>Bauxite & Alumina</u>	<u>Primary Aluminum</u>	<u>Fabricated Products</u>	
		<u>Flat Rolled</u>	<u>Extrusions</u>
Alcoa	Alcoa	Alcoa	Alcoa
Alcan	Alcan	Alcan	Alcan
Chalco	Rusal	Novelis (Alcan spinoff)	Kaiser
Comalco	Hydro	Kaiser	Norsk Hydro
Glencore	BHP Billiton	JW Aluminum	Tredegar
BHP Billiton	Chalco	Aleris	Indalex
Rusal	Rio Tinto	Wise Alloys	Hindalco
	Dubal	Norandal Aluminum	Nippon Light Metal
	Alba	Corus Group	Sapa
	Hindalco	Unifus	
	Century	Sumitomo Light Metal	
	Norsk Hydro	Kobe	
		Aluar Aluminio Argentino	
		Hindalco	
		Ormet	

Largest players are vertically integrated through value chain

Industry Market Shares

Bauxite Capacity - Major Players

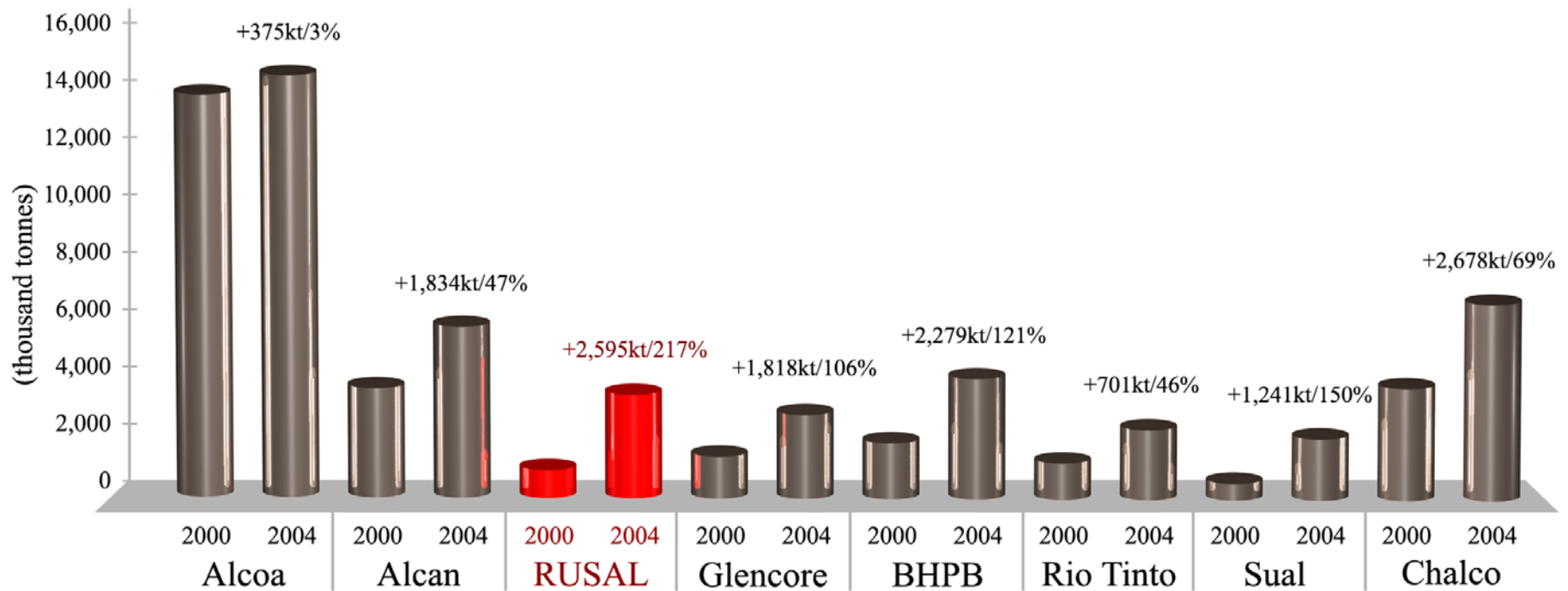
	Million Tons	
Alcoa	41	24%
Alcan	17	10%
Chalco	12	7%
Comalco	12	7%
BHP Billiton	9	5%
Rusal	9	5%
Others	72	42%
Total	172	100%

Alumina Capacity - Major Players

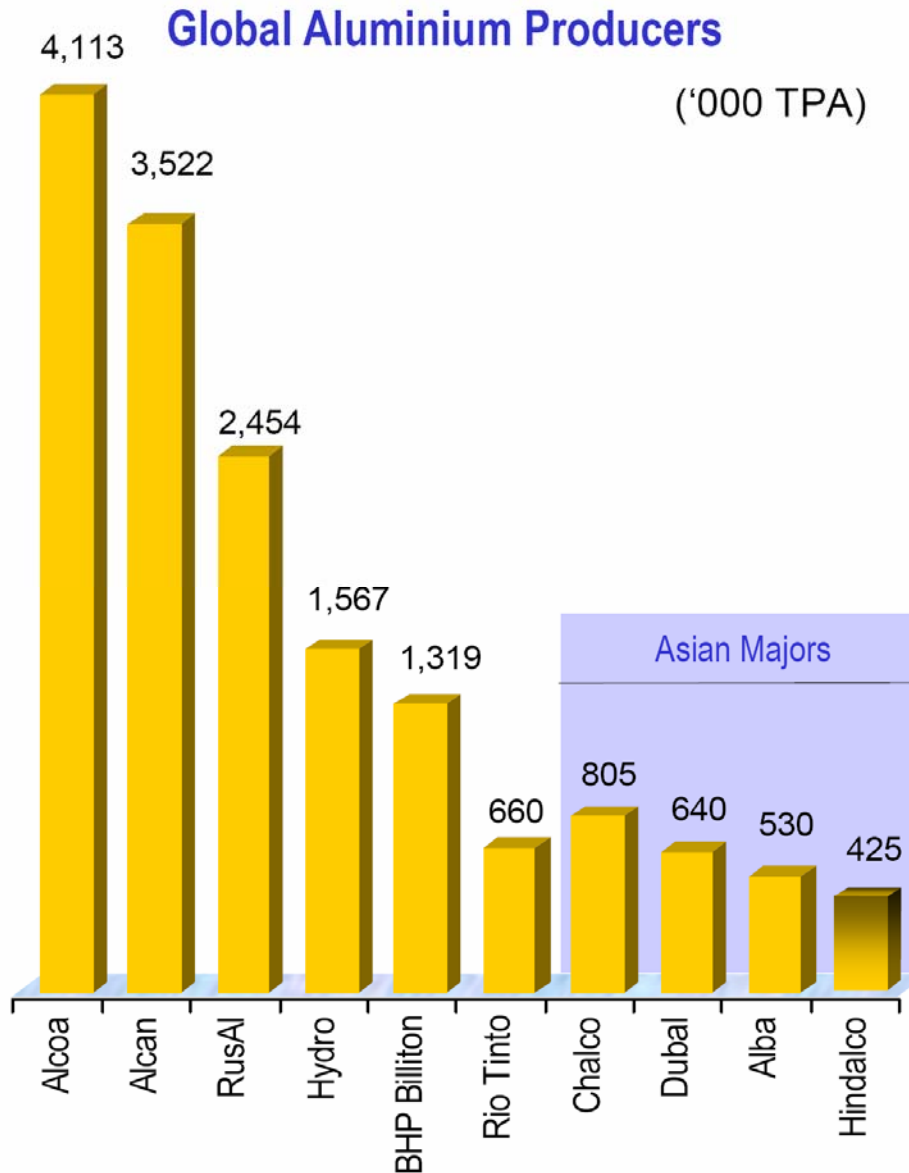
	Million Tons	
Alcoa	14	22%
Alcan	6	10%
Chalco	6	10%
BHP Billiton	4	7%
Glencore	3	5%
Rusal	3	5%
Others	25	41%
Total	62	100%

Alumina Refiners – Growth Trend

Leading Alumina Refiners – 2000 and 2004



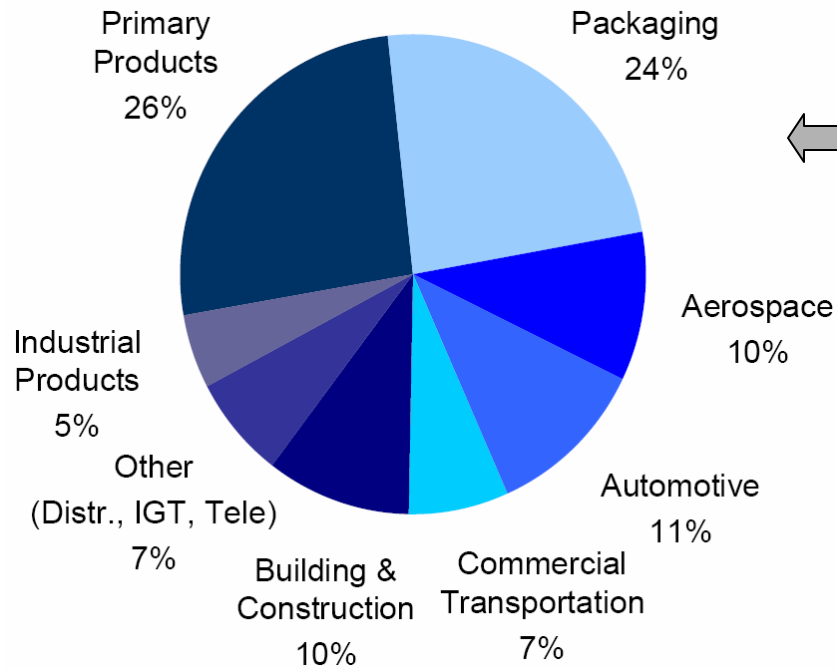
Primary Aluminum – Key Producers



Worldwide production in 2004 was about 30 kT

Ten largest producers account for one-half of total industry production

Key Competitors - Alcoa

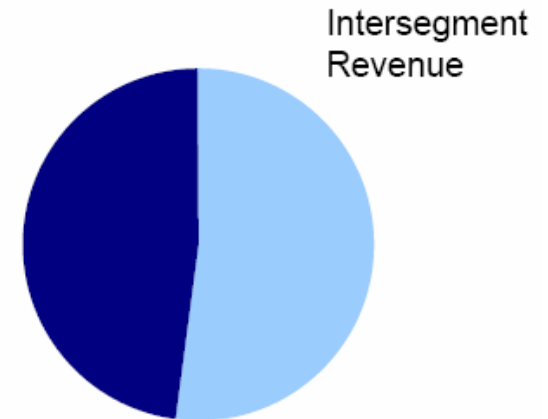


Alcoa: revenues by market as of Q1 2005

Primary products account for more than one-half of consolidated revenues – 26% from sales to third parties and the balance from internal sales to other Alcoa businesses for additional processing before sale to third parties.

Breakout of Alcoa Primary Products

3rd Party Revenue



Key Competitors - Alcoa

Competitive Positions as of Q2 2004

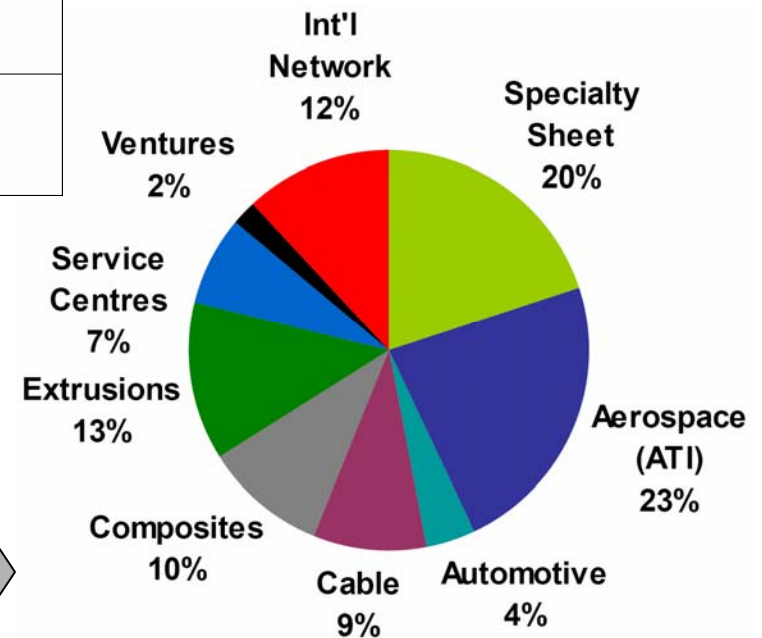
	Business/Product	Global Position
Upstream	Alumina	# 1
	Aluminum	# 1
Fabricated Products	Rolled Products	# 2
	Extruded Products	# 1
	Forged Products	# 1
	Investment Castings	#1
	Specialty Fasteners	#1
Packaging	Consumer	# 1 in NA
	Non-Consumer	Top 10

Key Competitors - Alcan

Business Groups	Revenues * (billions)	Number of Employees	Number of Countries	Capital Employed** (billions)
Bauxite & Alumina	US \$3.1	4,500	11	2.9
Primary Metal	US \$6.9	18,000	15	8.2
Engineered Products	US \$3.5	12,000	36	2.7
Packaging	US \$6.0	34,000	27	5.7

* Fiscal year 2004 adjusted to reflect inter-segment sales

** 2004 Year-end Pro-forma



Revenue Breakdown by Product/Industry



Appendix

- China – Aluminum Industry Overview

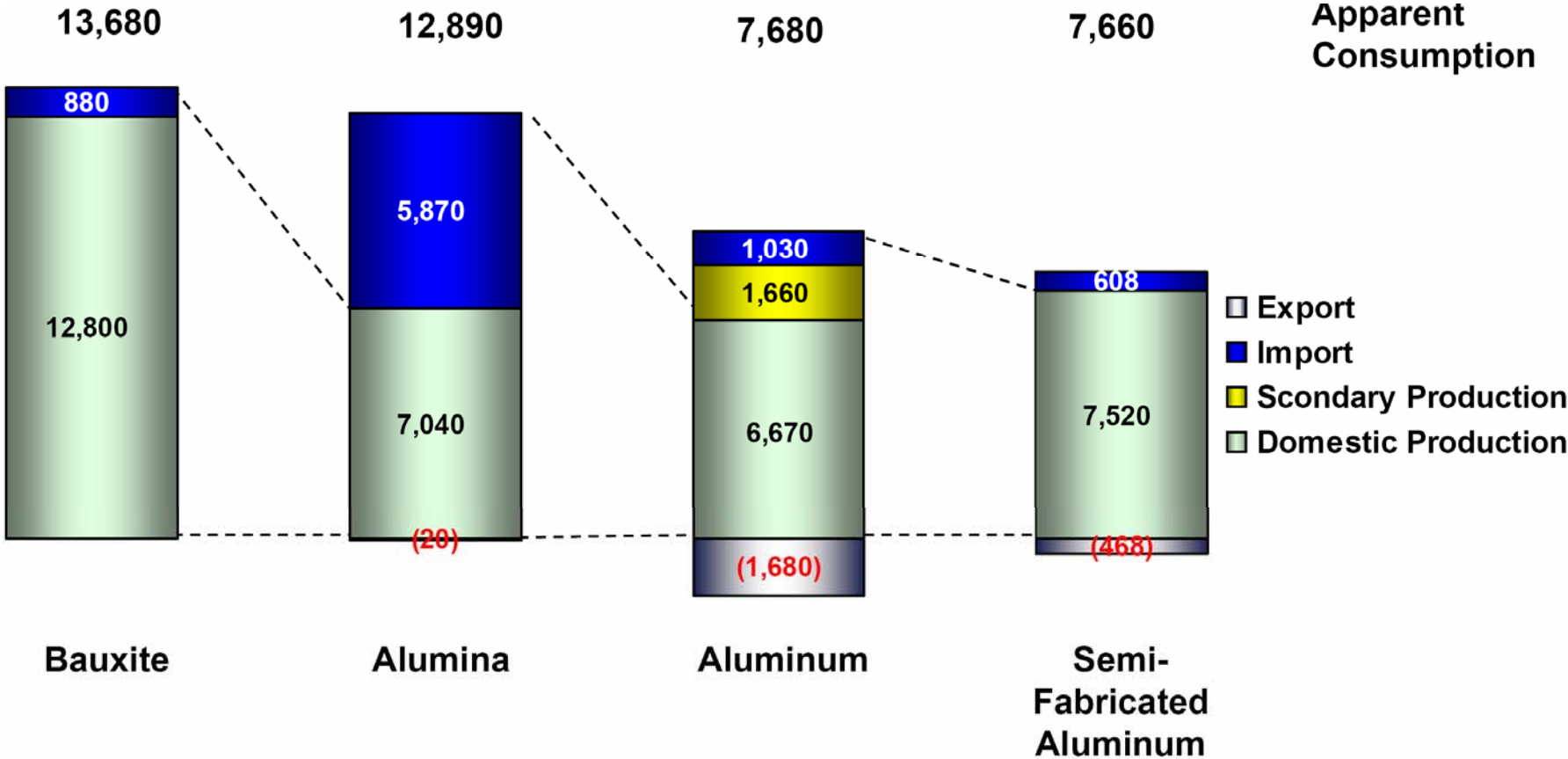
China – Industry Overview

- Major driver for growth in aluminum industry in China is economic boom and growth in per capita income; also, tax and other incentives for aluminum exports that have recently been reversed
- Due to relatively high levels of silica in bauxite reserves, alumina production costs are higher in China than in many other producing countries.
 - In 2004, 46% of the alumina consumed in China was imported.
- China's low labor costs and abundant sources of energy provided attractive fundamentals for aluminum smelting operations.
 - Massive growth in China's aluminum productive capacity was accompanied by government regulations that encouraged exports, including no import duties levied on alumina and tax rebates for aluminum exports.
- Favorable conditions for aluminum production and exports, combined with unfavorable conditions for alumina production, encouraged large-scale aluminum "tolling".
 - 80% of China's total aluminum exports (about 1.7 million tons in 2004) were "tolled".

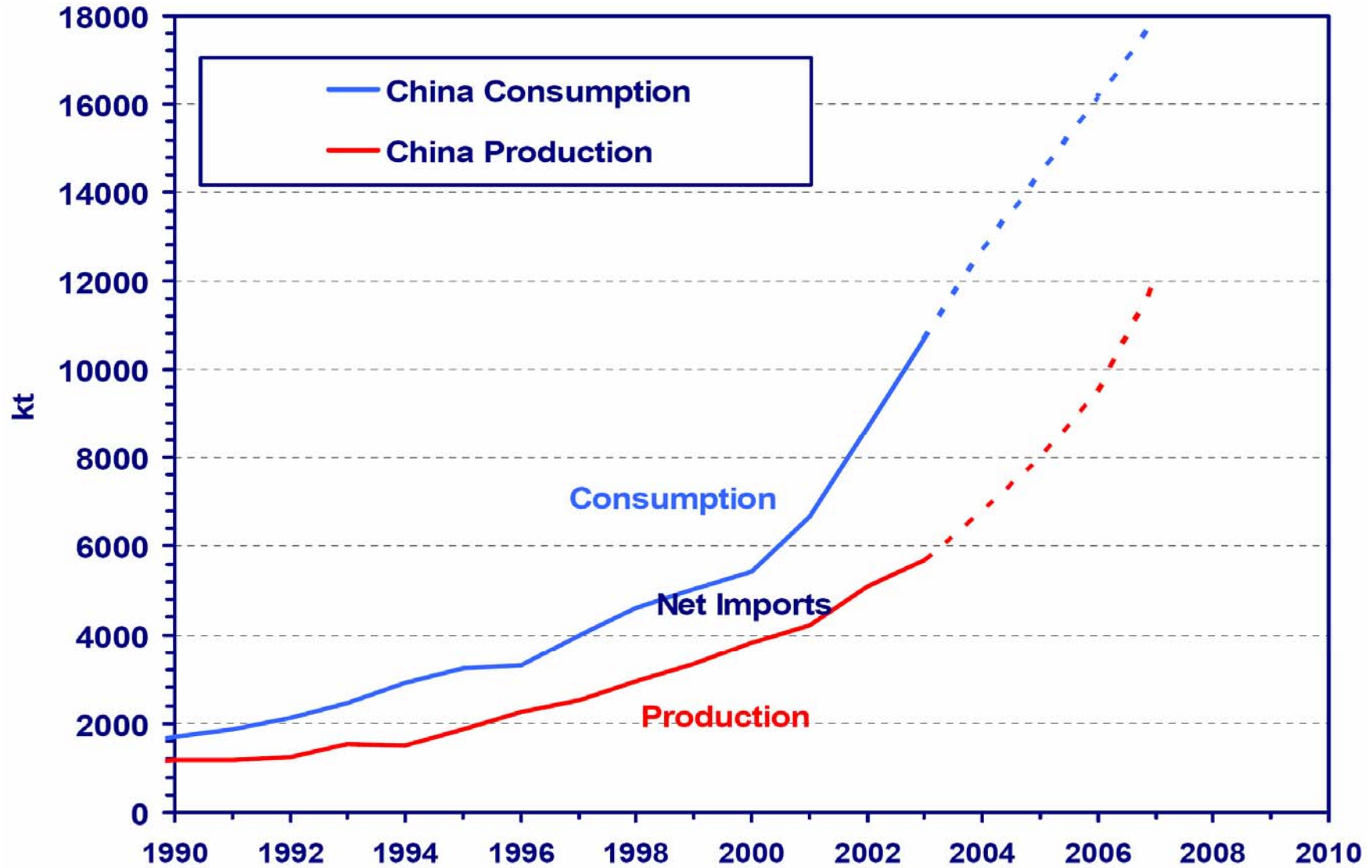
China – Industry Overview

- With looming shortage of electric power and increased power costs, the government has moved to restrict energy resources used for aluminum production in favor of other economic needs.
 - In January 2005, the government abolished the 8% export tax rebate and imposed a 5% export tax on aluminum.
 - In August, the export tax was increased to 17% and an import duty of 8% on alumina was imposed.
 - These measures will have a gradual effect, as toll agreements already under contract are not affected.
- In the last five years, China has moved from a net importer of aluminum to a significant exporter
 - Despite new government regulations, production growth is expected to push net exports higher until 2007.
 - Regulations and growing demand are expected to make China a net importer of aluminum again, by 2010.

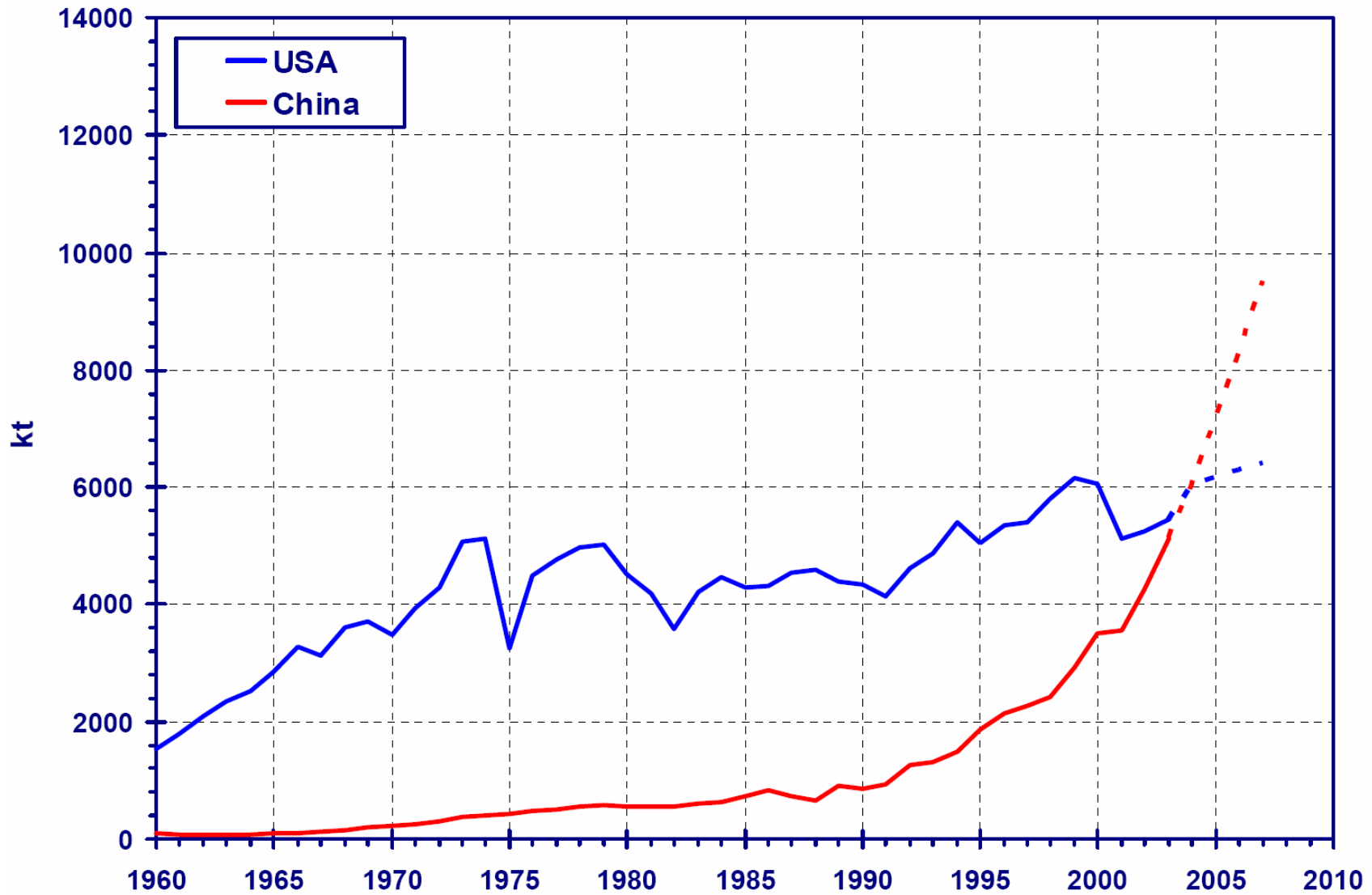
China - Supply Across Aluminum Value Chain in 2004



China – Alumina Supply / Demand



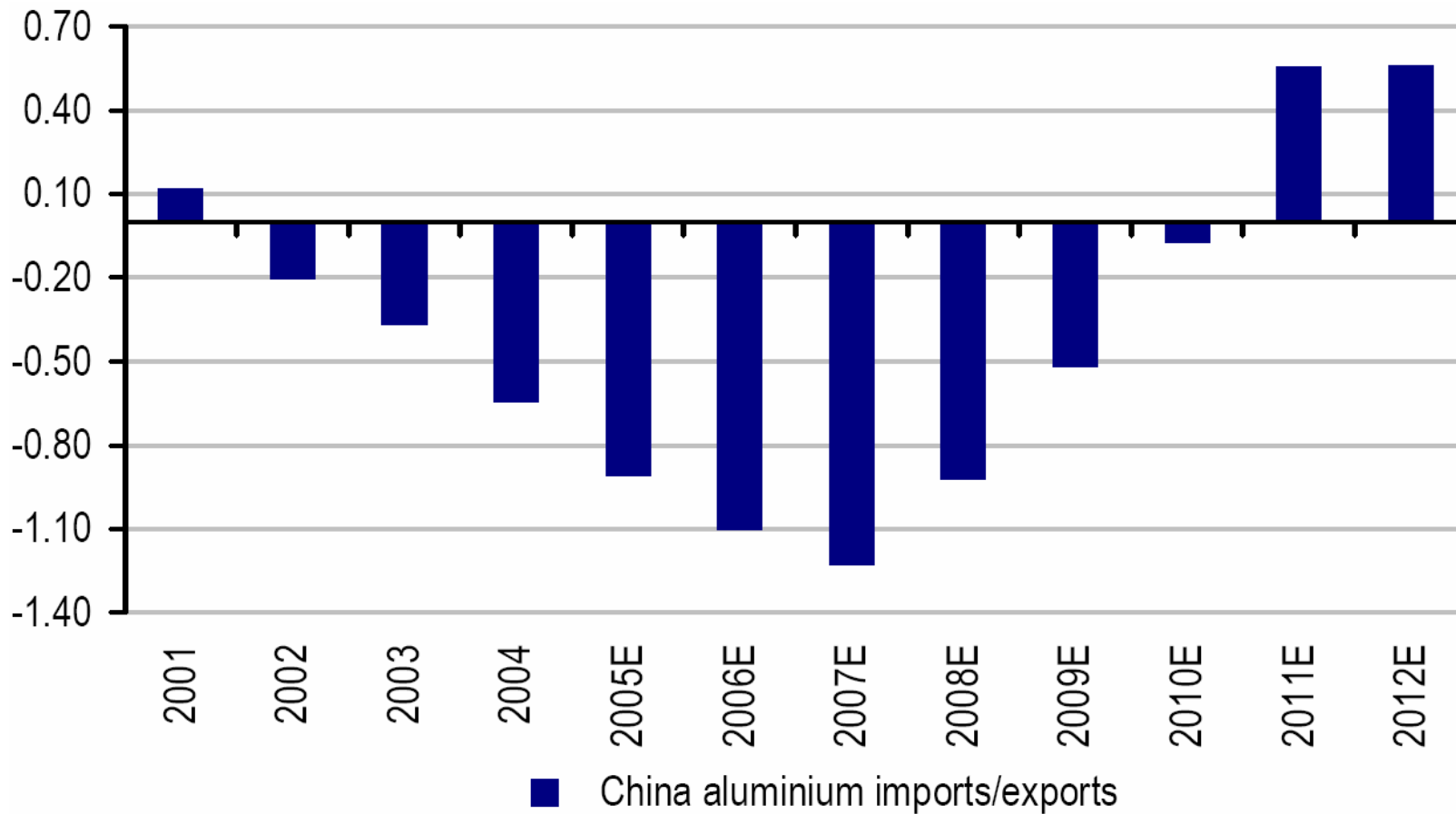
Primary Aluminum Consumption



China is expected to be the primary driver of global aluminum consumption over the next one to two decades

China - Supplemental

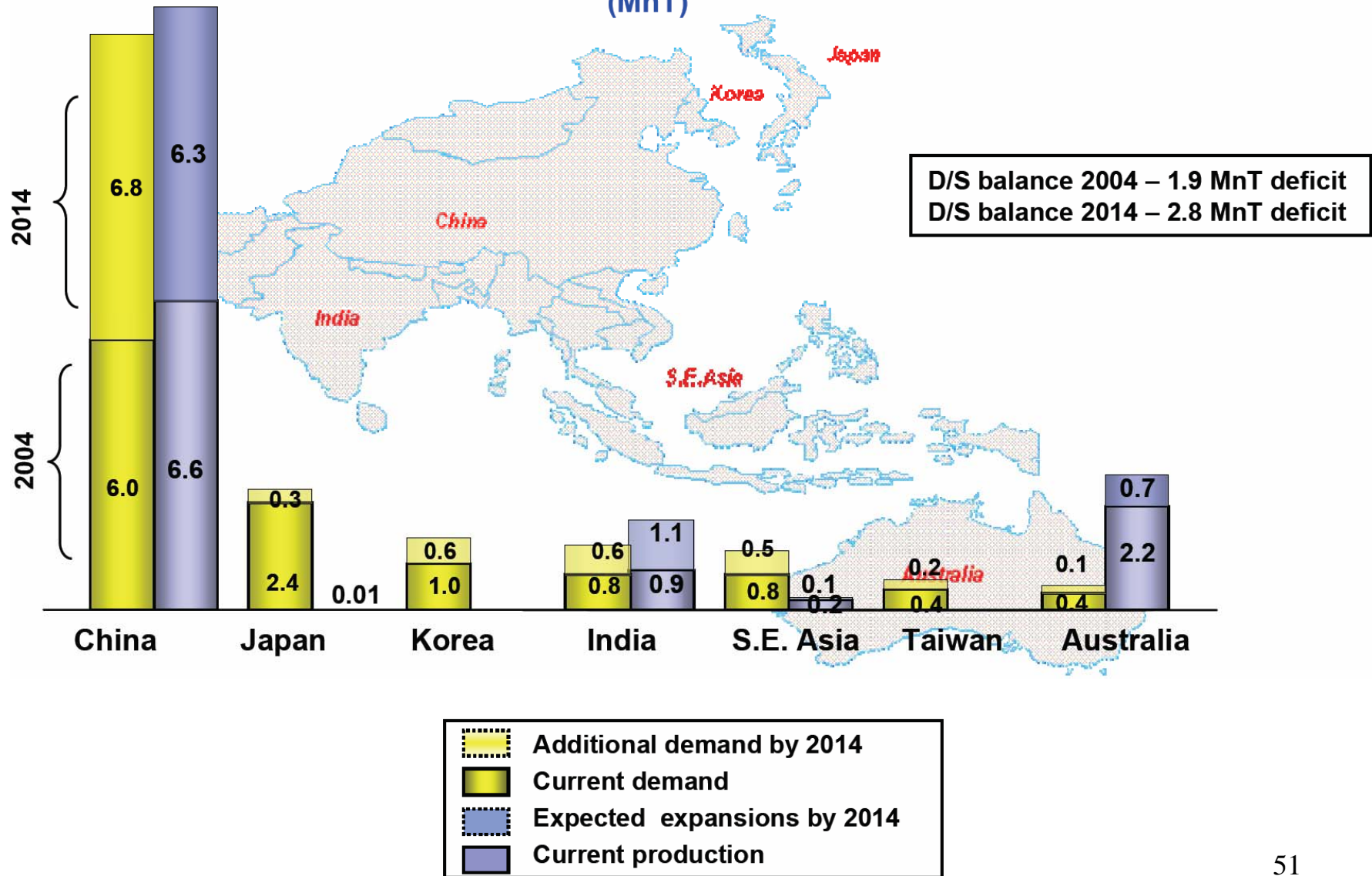
China Aluminum Net Imports/Exports



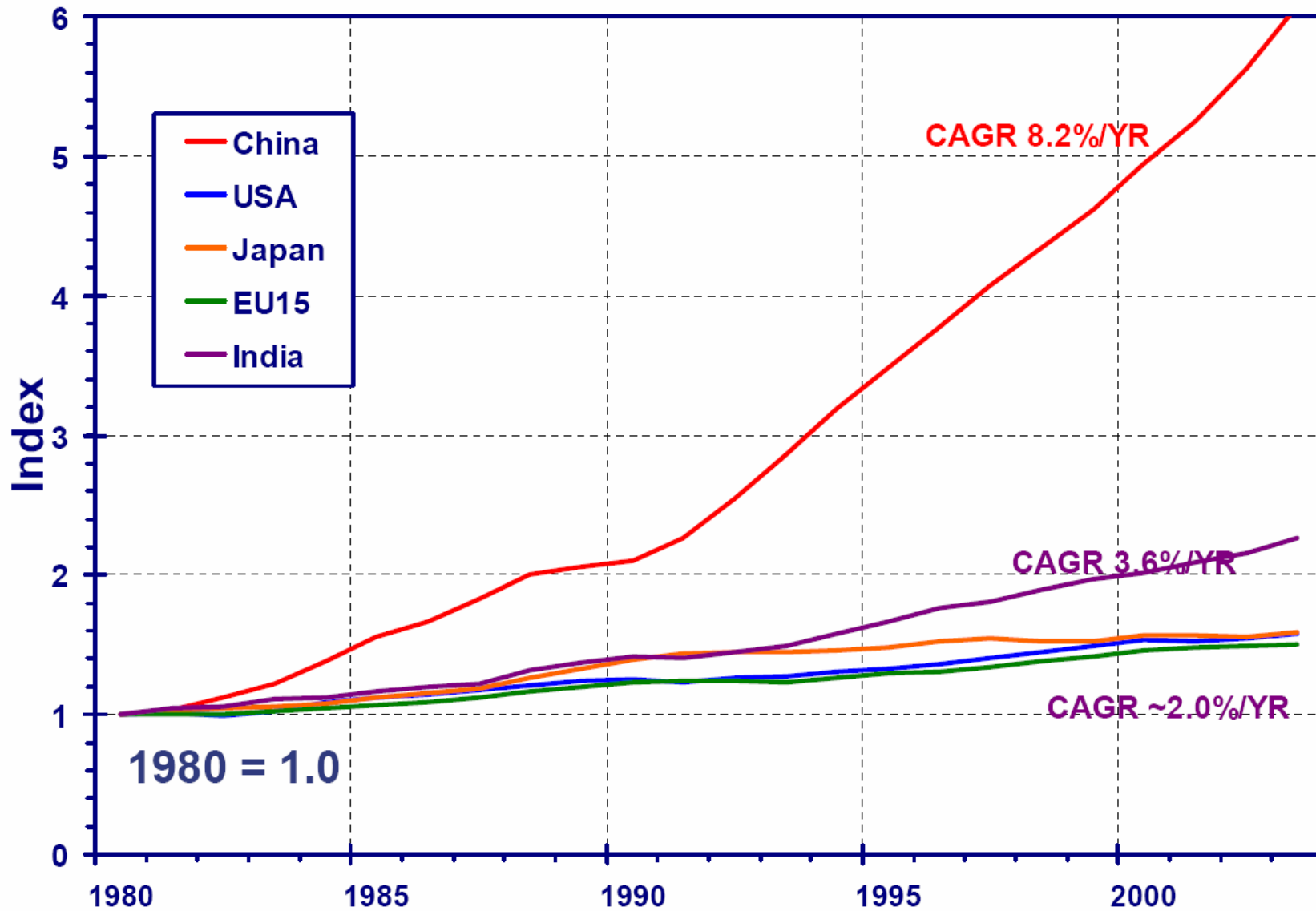
China Primary Metal Production Growth Expected to Match Demand Growth

Projected Primary Metal Balance in AsiaPac: 2004-2014

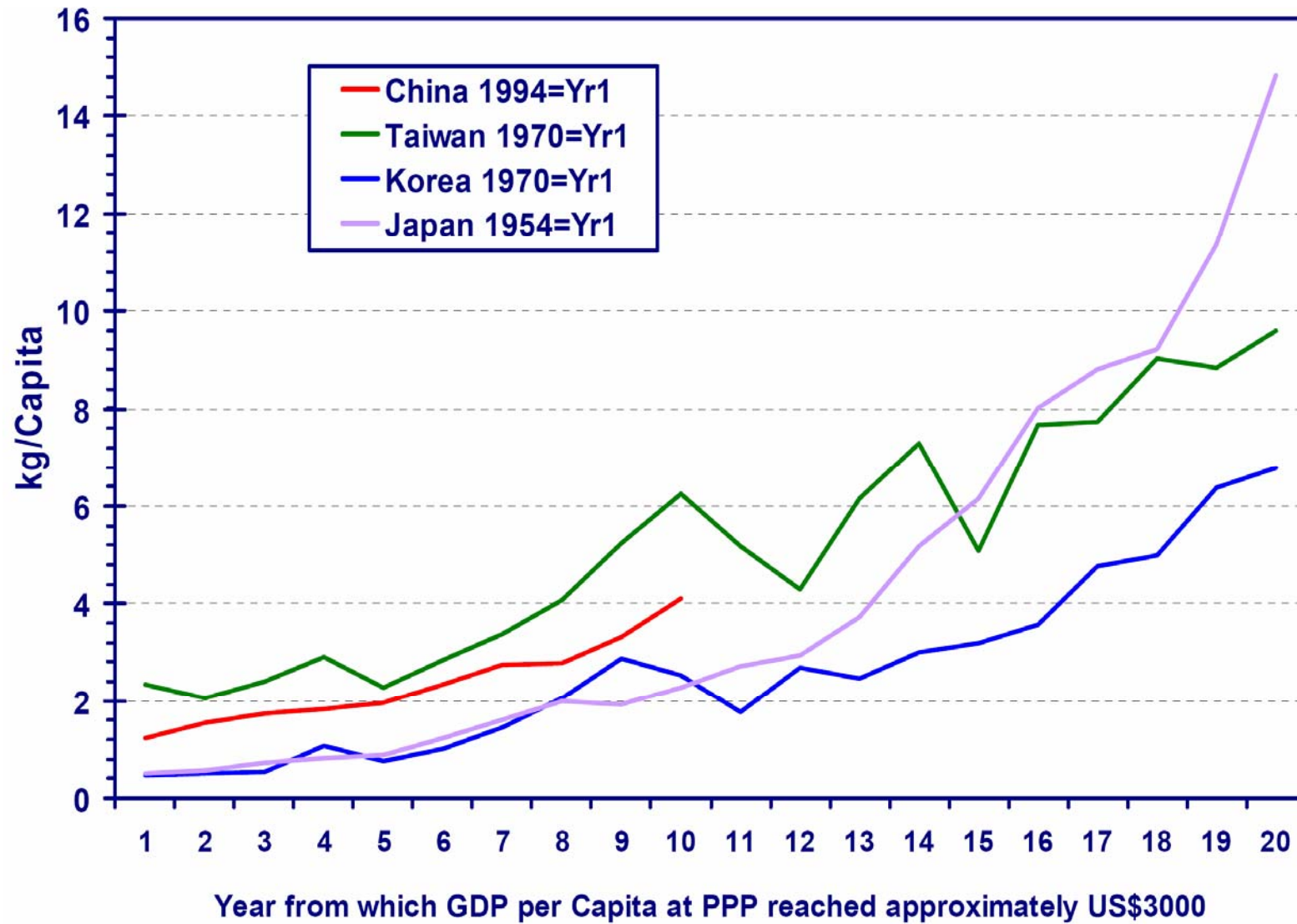
(MnT)



China GDP Growth



Growth in per Capita Aluminum Consumption



Sources

Slide #	Source
5	UBS Investment Research, August 11, 2005 Rusal, January 2005, "Asia- The Only Future? A Producer's Perspective"
8	Alcan, June 10, 2005, "Presentation to Investors"
9	Alcoa, April 2005, 1st Quarter Analyst Conference
10-12	UBS Investment Research, August 11, 2005
13	Rusal, January 2005, "Asia- The Only Future? A Producer's Perspective"
14	Rusal, January 2005, "Asia- The Only Future? A Producer's Perspective"
16	Alcan, December 7, 2004, Bauxite & Alumina Alcoa, March 2004 "Alcoa World Alumina Australia"
17	Alcan, December 7, 2004, Bauxite & Alumina
18-19	Alcoa, March 2004 "Alcoa World Alumina Australia"
21	Alcan Presentation to Investors, June 10, 2005
22	Alcan, December 7, 2004 Alcan Primary Metal
23	UBS Investment Research, August 11, 2005
24	Alcan Presentation to Investors, June 10, 2005
25	Alcan Presentation to Investors, June 10, 2005
27	UBS Investment Research, August 11, 2005
28	Alcoa 2004, "Alcoa's North American Primary Businesses"
29	Alcan May 25, 2005 "A New World of Opportunity"
30	Alcoa June 2005, "Merrill Lynch Global Refining"
31	CRU October 2003

Sources

Slide #	Source
32	Alcan May 25, 2005 "A New World of Opportunity"
33	CRU October 2003
34	Alcoa September 21, 2005 "Merrill Lynch China...Conference"
38	Alcan, December 7, 2004, Bauxite & Alumina
39	Rusal June 13, 2005 "Rusal's Growth Strategy"
40	Aditya Birla Group August 2005, "On a Sustainable High Growth Path"
41	Alcoa, April 2005, 1st Quarter Analyst Conference
42	Alcoa, May 2004 "A Global Leader"
43	Alcan May 25, 2005 "A New World of Opportunity"
47	Alcoa September 21, 2005 "Merrill Lynch China...Conference"
48	Alcan December 7, 2004 "China Update"
49	Alcan December 7, 2004 "China Update"
50	UBS Investment Research, August 11, 2005
51	Alcoa September 21, 2005 "Merrill Lynch China...Conference"
52	Alcan June 7, 2004 "Primary Aluminum - the China Syndrome"
53	Alcan June 7, 2004 "Primary Aluminum - the China Syndrome"