Investors should note that Hatch, an experienced consultant in the metals and mining industry, was engaged to prepare the Hatch Report, for use in whole or in part in this prospectus. Hatch prepared its report based on its in-house database, independent third-party reports, publicly available data from reputable industry organizations and data provided by our Company (with respect to the gold resources of the CSH Mine and the copper resources of the Jiama Mine). Where necessary, Hatch contacts companies operating in the industry to gather and synthesize information about market, prices and other relevant information. Hatch has assumed that the information and data which it relied on are complete and accurate.

Hatch has provided part of the statistical and graphical information contained in this Industry Overview. Hatch has advised that (i) some information in its database is derived from estimates from industry sources or subjective judgments; and (ii) the information in the database of other mining data collection agencies may differ from the information in Hatch's database. The information contained herein has been obtained from sources believed by Hatch to be reliable, but there can be no assurance as to the accuracy and completeness of any such information.

Investors should also note that no independent verification has been carried out on any facts or statistics that are directly or indirectly derived from official government and non-official sources. We believe that the sources of the information in this section are appropriate sources for such information and have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information is false or misleading or that any part has been omitted that would render such information false or misleading. The Company, the Sole Global Coordinator, the Sole Sponsor, the Joint Bookrunners, the Joint Lead Managers, any of the Underwriters, any of their respective directors and advisers or any other persons or parties involved in the Global Offering make no representation as to the accuracy of the information from official government and non-official sources, which may not be consistent with other information compiled within or outside the PRC. Accordingly, the official government and non-official sources contained herein may not be accurate and should not be unduly relied upon.

Upon the completion of the Global Offering, our mineral properties will include primarily the CSH Mine and the Jiama Mine. The CSH Mine is one of the largest gold mines in China in terms of mineral resources under the JORC Code, according to the CSH Technical Report. The main products from our CSH Mine are gold dore bars. According to the Jiama Technical Report, the Jiama Mine will become one of the largest copper-polymetallic mining operations in China in terms of ore production rate, total metal production and mineral resources under the JORC Code. The products of the Jiama Mine will include copper concentrate, molybdenum concentrate and lead concentrate. Gold and silver contained in our concentrates can be separated and smelted in downstream processing. The following is an overview of the gold, copper, molybdenum, silver, lead and zinc industries.

# GOLD

Gold (Au) is a precious metal commonly used for the making of jewellery, coinage, and other arts, and is found as nuggets or grains in rocks, in veins and in alluvial deposits. Gold extracting is most economical in large, easily mined deposits. Gold mining and extraction or recovery from its ores may require a combination of comminution, mineral processing, hydrometallurgical and pyrometallurgical processes to be performed on the ore. The detailed steps of the process vary from mine to mine depending upon ore characteristics and ore factors.

Gold produced at mine sites generally takes the form of gold dore bars with between 50% and 90% gold content. Gold dore bars are then sent to a refiner where silver and gold are parted and the gold is refined to commercial-grade gold bullion. Most gold is traded as refined gold (also known as gold bullion) in purity that ranges from 995 to 999 fineness which are produced by a chlorination process and that of higher fineness, by an electrolytic process. Gold is also produced in some mines as part of the process of mining and refining other metals, such as copper.

Historically, gold was used to back paper currencies in monetary systems known as "gold standards". In such money systems, currency issuers guaranteed to redeem notes for a fixed amount of gold. Today, gold is often held as part of an investment portfolio, as it is generally considered to maintain its value over the long term. Throughout history, gold has been particularly desirable during periods of weak economic confidence and inflation. In addition to its use in jewellery, coinage and as a standard for monetary exchange, gold is also an important industrial metal.

Global market flow for gold is illustrated in the following diagram.

#### **Global Market Flow for Gold in 2009**



Source: GFMS

(1) Excluding any delta hedging of central bank options.

(2) Equal to net retail investment.

#### **Global Gold Industry**

# Global supply of gold

Global gold reserves totaled 47 thousand tonnes of gold content in 2009, according to the United States Geological Survey. World gold supply is generally divided into primary gold (i.e. gold produced from ore) supply, official sector sales and secondary gold (i.e. gold produced from gold scrap) supply. World gold supply was 3,513 tonnes and 3,890 tonnes in 2008 and 2009, respectively,

representing an increase of 1.2% and 10.7% year-on-year, respectively according to the World Gold Council.

Primary gold supply was the largest source of gold, accounting for 58.6% and 59.0% of the world total supply in 2008 and 2009, respectively. Overall, world primary gold supply has been declining over the past few years. Secondary gold is also a significant source of gold, accounting for 34.6% and 39.8% of world total gold supply in 2008 and 2009, respectively. The remaining gold was supplied by official sector sales.

# World Gold Supply and Demand 2004-2009

	2004	2005	2006	2007	2008	2009(1)
	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes
Supply						
Primary gold production	2,463	2,522	2,481	2,476	2,409	2,554
Net producer hedging	-427	-86	-373	-444	-349	-257
Total primary gold supply	2,037	2,436	2,108	2,060	2,060	2,296
Official sector sales <sup>(2)</sup>	471	659	367	484	236	44
Secondary gold production	834	889	1,107	956	1,217	1,549
Total supply	3,342	3,984	3,582	3,471	3,513	3,890
Demand						
Fabrication						
Jewellery	2,618	2,704	2,283	2,405	2,187	1,747
Industrial & dental	410	429	458	462	436	368
Sub-total above fabrication	3,028	3,133	2,741	2,866	2,622	2,115
Bar & coin retail investment <sup>(3)</sup>	391	412	421	446	649	440
Other retail investment	-48	-24	-22	-14	213	236
ETFs and the like	133	208	260	253	321	595
Total demand	3,504	3,729	3,400	3,552	3,806	3,386
Inferred investment <sup>(4)</sup>	-162	255	90	-81	-293	504

Sources: GFMS, World Gold Council

(1) Provisional.

(2) Excludes any delta hedging of central bank options.

(3) Equal to net retail investment.

(4) Represents the difference between total supply and total demand.

According to GFMS, global gold mine production grew by 6% in 2009 to a six year high, and China, the U.S., South Africa and Australia were the major primary gold producing countries which accounted for 38.1% of the world total output in 2009.

# Global demand for gold

World gold demand is usually divided into categories such as fabrication, bar and coin retail investment, other retail investment and exchange traded funds and the like. The fabrication industry includes jewellery and industrial and dental. See the chart entitled "Breakdown of World Gold Demand 2004-2009" below.

In 2009, global demand for gold was 3,386 tonnes, representing an increase of 11.0% from 2008. The fabrication industry was the largest gold consuming sector, consuming 2,115 tonnes of gold,

accounting for 62.5% of the world's total consumption. Bar and coin retail and other investment consumed 440 and 236 tonnes of gold, accounting for 13.0% and 7.0% of the world's total consumption, respectively.



Source. World Gold Council

In March 2003, the World Gold Council launched the first ever gold ETFs on the Australian Stock Exchange, providing investors with a new, easy and cost-effective way to access the gold market. Today, gold is traded in the form of securities on stock exchanges in Australia, France, Hong Kong, Japan, Mexico, Singapore, South Africa, Switzerland, Turkey, the United Kingdom and the U.S. Unlike derivative products, these securities are entirely backed by physical gold held mainly in allocated form. These securities have had a major impact on the gold market, representing an annual average of 32% of identifiable investment and 6.5% of total physical demand over the five years ended 2008.

The term "consumer demand" is generally used by the World Gold Council to describe each country's gold demand, which is slightly lower than total gold demand. Gold consumer demand represents gold bought by individuals, e.g. as jewellery and net retail investment.

In 2009, gold consumer demand was 2,424 tonnes, decreasing by 20.5% from 2008. India was the largest gold consuming country which consumed 480 tonnes, or 19.8% of the world's total gold consumption. China was the second largest gold consuming country, consuming 428 tonnes of gold, or 17.7% of the world's total consumer demand. The U.S., Turkey, Saudi Arabia were also large gold consuming countries, according to the World Gold Council.

#### International gold prices

The world gold market comprises gold futures and the gold spot market. The most significant gold futures exchanges are New York Mercantile Exchange (NYMEX), Chicago Board of Trade (CBOT), Tokyo Commodity Exchange (TOCOM), Dubai Gold and Commodity Exchange (DGCX) and Bolsa De Mercadorias and Futuros (BM&F).

Over-the-counter transactions account for the majority of global gold trading. The over-the-counter market, where market makers trade with each other, trades on a 24-hour per day

continuous basis and accounts for most global gold trading. Market makers include the ten marketmaking members of the LBMA, a trade association that act as the coordinator for activities conducted on behalf of its members and other participants in the London bullion market.

The market-clearing price of gold set twice a day in London is commonly referred to as the London fixing price (AM or PM). This price, which is the international benchmark price is set in U.S. dollars per fine troy ounce of gold.

Unlike other metals, international gold prices maintained a continuous upward trend from 2004 to early 2008, peaking at US\$963 per troy ounce in March 2008. Affected by the recent global financial crisis, gold prices then fell to US\$754 per troy ounce in November 2008. In early 2009, prices began to recover and moved back to its pre-crisis high in August 2009. Since then, gold prices have kept reaching record highs, with the new record of US\$1,273 per troy ounce in September 2010. The recent strength in gold price is considered to have been driven by two major factors: the economic uncertainty and instability in certain regions and countries, and expectation of inflation.

Gold Spot Prices on COMEX and LBMA 2004-2010



Sources: LBMA, COMEX

Key factors affecting the price of gold include:

- Supply and demand. Like all investments and commodities, the price of gold is ultimately driven by supply and demand. Unlike most other commodities, the hoarding and disposal plays a much more significant role in affecting the price, because most of the gold ever mined still exists and is potentially able to come in to the market for the appropriate price. At the end of 2008, it was estimated that all the gold ever mined totaled 163,000 tonnes.
- *Central bank sales and purchases.* Central banks and the International Monetary Fund perform an important role in the gold price. Although central banks generally do not announce gold purchases in advance, some, such as Russia, had expressed interest in growing their gold reserves again as of late 2005. In early 2006, China, which only holds 1.3% of its reserves in gold, announced that it was seeking avenues to improve the returns on its official reserves. Some analysts believe that this signals that China might reposition more of its holdings into gold in line with the central banks in other countries.

- *Devaluation of the U.S. dollar*. Devaluation of the U.S. dollar is believed to remain the main source of price support for gold. In light of the pessimism over major world currencies as a result of the global financial crisis, investors increasingly favor gold over U.S. dollars as investment.
- *Inflation expectation.* Gold prices have displayed a strong correlation with inflation expectations. Traditionally, gold is regarded as an effective hedge against inflation. Concerns that the current phase of monetary stimulation will eventually lead to inflation may be a factor driving recent gold price increases.
- Low or negative real interest rates. Historically, if the return on bonds, equities and real estate is not adequately compensating for risk and inflation, the demand for gold and other alternative investments such as commodities increases. For example, the period of stagflation that occurred during the 1970s led to an economic "bubble" forming in precious metals.
- *War, invasion, looting, crisis.* In times of national crisis, people fear that their assets may be seized and that paper currency may be devalued. They perceive gold as a solid asset which can always be used to make purchases such as food or transportation. As a result, in times of great uncertainty, particularly when war is feared, the demand for gold rises.

# **PRC Gold Industry**

# PRC supply of gold

China is the world's largest gold producer in terms of total gold production and produced 417, tonnes of gold in 2009, increasing by 21.0% from 2008, according to GFMS and China Gold Association.

China also surpassed the United States and South Africa to become the largest primary gold producer since 2007. Chinese primary gold production grew at a CAGR of 8.1% during 2004 to 2009 and reached 324 tonnes in 2009 (see chart entitled "China Primary Gold Production Volume 2004-2009" below), accounting for 12.7% of world total (see table entitled "Primary Gold Production by Country 2004-2009" below).

Country	2004	2005	2006	2007	2008	2009
China	217	230	247	281	292	324
United States	260	262	252	238	235	210
South Africa	363	315	296	270	233	219
Australia	258	263	247	246	215	220
Russia	182	175	173	169	189	205
Peru	173	208	202	170	180	182
Canada	129	120	104	102	96	100
Indonesia	114	165	116	147	95	158
Ghana	58	63	70	77	80	90
Uzbekistan	84	76	74	75	77	85
Papua New Guinea	76	71	62	62	70	65
Brazil	43	45	49	57	59	67
Mexico	22	31	39	44	50	37
Others	484	498	550	535	543	592
World Total	2,463	2,522	2,481	2,473	2,414	2,554

# Primary Gold Production by Country 2004-2009



#### Source: GFMS

In 2009, China Gold Association reported that the top six primary gold from gold ore producing provinces in China were Shandong Province, Henan Province, Fujian Province, Shaanxi Province, Inner Mongolia Autonomous Region and Hunan Province, representing 19.7%, 11.1%, 7.3%, 5.1%, 5.1% and 4.5% of the national total, respectively.

#### PRC demand for gold

China is one of the largest gold consuming countries. Chinese gold demand increased rapidly throughout 2008 and 2009 primarily due to a number of factors, including:

- relative stability in the local currency and hence the local gold price;
- the resilience of the Chinese economy to the global economic downturn; and
- the absence of large stocks of gold holding among consumers due to earlier market regulations restricting private gold ownership.

During 2008, the Chinese gold market exhibited a unique resilience to the pressure of the global economic crisis. Gold consumer demand in China was 393 tonnes in 2008, representing a CAGR of 13.8% from 2004, according to the World Gold Council. Gold consumer demand in China was 428 tonnes in 2009. Approximately 347 tonnes of gold were bought as jewellery, accounting for 81.2% of the total consumer demand.



Sources: World Gold Council, China Gold Association

In 2007, Chinese gold output was lower than consumer demand for the first time. Chinese gold output from 2004 to 2009 increased at a CAGR of 11.0%.

#### Chinese gold price

The price of Au9999 released by the Shanghai Gold Exchange is the standard gold price in China. The Shanghai Gold Exchange officially opened in October 2002. The market currently trades in units of one kilogram and three kilograms, for gold with purities of 99.99% and 99.95%, respectively, with prices quoted in RMB per gram. Initially, the Shanghai Gold Exchange primarily served the jewellery industry. On December 31, 2006, the Shanghai Gold Exchange began trading for individuals and as a result, PRC individual investors are able to participate in physical gold investment through the financial members of the Shanghai Gold Exchange and other membership clients approved by the People's Bank of China.

<sup>(1)</sup> Output consists of primary gold and secondary gold.



Source: Shanghai Gold Exchange

On the Shanghai Gold Exchange, the price trend of Au9995 is in line with that of Au9999. Generally, the price difference between Au9999 and Au9995 is less than one RMB per gram. Chinese gold prices follows the international gold price trend closely.

#### **Competition**

The Chinese gold industry experienced further consolidation through merger and acquisition activities in 2008 and 2009, with the total number of gold producing companies decreasing from over 1,200 in 2002 to approximately 700. In 2009, the top ten producers' gold output was 149 tonnes, accounting for 47.3% of the national total, and their gold resources also account for more than 60% of the national total according to the China Gold Association.

As resource integration remains the key focus of competition in the Chinese gold industry, large enterprises with competitive strength in operation expertise, technology, human resources, finance and government support, are expected to continue to dominate the competitive landscape and remain leaders of industry consolidation.

The following table lists the top gold producers in 2008 and 2009 that are listed in Hong Kong or PRC.

# China Top Gold Producers<sup>(1)</sup> in 2008-2009

Company	Stock Code	Output (Tonne)		Y-0-Y	by the End of 2009	
		2008	2009			
Zhongjin Gold Corp., Ltd.	SH600489	78.6	82.3	4.5%	421	
Zijin Mining Group Company Limited	SH60189	57.3	75.4	31.5%	715	
Shandong Gold Mining Co., Ltd	SH600547	15.6	17.7	11.9%	225	
Real Gold Mining Limited	HK246	2.1	3.3	57.2%	120	
Zhaojin Mining Industry Company Limited	HK1818	17.6	19.5	10.6%	308	
Lingbao Gold Company Limited	HK3330	14.0	14.8	5.8%	108	
Hunan Chenzhou Group Company Limited	SZ002155	2.5	4.4	74.6%	37	

Sources: Annual reports of each respective company above and the China Gold Association

(1) Some of the producers in the table above have used a technical standard different from the JORC Code in calculating their resources. Therefore, their reported resources may not be directly comparable with the resources reported under the JORC Code.

Zhongjin Gold Corporation, a subsidiary of China National Gold, is the largest gold producer in China and is listed on the Shanghai Stock Exchange. According to Zhongjin Gold Corporation's annual report for 2009, it produced 82.3 tonnes of gold in 2009 and had gold resources of 421.2 tonnes of gold content at the end of 2009.

# Gold Resources of Major Chinese Gold Mines and the CSH Mine (in tonnes of gold content)

Gold Mine	Company	Resources
Jinfeng Mine	Eldorado Gold	155.64
CSH Mine	China Gold International Resources Corp. Ltd.	
	(formerly known as Jinshan Gold Mines Ltd.)	151.32(1)
Zijinshan Mine	Zijin Mining Group Company Limited	154.43
Dayingezhuang Mine	Zhaojin Mining Industry Company Limited	97.22
Shuguang Mine	Zijin Mining Group Company Limited	69.85
Shuiyindong Mine	Zijin Mining Group Company Limited	60.76
Nantaizi Mine	Real Gold Mining Limited	59.59
Tianjianshan Mine	Eldorado Gold	43.86
Dongping Mine	Zijin Mining Group Company Limited	38.41
White Mountain Mine	Eldorado Gold	36.95
Luotuochang Mine	Real Gold Mining Limited	34.90

Sources: Company annual reports or prospectus of each respective company above (except the CSH Mine, which is based on the CSH Technical Report)

(1) Based on estimated, indicated and inferred resources under the JORC Code as of June 30, 2010 as set out in the CSH Technical Report. The resource figures of other companies reflect the most recent publicly available estimates and under technical standards that might be different from the JORC Code. Therefore, their resources may not be directly comparable with the resources at the CSH Mine.

# **Gold Dore Bars**

The principal purchasers of gold dore bars in China are gold smelting operators. The price of gold dore bars is affected by a number of factors, including:

- *market price of gold.* There is a strong positive correlation between the gold market price and gold dore bar prices. As gold market prices increase, gold dore bar prices increase;
- *supply and demand dynamics*. Such dynamics primarily include the availability of production capacity of gold smelting operators in China;
- *content and grade of gold.* Gold smelting operators pay the gold dore bar producer according to the content and grade of gold contained in the concentrate. Higher content and grade of the gold generally lead to higher prices for the gold dore bars; and
- *the level of impurities contained in the gold dore bars.* If the impurities contained in a gold dore bar comprise valuable minerals which can be profitably extracted by the gold smelting operator (e.g. silver, copper, lead and zinc), the gold dore bar producer may be able to obtain a higher price for the concentrate. However, if the impurities contained in the gold dore bars hold little or no value or make extraction of gold from the concentrate more expensive, the gold dore bar producer may receive a lower price for the concentrate.

# COPPER

Copper (Cu) is usually found in nature in association with sulfur. Pure copper is generally produced from a multi-stage process, beginning with the mining and concentrating of low-grade ores containing copper sulfide minerals, and followed by smelting and electrolytic refining to produce a pure copper cathode. Copper is also produced from acid leaching of oxidized ores.

Copper is one of the oldest metals used and has been one of the important materials in the development of civilization. Copper is a major industrial metal, ranking third after iron and aluminum in terms of quantities consumed. Copper is mainly used in electrical industry, including power transmission and generation, building wiring, telecommunication, and electrical and electronic products. Copper by-products from manufacturing and obsolete copper products are readily recycled and contribute significantly to copper supply.

Major copper raw materials and products include:

- copper concentrate, which is produced from sulphide copper ore and usually contains around 30% of copper;
- blister copper (also called anode copper), which can be electrolyzed into refined copper and contains about 98.5% of copper; and
- refined copper (also called cathode copper), which can be used to produce copper products or copper alloy and contains at least 99.5% of copper. LME grade contains 99.99% copper. Primary refined copper refers to refined copper produced from copper ore. Secondary refined copper refers to refined copper produced from copper scrap.

Many elements are associated with copper ore, with some having value while others are detrimental and subject to penalties. Valuable elements include molybdenum, gold, silver, selenium and tellurium and Sulphur. Penalty elements include arsenic, antimony and bismuth.

# **Global Copper Industry**

# Global supply of copper

Global copper reserves were estimated to be 540 million tonnes of copper content in 2009, according to the United States Geological Survey.

# Copper ore production

World copper ore production increased from approximately 16.1 million tonnes to approximately 17.3 million tonnes of copper content over the period from 2004 to 2009, representing a CAGR of 1.4%. According to ICSG, the Americas and Asia are the major copper ore producing regions which accounted for 80.0% of the world total copper ore output in 2008. In 2008, the combined output of the ten largest copper ore producing countries accounted for approximately 81.7% of the world's total output.

#### Refined copper production

World refined copper production increased from approximately 15.9 million tonnes to approximately 18.1 million tonnes at a CAGR of 2.7% between 2004 to 2009. According to ICSG, Asia, the Americas and Europe were the major refined copper producing regions which collectively produced 94.0% of the world's total refined copper in 2009. According to ICSG, in 2009, the

combined output of the ten largest refined copper producing countries accounted for approximately 77.5% of the world's total output.

Refined copper includes primary refined copper and secondary refined copper. Globally, primary refined copper output accounted for 83.8% of total refined copper output in 2009.



# Refined Copper Production of Top 10 Countries in 2009 (in thousand tonnes)

Sources: ICSG, CNIA

# Global demand for copper

# Copper ore consumption

The demand for copper ores in China and other developing countries had increased steadily, resulting in a shortage of copper ores globally since 2005. The recent global economic crisis that alleviated the tight supply situation of copper ores. Driven by a strong demand of refined copper from China in 2009, the supply of copper ore is tightening again.

Primary refined copper output could be treated as an indication for global copper ore and concentrate demand. According to ICSG, global primary refined copper output increased from approximately 13.8 million tonnes to approximately 15.2 million tonnes from 2004 to 2009 at a CAGR of 1.9%.

# Refined copper consumption

Globally, electrical or electronic, construction and transportation are the principal copper consuming sectors which collectively accounted for approximately 82% of copper consumption in 2009.

#### Breakdown of Global Copper Consumption by Sector in 2009



Source: ICSG

World refined copper consumption increased from approximately 16.7 million tonnes to approximately 18.2 million tonnes over the period from 2004 to 2009 at a CAGR of 1.7%. Refined copper consumption of the ten countries with the highest consumption accounted for 76.3% of the world's total consumption in 2009.



# Refined Copper Consumption of Top 10 Countries in 2009 (in thousand tonnes)

Sources: ICSG, World Bureau of Metal Statistics, CNIA

# Global trade

According to ICSG, approximately 40% of the world's copper concentrate is traded globally. Chile, Indonesia, Peru, Australia, the U.S. and Canada are the main exporting countries and Japan, China, India, South Korea, Germany and Spain are the importing countries. Globally, copper ore flows mainly from the Americas, Oceania and Africa to Asia and Europe.



Sources: ICSG, American Bureau of Metal Statistics, World Bureau of Metal Statistics

The global refined copper trading flow direction is similar to that of copper concentrate.

#### International copper prices

There are three main copper futures exchanges in the world: the LME based in London, the COMEX based in New York and Shanghai Futures Exchange based in Shanghai. The LME is the world's premier non-ferrous metals market.

Copper has been traded on the LME since it was founded in 1877. The copper contract was upgraded to high grade copper in November 1981 and again to today's Grade A contract in June 1986. The LME copper price is the primary global reference price for copper, with refined copper traded between industry participants at a price related to the LME price. Copper trades on the LME in units of 25 metric tons and the settlement price of copper for cash delivery is the price for the contract, expressed as U.S. dollars per metric ton and scheduled for same-day settlement.

The international copper futures price began to increase in 2005 and exceeded US\$8,000 per tonne in mid-2006. Since then, such price continued to kept fluctuating within a certain range before declining sharply amid the global financial crisis in the second half of 2008, and slipped to below US\$3,000 per tonne at the end of 2008. Driven by increasing demand from China, international copper price has been experiencing steady recovery since January 2009. As of September 2010, international copper price rose to a level of approximately US\$7,700 per tonne.



Source: LME

LME spot copper price has displayed a similar price trend to that of copper future price.

# **PRC Copper Industry**

There is currently a shortage of copper raw materials in China, and the supply of copper products is inadequate to meet domestic demand. In 2009, Chinese net imports of copper concentrate (copper content), blister copper, refined copper (also known as cathode copper) were 1,838, 228 and 3,112 thousand tonnes, respectively, according to China Customs and China Chamber of Commerce of Metals Minerals and Chemicals Imports and Exports.

# **PRC** supply of copper

According to National Bureau of Statistics of China, Chinese copper ensured reserves are estimated to be approximately 28.9 million tonnes of copper content in 2008. Chinese copper reserves are mainly found in east, southwest and north China. The three regions account for 75.0% of Chinese copper reserves. In terms of deposit size, small- and medium-sized deposits are more commonly found than large and super-large deposits. Among the deposits explored, large and super-large sized deposits account for 9%, while small-sized deposits account for 88%.

#### Copper ore production

China is the fifth largest copper ore producing country in the world. However, China still imports large quantities of copper concentrate. In recent years, over 50% of the Chinese copper concentrate consumption was imported. Chinese copper concentrate imports accounted for 65.7% of the total consumption in 2009.

Chinese copper concentrate production increased from 607 thousand tonnes in 2004 to 961 thousand tonnes of copper content in 2009, representing a CAGR at 9.6%, according to CNIA. In the first six months of 2010, Chinese copper concentrate output was 532,000 tonnes of copper content, an increase of 25.5% from the corresponding period of 2009.



# Chinese Copper Concentrate Output 2004-2010H1 (in thousand tonnes of copper content)

Source: CNIA

According to CNIA, eastern China was the largest copper concentrate producing region with copper concentrate production accounting for 35.1% of the national total output in 2009. Southwestern and northwestern China were also significant copper concentrate producing regions, representing 23.3% and 17.1% of the national total output, respectively, in 2009.



# Breakdown of Chinese Copper Concentrate Output by Region in 2009

Source: CNIA

# Refined copper production

China is the world's leading producer of refined copper. Chinese refined copper output reached approximately 4.1 million tonnes in 2009, representing a CAGR of 14.8% from 2004 to 2009, according to CNIA. In the first three months of 2010, Chinese refined copper output was approximately 1.1 million tonnes, an increase of 17% from the corresponding period of 2009.

# **PRC** demand for copper

#### Copper ore consumption

China is one of the fastest growing countries in terms of demand for copper concentrate and has been the main driver behind the growth of the copper concentrate sector globally. Chinese copper concentrate apparent consumption, which is the aggregate of copper concentrate output and imports, increased from approximately 1.5 million tonnes of copper content to approximately 2.8 million tonnes from 2004 to 2009 at a CAGR of 13.8%, according to CNIA and China Chamber of Commerce of Metals Minerals and Chemicals Imports and Exports. In 2009, net imports of Chinese copper concentrate (copper content) were approximately 1,838 thousand tonnes, accounting for 65.7% of Chinese copper concentrate apparent consumption while in the first half of 2010, such net imports were approximately 1,001,000 tonnes, accounting for 65.3% of Chinese copper concentrate apparent consumption.



Chinese Copper Concentrate Apparent Consumption 2004-2010H1 (in thousand tonnes of copper content)

Sources: CNIA, China Customs, China Chamber of Commerce of Metals Minerals and Chemicals Imports and Exports

# Refined copper consumption

According to CNIA, the power industry was the largest copper consuming sector, representing 47.7% of total consumption in China in 2009. Refrigeration equipment, transportation and electronic industries collectively accounted for 31.0% of the total copper consumption in China in 2008.

Chinese refined copper apparent consumption increased from approximately 3.1 million tonnes to approximately 7.2 million tonnes from 2004 to 2009 at a CAGR of 18.1%, according to CNIA. In the first six months of 2010, Chinese refined copper apparent consumption was approximately 3.8 million tonnes.



# Chinese Refined Copper Apparent Consumption 2004-2010H1 (in thousand tonnes)

Sources: CNIA, China Customs

#### Chinese import of copper ore

China is the largest copper concentrate importing country in the world. China imported approximately 6.1 million tonnes of copper concentrate in 2009, according to China Customs. Such amount was equivalent of 1,840 thousand tonnes of copper content, according to China Chamber of Commerce of Metals Minerals and Chemicals Imports and Exports. Chinese copper concentrate imports increased to approximately 6.1 million tonnes in 2009, representing a CAGR of 16.3% from 2004.



# Chinese Copper Concentrate Net Imports 2004-2010H1 (in thousand tonnes)

Sources: China Customs, China Chamber of Commerce of Metals Minerals and Chemicals Imports and Exports

#### Chinese refined copper prices

Chinese refined copper prices are primarily related to futures prices traded on the Shanghai Futures Exchange. As copper is negotiable in the global market, the trend of copper futures prices on the Shanghai Futures Exchange is in line with that on the LME.

# Shanghai Futures Exchange 3-Month Copper Prices 2004-2010 (in RMB per tonne) 90,000 70,000 50,000 30,000 10,000 Jan/04 Jan/05 Jan/06 Jan/07 Jan/08 Jan/09 Jan/10

**INDUSTRY OVERVIEW** 

Source: Shanghai Futures Exchange

Spot copper prices in Shanghai have displayed a similar price trend to the three-month futures price on the Shanghai Futures Exchange.

# **Competition**

The Chinese copper concentrate industry is highly fragmented, with a small number of producers that have an annual production capacity of over ten thousand tonnes of copper content.

# Copper Concentrate Production and Resources of Chinese Major Copper Concentrate Companies 2004-2009<sup>(1)</sup> (in thousand tonnes of copper content)

Company	2004	2005	2006	2007	2008	2009	in 2009
Jiangxi Copper	157	158	154	160	159	167	15,380
Tongling Non-ferrous Metals	32	37	46	46	56	44	2,470
Yunnan Copper	74	83	80	130	138	113	7,560(2)
Jinchuan Group (JNMC)	39	44	34	50	N/A	N/A	3,495(2)
China Daye Non-ferrous Metal Mining Limited	20	21	21	21	20	20	1,788
Zhongtiaoshan Non-ferrous Metals Group	21	22	21	N/A	N/A	8	1,950(2)
Baiyin Non-ferrous Metals Group Co., Ltd.	8	8	7	N/A	$\underline{N/A}$	8	N/A
Sub-total	351	373	363	407	373	360	32,643
Total China	607	<u>651</u>	755	831	931	961	85,310(2)

Sources: Antaike, company reports of each respective company above.

(1) For other companies listed above, the resources numbers represent the total resources of the whole company which may include more than one mine. As public information of the individual mines are not available, only the aggregate resources number of the other companies are listed.

(2) Refers to 2008 data.

# **Copper Concentrates**

#### Pricing of copper concentrate

Unlike copper metal, there is no formal exchange for copper concentrates. Prices of copper concentrates are established through negotiations between buyers (typically smelting factories) and sellers (typically mining companies) on a yearly or bi-yearly basis. When the concentrates are sold to the buyers, the sellers are paid for a portion of the copper metal and any by-products and penalized for impurities contained in the concentrate. In addition, the buyers will generally impose a treatment charge and refining charge and retain some exposure to the copper price, when it is above or below a pre-specified value, through what is called price participation. Treatment and refining charges fluctuate based on the underlying balance in the copper concentrate market. They are either quoted on a spot basis or negotiated semi-annually in cases of long-term contracts. Treatment and refining cost contracts are generally six months in duration, known as a brick contract.

Price participation typically involves an extra payment to buyers when the price of copper exceeds a certain value (generally 90 cents a pound). The payment is equal to a certain percentage (generally 10 per cent) of the difference between the purchase price and the market price.

# **MOLYBDENUM**

Molybdenum (Mo) is a silvery white, malleable metal with an exceptionally high melting point (2,625°C) used principally as an alloying agent in steel, cast irons and superalloys to enhance hardness, strength, toughness and resistance to wear and corrosion.

Molybdenum has been found in various minerals. The molybdenum content of viable ore bodies ranges between 0.01% and 0.25%, often associated with the sulphide minerals of other metals, notably copper.

Molybdenum ore bodies and mines are generally classified in three types:

- primary mines, where the recovery of molybdenite is the sole objective;
- by-product mines, which separate molybdenite during copper recovery; and
- co-product mines, where commercial viability is dependent upon the extraction of both molybdenite and copper-bearing minerals.

Molybdenum production comprises mining and concentrating followed by conversion to molybdenum oxide by roasting. Some molybdenum oxide and molybdenum concentrates are then further processed to produce ferromolybdenum, molybdates and other chemicals, or molybdenum metal prior to consumption.

Molybdenum concentrate ( $MoS_2$ ) usually contains 45-53% of molybdenum and a large number of impurities such as silicon, ferrum (iron), bismuth, tin, antimony and phosphorus. Molybdenum concentrate requires further processing into molybdenum oxide for uses. Molybdenum products include molybdenum oxide, ferromolybdenum, molybdenum metal as well as molybdenum chemicals. In terms of volume, molybdenum concentrate ( $MoS_2$ ), molybdenum oxide ( $MoO_3$ ) and ferromolybdenum (FeMo) dominate international trade for molybdenum.

#### **Global Molybdenum Industry**

# Global supply of molybdenum

Global molybdenum reserves were estimated to be 8.6 million tonnes with a reserve base of 19.0 million tonnes in 2008, measured by molybdenum metal contained, according to the United States Geological Survey. In 2009, the world molybdenum reserves slightly increased to 8.7 million tonnes, with 70 thousand tonnes newly found in Mongolia. Molybdenum reserves of China, the U.S. and Chile collectively account for approximately 82% of world molybdenum reserves.

Molybdenum production is usually derived from two sources: as a by-product of copperporphyry mining and through the extraction of molybdenum from porphyry molybdenum deposits as the primary product. There is a small quantity of molybdenum recycled from waste and scrap. The production data of recycled molybdenum are not published officially. World molybdenum concentrate output (measured by molybdenum content) was 215 thousand tonnes in 2008, representing a CAGR of 6.0% from 2004, according to the estimates by Raw Materials Group. The principal supply countries of molybdenum concentrate were China, the United States, Chile, Peru, Canada and Mexico. The output of these six countries collectively accounted for around 97.2% of the world total molybdenum concentrate output in 2009, ten percentage points higher than that of 2008.

![](_page_21_Figure_5.jpeg)

World Molybdenum Concentrate Production by Country 2004-2009 (in thousand tonnes of molybdenum content)

Sources: Raw Materials Group, USGS, CNIA

# Global demand for molybdenum

World demand for molybdenum products has increased in recent years as a result of increasing energy investment and global economic growth, driven largely by the rapid expansion of the Chinese economy. In addition, steel manufacturers have applied greater use of molybdenum in some alloys in order to improve product performance.

According to Raw Materials Group's estimates, world molybdenum products consumption amounted to 212,600 tonnes (molybdenum content) in 2008, representing a CAGR of 5.0% from 2004. China, Western Europe, the U.S. and Japan consumed approximately 87% of the world's molybdenum consumption in 2008. In 2009, world molybdenum consumption (molybdenum content) declined year-on-year by 17.8% to 174,800 tonnes, according to CNIA.

![](_page_22_Figure_1.jpeg)

# World Molybdenum Products Consumption 2004-2009 (in thousand tonnes of molybdenum content)

Sources: Raw Materials Group, CNIA

According to International Molybdenum Association, approximately 78% of the molybdenum products were used in steel production in the forms of molybdenum oxide or ferromolybdenum, while others are used in superalloys, molybdenummetal and molybdenum chemical industries. The end user sectors for molybdenum include construction, machinery manufacturing, automobile, shipbuilding, aerospace, oil pipelines and drilling platform and the production of catalyst, pigment, lubricants and other chemical products.

![](_page_22_Figure_5.jpeg)

# World Molybdenum Consumption Breakdown by Application in 2009

Source: International Molybdenum Association

#### International molybdenum prices

Molybdenum products are not traded on any exchange market. Therefore, no futures market exists for molybdenum products where producers, consumers and traders can set an official or settlement price. Molybdenum concentrate, molybdenum oxide and ferromolybdenum are sold, largely on a spot basis, by traders and dealers worldwide. Some transactions are entered into on the basis of long-term supply contracts between producers and consumers, and the major producers typically have a network of sales offices through which molybdenum products are bought.

Europe is the largest molybdenum consumption market. European molybdenum oxide prices are a key measure of molybdenum price and are widely used and typically quoted within the molybdenum industry and by industry specialists, commodity and equity analysts as a benchmark of molybdenum prices. Molybdenum oxide prices are typically used by industry participants as a benchmark to related molybdenum concentrate and ferromolybdenum prices. Prices of concentrate are no longer separately quoted as they are based on prices for molybdenum oxide, with penalties for deleterious elements. European prices are quoted in U.S. dollars per pound of contained molybdenum for molybdenum oxide, and U.S. dollars per kilogram of contained molybdenum. Ferromolybdenum normally commands a price premium over oxide to reflect conversion costs.

![](_page_23_Figure_2.jpeg)

![](_page_23_Figure_3.jpeg)

Source: Metal Bulletin

Driven by strong growth in the steel and petroleum industries and limited global capacity for roasting and refining, European molybdenum oxide price showed a sharp rise in 2004 and peaked in May 2005 at between US\$40 and US\$50 per pound of molybdenum content, the highest level since 1979. In this period, the decrease in exports from China upheld the soaring international prices, as Chinese government tightened regulation on domestic molybdenum production. The European molybdenum oxide price stayed at US\$30 to US\$40 per pound of molybdenum content in 2007 and the first three quarters of 2008, and dropped to below US\$10 per pound when the global economic downturn emerged. As the world's major producers reduced production output, the international molybdenum prices showed a recovery in the first half of 2009. Molybdenum oxide price and ferromolybdenum price fell by 50% during the two months of July and August of 2009. These prices turned to rise from November 2009 and the price of molybdenum oxide in September 2010 reached US\$15.1 per pound of molybdenum content.

#### **PRC Molybdenum Industry**

China is a major supplier of molybdenum oxide and ferromolybdenum to the world, and is itself also a large market for molybdenum products.

# PRC supply of molybdenum

China has the largest molybdenum deposits in the world currently known. Approximately 38% of the world's molybdenum reserves and around 44% of the world's molybdenum reserve base are located in China.

Chinese molybdenum concentrate production has increased rapidly since 2005 and was driven by strong demand from the Chinese steel industry. China became the world's largest producer of molybdenum concentrate in 2007. According to the estimates by CNIA, Chinese molybdenum concentrate output (molybdenum content) reached 81,270 tonnes in 2008, representing a CAGR of 11.1% from 2004, and accounted for 36.2% of the world molybdenum concentrate output. As most mines in China reduced or suspended molybdenum production in 2009, Chinese molybdenum concentrate output was 73,000 tonnes in 2009, a 10% decrease as compared to 2008, according to Antaike, accounting for 38% of world total molybdenum concentrate output.

![](_page_24_Figure_4.jpeg)

China Molybdenum Concentrate Production 2004-2009 (in thousand tonnes of molybdenum content)

Source: CNIA, Antaike

#### PRC demand for molybdenum

Driven by buoyant growth in demand for molybdenum from the steel industry in China, with respect to stainless steel and alloy steel in particular, Chinese molybdenum product consumption grew at a CAGR of 23.7% from 2004 to 2009. According to the estimates of CNIA, Chinese molybdenum products apparent consumption reached 54 thousand tonnes (molybdenum content) in 2009, increasing by 13.8% from 2008, accounting for 30.9% of the world's molybdenum consumption.

In recent years, Chinese molybdenum product exports to industrialized countries have decreased from 46 thousand tonnes (molybdenum content) in 2004 to 8 thousand tonnes in 2009, decreasing by 82.5%, as domestic demand for molybdenum grew rapidly.

Though it exports molybdenum products, China is a net importer of molybdenum concentrate. In 2009, China was a net importer of molybdenum products primarily due to the steady domestic consumption and comparatively low international molybdenum prices. Chinese imports of

Note: 2009 data is quoted from Antaike

molybdenum products (exclude concentrate) reached 28 thousand tonnes (molybdenum content) in 2009.

#### Competition

The molybdenum industry in China is highly fragmented although the reserves are concentrated in three provinces. Only Luoyang Luanchuan Molybdenum Mining (洛陽樂川鉬業) and Jinduicheng Molybdenum Mining (金堆城鉬業) have a molybdenum concentrate production capacity above 10 thousand tonnes per year (in terms of molybdenum content). In 2009, the collective molybdenum concentrate output of these two companies was 26,100 tonnes (in terms of molybdenum content), accounting for 36% of total national output. The remaining 64% of national output is contributed by a large number of smaller-scale producers who usually have comparably high production cost.

#### Chinese molybdenum prices

As a leading molybdenum producing country, China is expected to perform a more prominent role in global molybdenum supply and to have a significant impact in the global molybdenum market in the future. Chinese national standard for the grade of molybdenum concentrate ranges between 47%Mo and 53%Mo, with 45%Mo being the dominating grade and used as the key reference of domestic molybdenum concentrate.

![](_page_25_Figure_6.jpeg)

![](_page_25_Figure_7.jpeg)

Source: Antaike

#### SILVER

Silver (Ag) is the whitest and most ductile of all metals. With a number of unique properties, silver is widely used in traditional sectors (e.g. coinage, photography, silver jewelry, silverware and table settings), industrial sectors (e.g. batteries, bearings, brazing and soldering, catalysts and electronics) and other emerging sectors (e.g. medical applications, mirrors and coating, solar energy and water purification).

Approximately 25% of the silver produced comes from ores actually mined for their silver value, with the remaining 75% coming from ores that have as their major metal value either lead, copper, gold or zinc. As silver is always found associated with copper/zinc/lead sulphide ores, its main

extraction method is through concentrating and extracting those heavy metals. The silver associated with gold is recovered in gold cyanidation process.

According to the United States Geological Survey, China's primary silver production in 2009 was 3,000 tonnes, or 11.7% of the world's total, and was the third largest silver producing country in the world. According to CNIA, Chinese total silver production in 2009 reached 10,348 tonnes. Most of its silver were produced from recycled silver and used silver scrap. In China, it is estimated that only half of the silver production is consumed domestically and the balance of the production is exported. Silver is exported as primary unwrought silver products mainly to other Asian countries.

The international trading market for silver was formed in the late 19th century, with the main trading vehicles located in London, New York, Chicago and Tokyo. Silver prices in London and New York are considered as benchmark prices for the world. The only official silver trading exchange in China, the Shanghai White Platinum and Silver Exchange, was launched in 2003. Silver spot prices on LBMA and COMEX are closely synchronized, while silver prices on the Shanghai White Platinum and Silver Exchange closely follow international price trend. Since the beginning of 2009, silver price rose gradually and nearly reached the pre-crisis level. In 2010, the price continued to move upward, except for a dip in early February and a slight decrease in July, to approximately US\$20.6 per troy ounce in September. One of the key reasons for this price hike could be the impact of the Chilean earthquake at the end of February 2010. As the fourth largest silver producer in the world, Chile's earthquake had adversely affected silver supply.

![](_page_26_Figure_4.jpeg)

![](_page_26_Figure_5.jpeg)

Source: LBMA, COMEX, Shanghai White Platinum and Silver Exchange

(2) The line of Silver Spot Prices on COMEX overlaps with that of Silver Spot Prices on London Fixing.

<sup>(1)</sup> No.1 Silver on Shanghai White Platinum and Silver Exchange is of 99.99% purity, while silver on COMEX and LBMA are of 99.9% purity.

# LEAD

Lead (Pb) is a very corrosion-resistant, dense, ductile, and malleable blue-gray metal that has been used for at least 5,000 years.

Lead is usually found in ore with zinc, silver and copper and is extracted together with these metals. Lead ore is first processed to a fine suspension in water by grinding in ball or rod mills, then concentrated by selective froth flotation to produce lead concentrate. Lead concentrate is a widely traded mineral product as refined lead and lead alloy product.

The principal consumption of lead is for lead-acid batteries which are used in vehicles, and in emergency systems (such as hospitals) as well as in industrial batteries found in computers and fork lift trucks. Lead is also used in remote access power systems and load leveling systems as well as in compounds in the glass and plastics industries and for radiation shielding.

# **Global Lead Industry**

# Global supply for lead

World lead concentrate production increased from 3,129 thousand tonnes to 3,920 thousand tonnes over the period from 2004 to 2008 at a CAGR of 5.8%, according to International Lead and Zinc Study Group (ILZSG). In 2009, world lead concentrate production tallied 4,029 thousand tonnes of lead content, surpassing four million tonnes for the first time.

The increase of world lead concentrate output in 2009 was mainly driven by Chinese production.

From 2004 to 2008, global refined lead production increased at a CAGR of 5.5% from 7.0 million tonnes to 8.7 million tonnes. During 2004-2008, lead production in the rest of the world (excluding China) increased at an average of just 2% per annum from 5.2 million tonnes to 5.6 million tonnes. At the same time, the share of Chinese refined lead production of the world total lead output increased to 36% in 2008. In 2009, lead production in the rest of the world (excluding China) decreased by 8.9% to 5.1 million tonnes, which was lower than that of 2004, while the share of Chinese refined lead output increased to 42%.

# Global demand for lead

From 2004 to 2009, the world lead concentrate consumption increased by an average of 5.4% each year from 3.1 million tonnes to 4.0 million tonnes of lead content.

Global refined lead consumption increased at a CAGR of 3.7% from 7.3 million tonnes in 2004 to 8.8 million tonnes in 2009. The consumption increase of the world lead industry in the past 5 years came mainly from the growth of Chinese lead consumption. China's share in the world lead consumption increased from 16.7% in 2003 to 44.1% in 2009.

Around 80% of refined lead of the world is used to produce lead-acid batteries, which are used in motor vehicles, electric powered vehicles and electric bicycles. Meanwhile, lead-acid batteries are highly suitable for recycling and the major source for secondary lead production.

Lead is also used to manufacture lead sheet and pipe products for construction and chemical industries.

![](_page_28_Figure_2.jpeg)

Source: ILZSG

#### **PRC Lead Industry**

# **PRC** supply of lead

China is the world's largest lead concentrate producer and refined lead producer; meanwhile, China is the world's largest importing country of lead concentrate and exporting country of refined lead (before 2008).

Chinese lead concentrate output reached 1,145 thousand tonnes of lead content in 2008, achieving a year-on-year rise of 20%, according to NBSC. In the first half of 2010, China produced 821 thousand tonnes of lead concentrate (lead content), a year-on-year increase of 55.8%.

![](_page_28_Figure_8.jpeg)

![](_page_28_Figure_9.jpeg)

Source: NBSC, CNIA, Antaike

China was the largest refined lead exporter of the world before 2008. In 2006, Chinese total exports of refined lead and lead alloy reached 552 thousand tonnes. Since then, Chinese lead exports (refined lead and lead alloy) dropped significantly to 264 thousand tonnes in 2007, 45 thousand tonnes in 2008 and 65 thousand tonnes in 2009. On the other hand, Chinese imports of refined lead and lead alloy products increased from 45 thousand tonnes in 2007 to 59 thousand tonnes in 2008 and 210 thousand tonnes in 2009. Chinese net imports of lead and lead alloy products were 11.1 thousand tonnes in the first quarter of 2010.

# PRC demand for lead

The total consumption of lead concentrate consists of domestic production and imports. China is the world's largest lead concentrate producing and importing country. Thus China is also the world's largest lead concentrate consuming country. From 2004 to 2009, Chinese lead concentrate consumption grew at CAGR of 15.2% from 1.1 million tonnes to over 2.3 million tonnes of lead content. In the first quarter of 2010, Chinese lead concentrate output, imports and consumption were 298, 187 and 485 thousand tonnes of lead content, respectively.

CNIA reported that Chinese refined lead consumption increased at a CAGR of 14% from 1.7 million tonnes in 2004 to 2.8 million tonnes in 2008. According to Antaike, Chinese refined lead consumption in 2009 reached 3.4 million tonnes, a year-on-year increase of 16.0%. As the largest lead consumer of the world, China's share in the world lead consumption increased from 16.7% in 2003 to 44.1% in 2008.

# International and PRC lead prices

Lead is traded on the LME. The 3-month LME lead is the benchmark contract traded on the exchange. LME Lead prices peaked at US\$3,890 per tonne in October 2007 and then dropped sharply to US\$850 per tonne in December 2008. In the first 10 months of 2009, with the recovery of the lead consumption, lead prices increased steadily from US\$850 per tonne to over US\$2,200 per tonne on the LME. In January 2010, the lead price reached US\$2,392 per tonne on the LME. The following chart shows the monthly price trend of refined lead from 2004 to the first nine months of 2010.

#### **Chinese and LME Lead Prices 2004-2010**

![](_page_30_Figure_2.jpeg)

Source: LME, Antaike

There are no lead futures contracts in China. Chinese lead prices are generally in line with the LME lead price trend. See the above figure for the spot market prices in China and key Chinese producers' offer prices.

The lead concentrate pricing mechanism is similar to copper concentrate, (see copper "— Copper — Copper Concentrate — Pricing of copper concentrate" above). Lead concentrate price is determined by payable lead and treatment charge (with escalator/de-escalator based on LME price). The price trend of lead concentrate is similar to that of lead.

# ZINC

Zinc (Zn) is a bluish-white, lustrous, diamagnetic metal. It is less dense than iron. Zinc is the fourth most common metal in use, trailing only iron, aluminum, and copper, with an annual global production of about 11 million tonnes.

Approximately 95% of the world's zinc is mined from sulfidic ore deposits, in which sphalerite ZnS is nearly always mixed with the sulfides of copper, lead and iron. There are zinc mines throughout the world, with the main mining areas being China, Australia and Peru.

With good anti-corrosion capability, zinc is widely used as a coating material for steel products to produce galvanized steel. In addition, zinc is also used to make batteries, brass and bronze, zinc compounds and die casting zinc alloy materials.

China is not only the largest refined zinc producer but also the largest refined zinc consumer of the world. Chinese refined zinc production and consumption grew at CAGRs of 9.5% and 10.1% from 2.7 million tonnes and 2.7 million tonnes in 2004 to 3.9 million tonnes and 4.0 million tonnes in 2008, respectively, as reported by CNIA and Antaike. China continued to be the main destination for world zinc concentrate shipments, with 3.9 million tonnes (equivalent to approximately 2.1 million tonnes of

zinc content) unloaded at Chinese ports in 2008, an increase of 61.5% from 2004. In the first quarter of 2010, Chinese total imports of zinc concentrate reached 857 thousand tonnes (equivalent to 471 thousand tonnes of zinc content).

Zinc trades on the LME in units of 25 tonnes and the settlement price of zinc for cash delivery is the price for the contract, expressed in U.S. dollars per tonne and scheduled for same-day settlement. Zinc is also traded on in the Shanghai Futures Exchange as a futures product. Three-month LME zinc is the benchmark contract traded on the LME.

![](_page_31_Figure_3.jpeg)

![](_page_31_Figure_4.jpeg)

(1) Shanghai Futures Exchange began zinc futures trade in March 2007.

# SOURCES OF INFORMATION

## **Hatch Report**

We have engaged Hatch, an experienced consultant in the mining and metals industry, to prepare the Hatch Report for use in whole or in part in this prospectus.

The research and writing of the Hatch Report was a desktop exercise carried out by experienced Hatch professionals who have extensive knowledge of the mining and metals sector. Hatch utilizes its in-house database, independent third-party reports, publicly available data from reputable industry organizations and data provided by our Company (with respect to the gold resources of the CSA Mine and the copper resources of the Jiama Mine) to prepare the Hatch Report. Where necessary, Hatch's researchers contact companies operating in the industry to gather and synthesize information about the market, prices and other relevant information.

In preparation of the Hatch Report, Hatch has assumed the completeness and accuracy of the information and data that it has relied on. Hatch has confirmed that it is not aware of anything which could possibly lead it to believe that this assumption is unfair, unreasonable or incomplete.

Hatch seeks to operate according to international standards of moral, legal and professional conduct to protect its reputation for independence and confidentiality. Hatch has more than 15 years of

Source: LME, Shanghai Futures Exchange

project experience in the PRC and has completed assignments on over 150 projects with a capital value in excess of US\$3.0 billion.

We have paid Hatch a total of RMB495,000 for the preparation and update of the Hatch Report.

# Others

We have not engaged Antaike, CNIA, COMEX, GFMS, ICSG, ILZSG, LBMA, LME, American Bureau of Metal Statistics, China Chamber of Commerce of Metals Minerals and Chemicals Imports and Exports, China Customs, China Gold Association, International Molybdenum Association, Metal Bulletin, National Bureau of Statistics of China, Raw Materials Group, Shanghai Gold Exchange, Shanghai Futures Exchange, Shanghai White Platinum and Silver Exchange, the United States Geological Survey, World Bureau of Metal Statistics or World Gold Council when preparing data cited in this prospectus. Data from these sources were not prepared on a commissioned basis by us.