

**Mining & Metals
Global
Special Report**

Base Metals

A Mixed Bag

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Related Research

- [Base Metals: Are We There Yet?, Dec. 17, 2007](#)

Overview

US dollar declines, cost inflation, power shortages and other disruptions to production have resulted in some metals prices reaching new peaks in 2008 despite new supply and weakening demand from the United States and Europe. Demand from China and other developing nations continues to drive strong growth in consumption.

Price volatility, intensified by tight supply, is expected to persist over the short-to-medium term.

Constraints to earnings include: declining ore grades; rising energy and fuel prices; capital costs, consumable and labor costs inflation; and increasing governmental and non-governmental public action to curtail production. As supply pressures ease, there may be opportunities to improve efficiency and lower production costs, but Fitch does not expect cost pressures to ease in the medium term. Persistent weakness in the US dollar tends to adversely affect margins, especially where costs are incurred in Australia, Canada, Brazil and Europe. By-product metal credits—particularly from molybdenum or gold—should continue to strongly benefit earnings.

The ratings outlook on the industry is stable.

What to Watch

Tighter credit generally appears to be affecting trading and stocking activity and may lead to market distortion.

Declines in US residential construction and automotive sales are translating to declines in US demand for copper, aluminum, nickel and zinc.

China accounts for 20%–35% of the world's consumption of base metals and continued fixed-asset investment underpins strong demand growth. Efforts to slow down the economy to rein in inflation may affect metals demand.

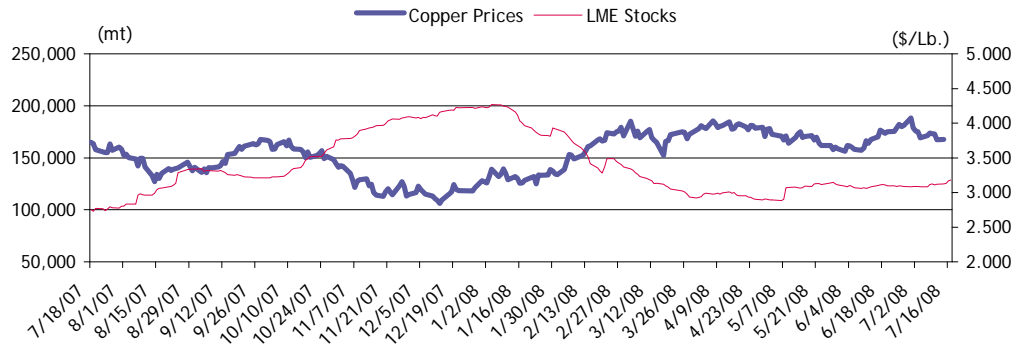
China's production was hampered in February by extraordinarily heavy snows and again in May with the earthquake. Production cuts of 5%–10% for some metals are expected during August to cut pollution and conserve power. In all Fitch does not expect these disruptions to have a significant or lasting effect.

Analysts' Metals Price Forecasts

	Spot	2H08	2009	2010
Copper \$/lb.	3.74			
Median		3.45	3.06	2.75
Mean		3.48	3.26	3.02
Forward		3.64	3.54	3.40
Gold \$/oz	961.81			
Median		936.50	944.00	825.00
Mean		930.36	939.77	882.27
Forward		978.10	991.54	1,028.00
Moly \$/lb.	33.88			
Median		33.13	25.00	15.00
Mean		30.31	25.14	18.8
Aluminum \$/lb.	1.41			
Median		1.32	1.34	1.30
Mean		1.34	1.35	1.31
Forward		1.44	1.49	1.53
Nickel \$/lb.	9.25			
Median		11.75	10.86	9.30
Mean		11.78	10.98	9.49
Forward		9.28	9.29	9.05
Zinc \$/lb.	0.81			
Median		0.98	0.91	0.91
Mean		0.99	0.93	0.88
Forward		0.91	0.84	0.86

Mt – Metric ton.
Source: Bloomberg as of July 17, 2008.

Copper Prices and LME Stocks
(July 18, 2007–July 17, 2008)



Mt - Metric ton.
Source: London Metal Exchange (LME).

Copper — 2007 Production

	000 mt	Share %
Corporacion Nacional Del Cobre de Chile (Codelco)	1,665	9
Freeport-McMoRan Copper & Gold Inc.	1,466	8
BHP Billiton plc	1,181	7
Xstrata plc	987	5
Rio Tinto plc	738	4
Anglo American plc	655	4
Southern Copper Corporation	592	3

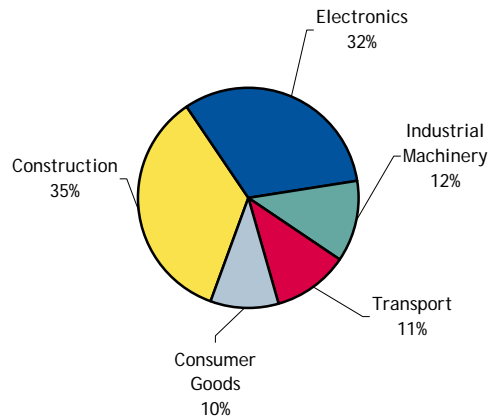
Mt - Metric ton.
Source: Company figures, Fitch calculations.

Copper — Constrained Supply

The copper market, at 18.1 million metric tons (mt) in 2007, is exhibiting continued tightness in the face of robust demand from China, India and Russia; declining demand from other industrial economies; and limited new supply. China, accounting for about 25% of world consumption in 2007, should continue to show growth driven by the building of power generation facilities and the upgrading of urban infrastructure. By comparison, the United States accounts for about 12% of world consumption; 40% of American demand comes from automotive original equipment manufacturers and about 30% comes from construction. Fitch expects copper consumption to grow by about 4% annually over the next 18–24 months, driven by growth in developing nations.

Copper has been seeing demand destruction as a result of sustained high prices and short supply. In

Uses of Copper



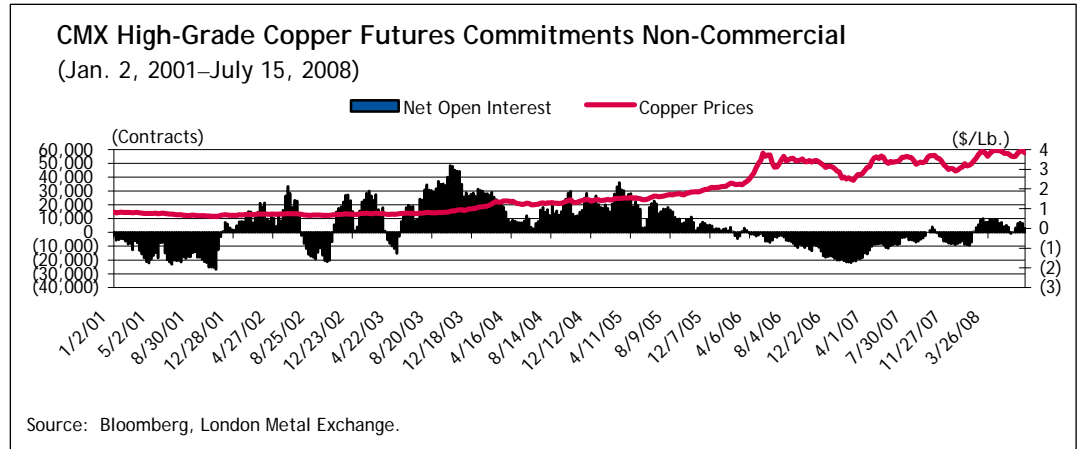
Source: Brook Hunt.

ICSG Outlook for World Copper

(Thousand mt)

	2005	2006	2007	2008	2009
Mine Production	14,925	14,987	15,441	16,409	17,919
Adjusted Refined Production	16,581	17,323	18,083	18,578	19,878
Copper Usage	16,730	17,051	18,137	18,493	19,449
Refined Production - Usage Balance	(149)	272	(54)	85	429

Mt - Metric ton. Source: International Copper Study Group (ICSG).



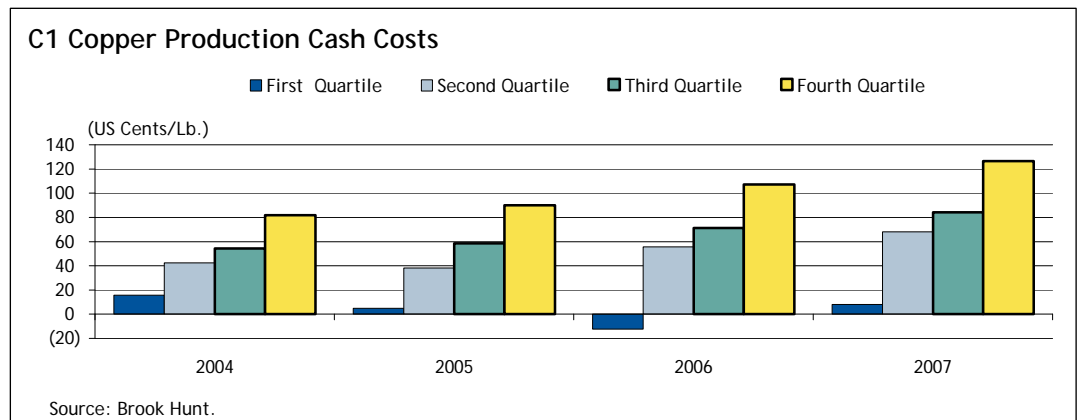
particular, there has been substitution in plumbing applications with polyvinyl chloride tube, and replacement by thinner-walled, narrower tubes in air conditioning applications. Copper can be replaced with aluminum in power cables and electrical equipment, and optical fiber in telecommunications. Fitch estimates that annual demand on the order of one million mt has been replaced by aluminum or plastics over the past five years.

Supply response has been limited by strikes, natural disasters, declining ore grades and operating delays. Production has undershot expectations by 4% annually over the past four years and by 5% in 2007. Additional production is expected this year from new projects (annual production at full capacity): Codelco’s Gaby (150,000 mt) and Andina (120,000 mt); Equinox Minerals’ Lumwana (169,000 mt); and Oxiana’s Prominent Hill (90,000 mt). Secondary production has been increasing with prices but should remain steady.

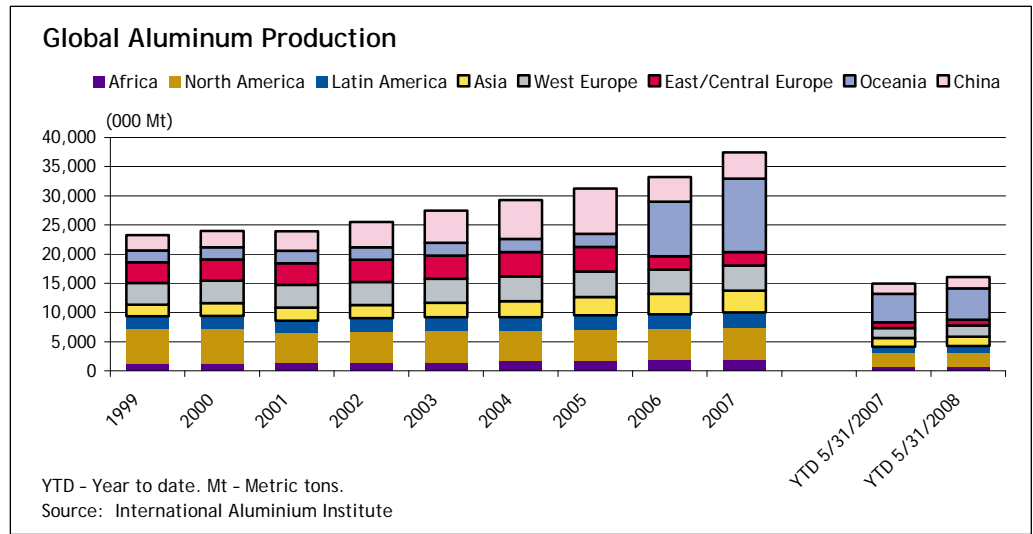
Fitch expects copper supply to grow about 3% annually in the short run given continued production disruptions; overall the copper market should remain relatively tight over the next 18–24 months. Prices could moderate further but should remain at historically high levels.

Speculative demand tends to amplify price moves from supply disruptions (even those of a temporary nature) and thus adds volatility to the market.

Production costs benefit from molybdenum, gold and other by-product credits. Costs have increased with prices as it becomes economic to mine lower grades, but more



recently markets for consumables are exhibiting tightness and very high prices. In particular, contract costs for sulphuric acid are up at least \$100/mt this year due to higher fertilizer demand. Given that solvent extraction/electrowon (SxEw) production consumes 2.1 mt for each mt of copper produced; cash costs are up \$0.10/lb. for acid costs alone. Natural gas prices influence explosives costs and oil prices affect freight and haulage costs. On average, production costs are up 60% over the past four years. The costs of capital expenditures were up about 45% over the past two years.



Aluminum — 2007 Annual Capacity

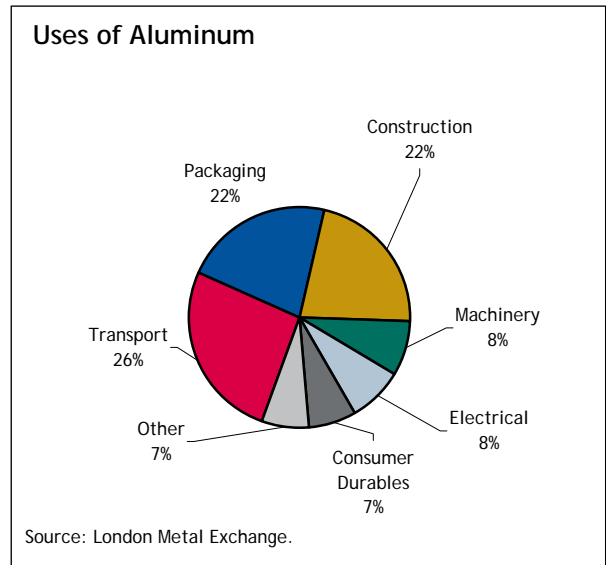
	Mil. mt	Share %
Rusal	4.2	10
Rio Tinto Alcan	4.1	10
Alcoa	3.8	9
Chalco	3.2	8
Norsk Hydro	1.7	4
BHP Billiton	1.3	3

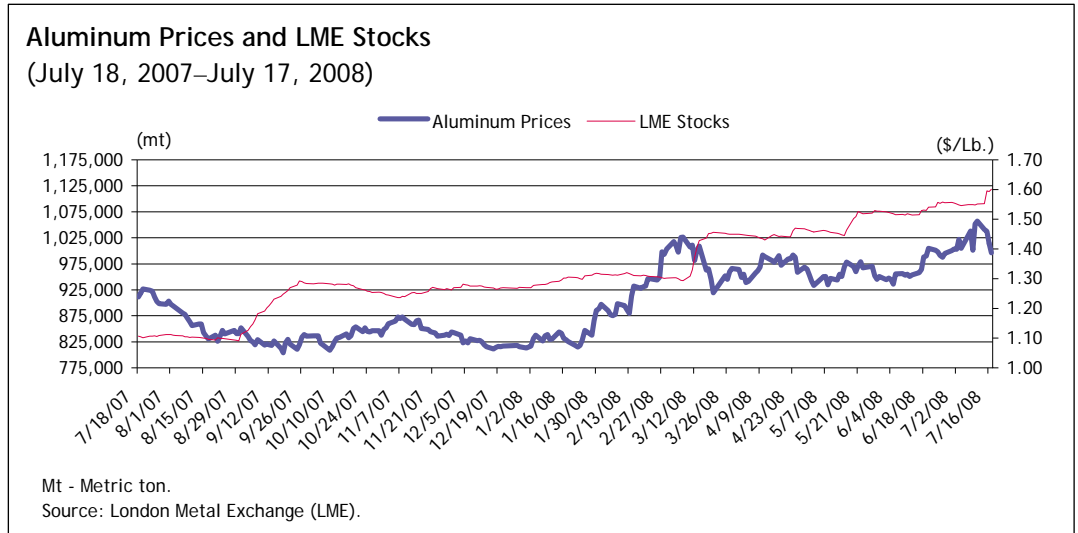
Mt – Metric ton.
Source: Brook Hunt, Company figures.

Aluminum — Supply Growth Constrained by Power

Aluminum, at 37 million mt in 2007, is a relatively small base metal market, about three-quarters of copper by value but less than 10% of the value of world steel consumption. The market dynamics of aluminum behave more like a processed commodity such as steel rather than another base metal such as copper, nickel or zinc given the lack of supply-side constraints and short lead times. New production capacity has surged, primarily where energy is relatively cheap or stranded (Iceland, the Middle East and Russia) or where capital costs are low (China). Idled capacity restarts have been significant as well, particularly in the United States and China where current high metal prices overcome the relatively high costs of power. This swing capacity is very price-sensitive.

The United States accounts for about 18% of world aluminum demand and consumption has fallen with weakness in the US housing and automotive markets. The Aluminum





Association reports that North American demand was off 4% in 2007 and consumption fell 6.3%. The association reports that North American demand was down a further 3.6% in the first quarter of 2008 compared with the first quarter of 2007.

China accounts for 33% of world consumption, and growth there as well as in other transitional economies is expected to continue to be robust. In particular, China's demand grew 39% in 2007 and is expected to grow 25% in 2008.

Aluminum manufacture (including alumina smelting) is energy-intensive with power accounting for about 40% of total costs. Given this dominance, the industry cost curve has been both rising and flattening, tending to underpin current prices.

Power constraints in South Africa have been limiting that country's aluminum production; South Africa accounts for about 2% of global production. A bigger concern is China, which accounts for 33% of global production. Production was cut 10%–15% in the first quarter when power was interrupted due to disruptions in coal shipments caused by the February 2008 storms. Output capacity has recovered but producers have promised a further production cut during August.

Fitch expects aluminum demand and supply to show a slight surplus.

Nickel—Demand to Rebound

Nickel — 2007 Production

	000 mt	Share %
MMC Norilsk Nickel	295.0	20
Vale	247.9	17
BHP Billiton plc	175.8	12
Xstrata plc	123.9	9
Jinchuan	109.3	8
Eramet	59.8	4
Anglo American	25.6	2

Mt – Metric ton.
Source: Company figures.

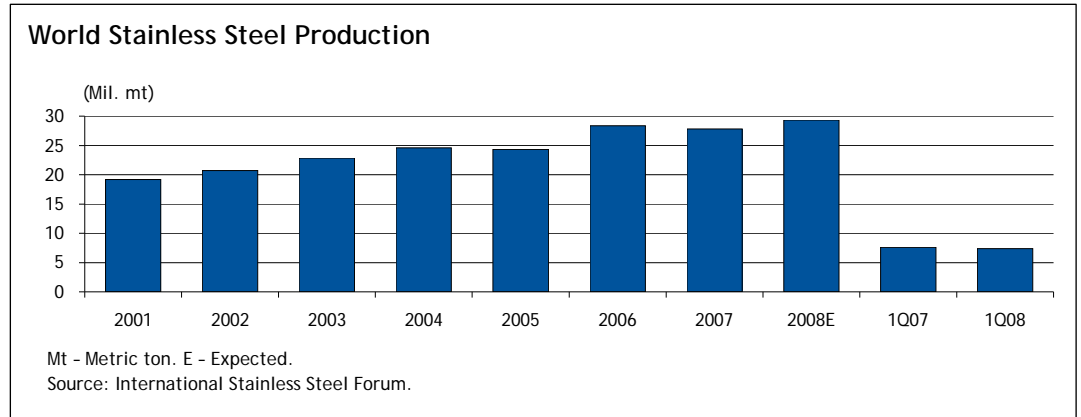
INSG Outlook for Nickel

(Thousand mt)

	2005	2006	2007	2008
Primary Nickel Production	1,296.7	1,352.2	1,449.1	1,540.0
Primary Nickel Usage	1,246.9	1,394.9	1,298.7	1,466.5
Balance	49.8	(42.7)	140.4	73.5

Source: International Nickel Study Group (INSG).

Nickel, at 1.4 million mt in 2007, compares at 19% of the copper market by value. Its primary use is in the manufacture of stainless steel (65%). It is also used in steel alloys and superalloys (12%), which have a major role in the development of the chemical and aerospace industries.

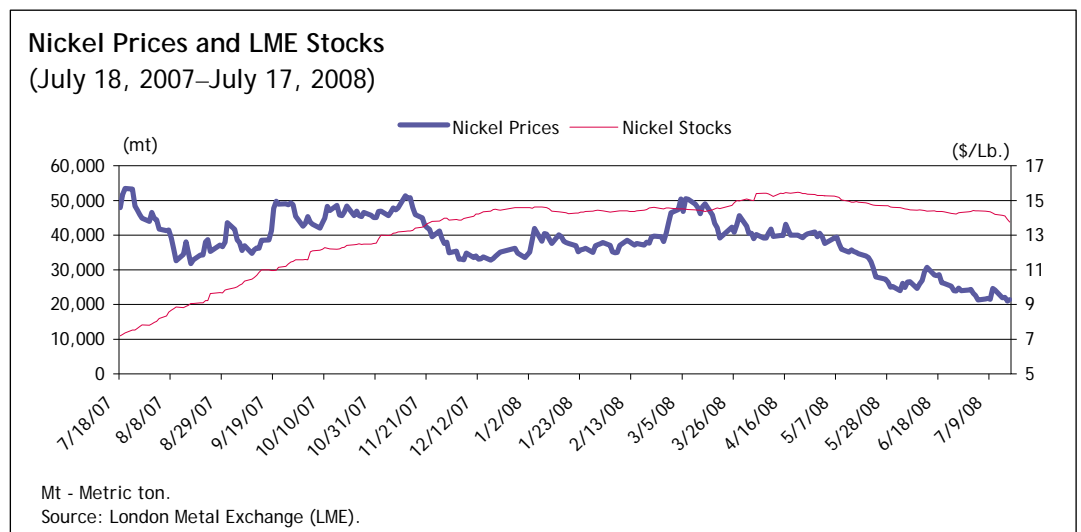


Chinese consumption of stainless steel has increased significantly over the past few years, and China has limited and low-quality nickel resources of its own. New stainless steel capacity additions scheduled in China are expected to drive strong nickel demand over the medium term.

2007 saw global consumption decline given destocking and some substitution. Nickel has suffered temporary substitution when prices are high: aluminum, galvanized steel and carbon steel are used in place of stainless steel; scrap nickel is used in place of primary nickel; and low-nickel or no-nickel alloys are used with greater penetration. Demand is expected to be up over 6% annually over the next 12–18 months due to restocking as well as demand from China’s stainless steel mills.

Primary nickel production is estimated to increase steadily, by 6% in 2008. The completion of the expansion at Yabulu in Australia is expected to add nickel production in 2008, eventually reaching 45,000 mt of capacity, and to contribute to increased refined nickel production in 2008. However, the early closure for maintenance of the Kalgoorlie smelter in Australia in the second half of 2008 is expected to offset some of this gain.

Fitch expects nickel prices to remain volatile but to trend downward as new production comes on stream. Should prices remain below \$10/lb. we would expect some supply destruction.



China has made increasing use of nickel pig iron in the manufacture of stainless steel. Crude nickel pig iron containing 2%–4% nickel requires a \$12–\$14 per pound nickel price and mainly replaces scrap. The use of electric arc furnaces to increase the nickel content increases energy costs and still requires nickel at over \$10/lb. to cover costs.

Zinc — Near-Term New Mine Supply

Zinc — 2007 Production

	000 mt	Share %
Xstrata plc	843.7	7
Teck Cominco	699.0	6
Glencore	618.3	5
Zinifex	607.5	5
Hindustan Zinc	426.0	3

Mt - Metric ton.
Source: Company figures.

ILZSG Zinc Outlook

(Thousand mt)

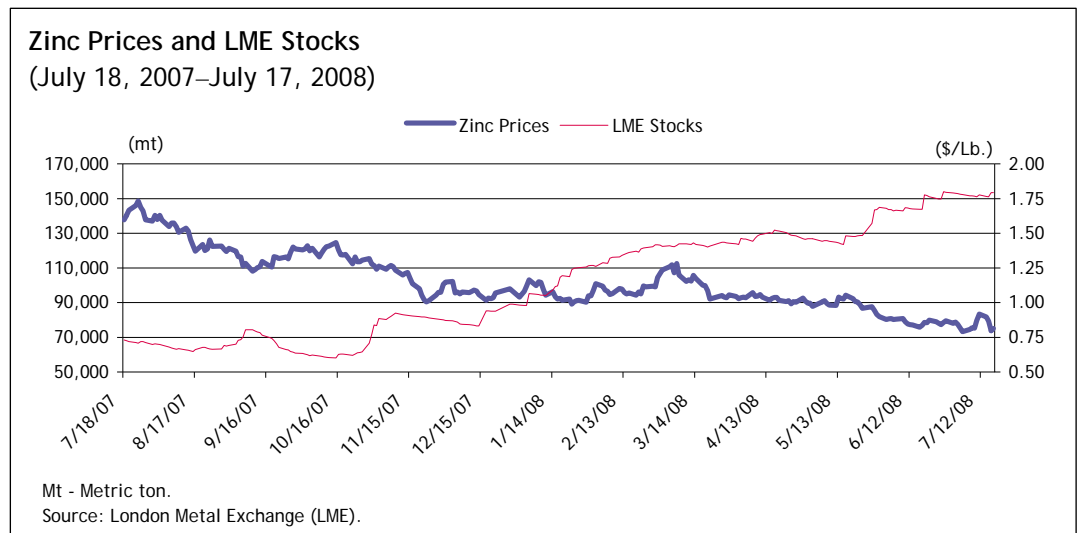
	2005	2006	2007	2008
Mine Production	10,156	10,479	11,180	12,080
Metal Production	10,224	10,645	11,346	12,060
Metal Consumption	10,612	11,012	11,344	11,850
Balance	(388)	(367)	2	210

Source: International Lead and Zinc Study Group (ILZSG).

Zinc, at 12.1 million mt in 2007, is smaller than the nickel market by value. Zinc is primarily (50%) used to galvanize steel to prevent corrosion. It is also used in the manufacture of brass and bronze (17%) and die-cast alloys (17%). The primary end uses of zinc are construction (45%) and transportation (25%).

China is a significant producer of mined and refined zinc (roughly 33% of global production), and was a net exporter of the metal until 2004. More recently, a ramp-up of galvanized steel production resulted in periods where China was a net importer of concentrate and refined zinc. In the first five months of 2008 China's net imports of refined zinc metal were 18,000 mt, which compares with net imports of 114,000 mt for the first five months of 2007.

Global consumption grew about 3% in 2007; China's consumption is estimated to have grown by 15% while consumption in the United States declined by 9%. North America was about 11% of consumption, compared with China at 31%. Consumption this year through May 2008 is up nearly 1% over the same period of 2007 despite weakness in North America and an 8% decline in Europe.



In response to the high price environment through the end of 2006 several new mining projects were developed. Apex Silver Mines Ltd.'s San Cristobal operation in Bolivia began production in August 2007 and will ramp up over the 18 months to its annual capacity of 235,000 mt. In all, mines with eventual capacity of 502,000 mt started in 2007; mines accounting for a further eventual capacity of 235,000 mt are currently scheduled for completion this year.

Currently, the market looks to be in surplus but may become more balanced with reduced production or delays in development. In July 2008, AIM Resources Limited suspended development of the Perkoa Zinc Project in Burkina Faso until zinc prices and funding opportunities improve.

With the price declines over the past year and expectations of a surplus, some high-cost operations are expected to be shuttered. In particular, the Lennard Shelf Pillara zinc mine in Western Australia with annual capacity of 80,000 mt will close. The mine is a joint venture between Xstrata plc and Teck Cominco Ltd.

Appendix I: Key Rating Criteria in Analyzing Mining Companies

In addition to Fitch's standard corporate methodology, we consider the following when analyzing companies in the metals and mining sector.

Diversity — Diversification by mine/operation, product and geography; economies of scale; operating flexibility; ability to withstand downturns in specific product cycles and end-customer sectors; and the risks of product substitution.

Production

- **Costs** — Cost advantages/disadvantages arising from: orebody, raw material or labor sources; transportation; operating efficiency; degree of pricing power; smelting and refining; and cost of capital.
- **Operating Risk** — Mining method, ore-processing technology, and metallurgy.
- **Exploration and Development** — Geology, engineering, metallurgy, risk-sharing partnerships, capital and operating costs.
- **Mine Reserves** — Valuation analysis including assessing public disclosure, basis of reporting, and evaluating historical experience.
- **Project Pipeline** — Evaluating the organic growth potential and its financial effect as demonstrated by capital budgeting.

Sustainability — Given the long-term nature of many mining assets, the following aspects require assessment:

- **Corporate Governance** — Quality of disclosure, ownership structure, management experience and transparency.
- **Environmental, Health and Safety Considerations** — Practices, monitoring and reporting relative to international benchmarks; current provisions and legacy liabilities; trends in new regulation.
- **Social and Political Issues** — Sovereign and political risks which may affect repatriation of cash, recognition of mining rights and concessions, or disrupt operations; non-governmental organization or local citizen action to halt or discourage development or operation.
- **Financial Profile** — Ability to maintain satisfactory credit metrics and manage cash flows across a downcycle.

Project Finance — Specific risks associated with mining projects (see the Criteria Report, "Fitch's Rating Approach to Mining Projects," dated Jan. 13, 2005, and available at www.fitchratings.com).

Appendix II: Fitch Ratings' Public Ratings of Base Metals Producers

Fitch Ratings' Public Ratings of Base Metals Producers

Issuer	Long-Term Rating	Outlook	Watch	Analyst
Alcoa Inc.	'BBB+'	Stable	—	Monica Bonar
Alcoa Aluminio S.A.	'BBB'	Stable	—	Joseph Bormann
Aluminium Corporation of China	'A-'	Stable	—	Su Aik Lim
Americas Mining Corporation (AMC)	'BBB-'	Stable	—	Joseph Bormann
Anglo American PLC	'A'	Stable	—	Peter Archbold
Clarendon Alumina Production Limited (CAP)	'B'	Stable	—	Joseph Bormann
Companhia Vale do Rio Doce (Vale)	'BBB-'	Positive	—	Joseph Bormann
Corporacion Nacional del Cobre de Chile (Codelco)	'A'	Positive	—	Giovanny Grosso
Freeport-McMoRan Copper & Gold Inc.	'BBB-'	Stable	—	Monica Bonar
Grupo Mexico, S.A. de C.V. (Grupo Mexico)	'BBB-'	Stable	—	Joseph Bormann
Molibdenos y Metales S.A. (Molymet)	'BBB'	Stable	—	Joseph Bormann
Norilsk Nickel	'BBB-'	Stable	—	Peter Archbold
Rio Tinto Plc	'A-'	—	Positive	Peter Archbold
Southern Copper Corporation	'BBB'	Stable	—	Joseph Bormann
Zinifex Limited	'BB+'	—	Positive	Maurice O'Connell
National Scale Ratings				
Companhia Vale do Rio Doce (Vale)	'AA+' (BRA)	Positive	—	Joseph Bormann
Corporacion Nacional del Cobre de Chile (Codelco)	'AAA' (CHL)	Positive	—	Giovanny Grosso
Hindalco Industries Limited	'AA' (IND)	Stable	—	Priyamvada Balaji
Minera Escondida Ltda.	'AAA' (CHL)	Stable	—	Giovanny Grosso

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