

Ensuring Sustained Growth in Copper Supply: Copper Mine Developments and Recycling Trends in China

Beijing Antaika Information Development Co. Ltd.

Yusheng Li

April 15, 2011 Lisbon, Portugal

Disclaimer & Copyright

Disclaimer

This document has been prepared with care. However, Beijing Antaika Information Development Co., Ltd. (hereinafter Antaika) makes no warranty of any kind in regard to the contents and shall not be liable for incidental or consequential damages, financial or otherwise, arising out of the use of this document.

Copyright

The contents of this presentation are copyright Antaika

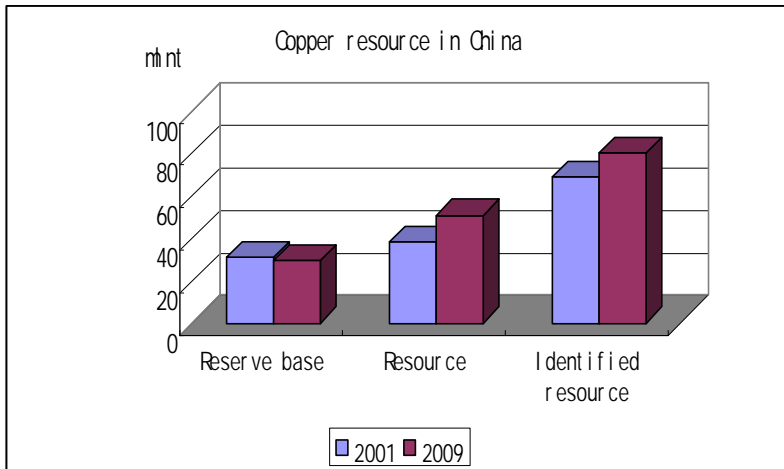
© 2010 Antaika

- **Copper Mine**
 - Copper resource in China
 - Copper concentrates production
 - Copper mine development
 - Oversea Copper mine investment & Development
- **Copper Recycling**
 - Copper scrap generation in 2001-2010
 - Copper scrap generation in the future
- **China's Copper Supply/Demand Balance**
- **Conclusion**

- Entering the 21st century, Chinese nonferrous metals industry has made impressive progress, among which, copper output witnessed rapid growth. From 2001 to 2010, the output of copper-in-concentrate rose to 1156 kt from 587 kt, with an annual growth rate of 7.8%; refined copper output reached 4.57 Mt from 1.52 Mt, saw an annual growth rate of 13.0%. In the same period, domestic copper scrap generation reached 713 kt from 257 kt at a CAGR of 12.0%.
- While the copper output increased, refined copper consumption increased rapidly too, from 2001 to 2010, China's refined copper consumption grew by an annual average of 13.1% to 6.80 Mt in 2010. The supply tightness of copper raw materials has been intensified in China year by year. How to ease the supply shortage to maintain sustainable development of Chinese copper industry has become the concern of Chinese government, enterprises and relevant research institutes and organizations.

China's Copper Resource

Leading Information Provider and Consultant for Metal and Mining Industry



Source: MLR

Note: Reserve base + Resource = Identified resource

5

China's Copper Resource

Leading Information Provider and Consultant for Metal and Mining Industry

- According to figures released by the Ministry of Land and Resource, there were 1,607 copper deposits in China at the end of 2009. The reserve base amounted to 29.51 mlnt; resource, 50.75 mlnt; Identified resource, 80.26mlnt.
- In 2001, there were 961 copper deposits in China. The reserve base amounted to 30.84 mlnt; resource, 38.33 mlnt; Identified resource, 69.17 mlnt.
- In 2009, the reserve base of copper-rich deposits(Cu> 1%) amounted to 8.23mlnt, accounting for 27.9% of the total in China. In 2001, the reserve base of copper-rich deposits(Cu> 1%) amounted to 10.00 mlnt, representing 32.4% of the total reserve base.

6

China's Copper Resource

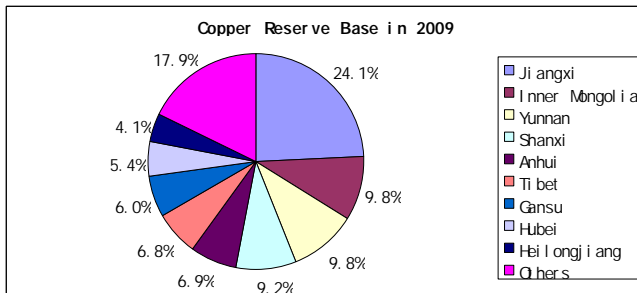
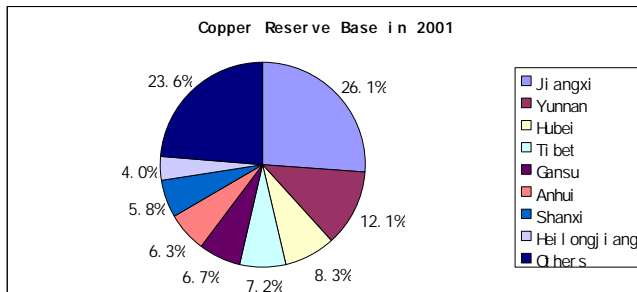
Leading Information Provider and Consultant for Metal and Mining Industry

- In 2001, each of eight provinces has over 1.00 mlnt of copper reserve base, namely, Jiangxi, Yunnan, Hubei, Tibet, Gansu, Anhui, Shanxi and Heilongjiang, and the combined reserve base accounts for 76.4% of Chinese total. Each of eight provinces has over 3.00 mlnt of identified copper resource, namely, Jiangxi, Tibet, Yunnan, Gansu, Heilongjiang, Inner Mongolia, Hubei, Anhui and Shanxi, and the combined identified resource accounts for 74.4% of Chinese total.
- At the end of 2009, each of nine provinces has over 1.00 mlnt of copper reserve base, namely, Jiangxi, Inner Mongolia, Yunnan, Shanxi, Anhui, Tibet, Gansu, Hubei and Heilongjiang, and the combined reserve base accounts for 82.1% of Chinese total. Each of nine provinces has over 3.00 mlnt of copper identified resource, namely, Tibet, Jiangxi, Yunnan, Inner Mongolia, Shanxi, Anhui, Heilongjiang, Gansu and Xinjiang, and the combined identified resource accounts for 79.9% of Chinese total.

7

Copper Reserve Base in 2001 and 2009

Leading Information Provider and Consultant for Metal and Mining Industry

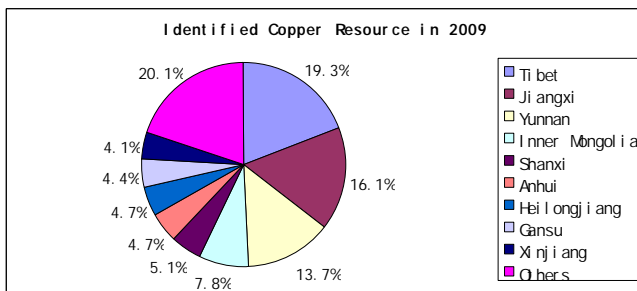
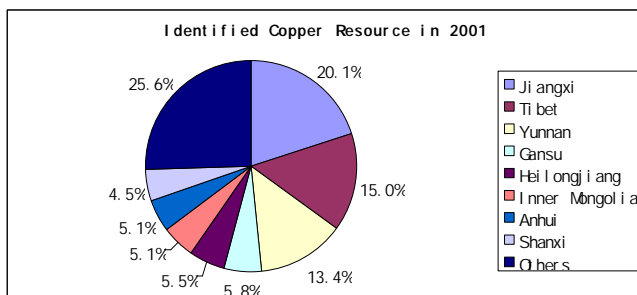


Source: MLR

8

Identified Copper Resource in 2001 and 2009

Leading Information Provider and Consultant for Metal and Mining Industry



Source: MLR

9

China's Copper Resource

Leading Information Provider and Consultant for Metal and Mining Industry

- During 2001-2009, Chinese copper reserve base kept on decreasing. The major reason is that the growth in the reserve base was less than the growth in the mining output.
- In the meantime, Chinese copper identified resource increased largely by 12.42 mlnt.
- The provinces reported increase in copper identified resource mainly in: Tibet, 5.34 mlnt; Yunnan, 2.60 mlnt; Xinjiang 1.10 mlnt, and Guangdong 1.10 mlnt. The combined newly-discovered Identified resource represented 81.6% of the Chinese total.

China's Copper Resource

Leading Information Provider and Consultant for Metal and Mining Industry

➤ Characteristics of Chinese copper resource

Small sized copper deposits: in China, the reserve base of most the copper deposits is less than 1.00 mlnt of copper content.

Associated mineral ores take a big share and the copper grade is low: In China, the paragenous and associated copper deposits accounts for 73% of the total. The average copper ore grade is just 0.87%.

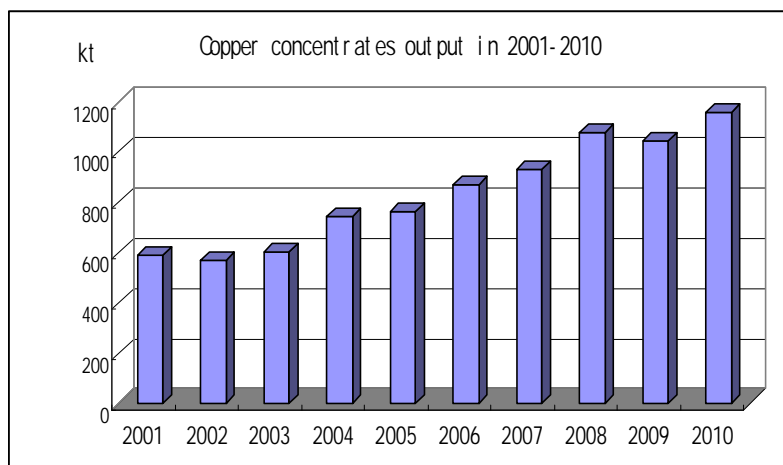
Most of newly-discovered or large-scale copper deposits are located in the west of China and remote areas, such as Tibet, Yunnan and Xinjiang. The condition of infrastructure and external construction is rather poor.

More sulphide ores but less oxide ores. In China, most of copper deposits is sulphide-type. At present, there are several SX-EW copper production plants owned by Zijin Mining, Jiangxi Copper, Shanxi Zhongtiaoshan and Yunnan Copper, etc. The combined SX-EW copper output was only around 30kt.

11

China's Copper concentrate production

Leading Information Provider and Consultant for Metal and Mining Industry



Source: CNIA

12

Major copper concentrate production regions

kt

Leading Information Provider and Consultant for Metal and Mining Industry

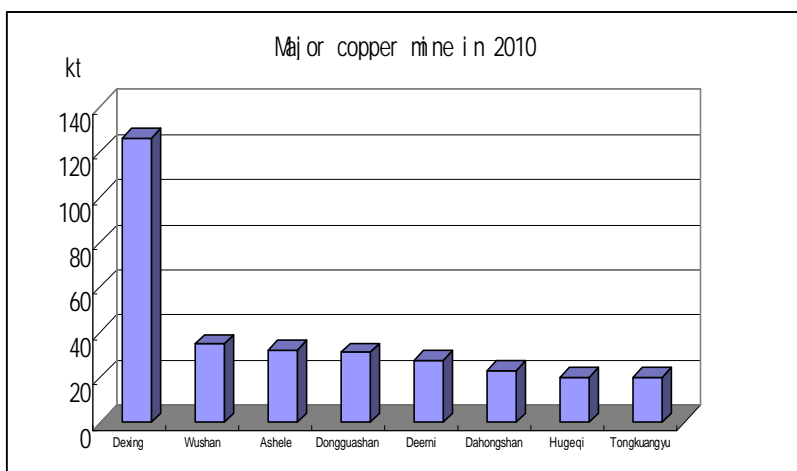
No.	Province	2001	2010	Net Increase	Percentage
1	Jiangxi	147.7	210.8	63.1	42.7%
2	Yunnan	85.0	206.1	121.1	142.5%
3	Inner Mongolia	12.9	170.5	157.6	1219.1%
4	Anhui	48.0	129.1	81.1	169.2%
5	Gansu	43.4	87.2	43.8	100.8%
6	Xinjiang	1.2	73.5	72.3	5948.3%
7	Sichuan	20.1	71.1	51.0	253.5%
8	Hubei	124.5	53.6	-70.9	-57.0%
9	Qinghai	1.0	38.9	37.9	3643.7%
10	Shanxi	33.4	25.4	-8.0	-24.0%

Source: CNIA

13

Major copper mines in China

Leading Information Provider and Consultant for Metal and Mining Industry

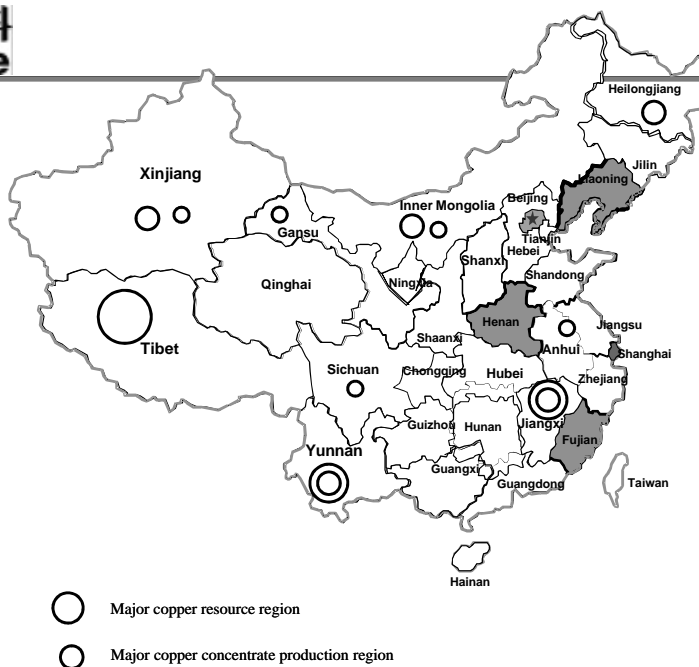


Source: Antaiko

14

Copper concentrate production

- In 2001, Chinese copper-in-concentrate output was 587.4 kt, the output reached 1155.8 kt, up by 568.4 kt or 96.8%. The average annual growth rate was 7.8%. The reasons behind the output growth are:
 - ◆ Copper price stays at high level and therefore it is economic viability to exploit partial low-grade copper deposits.
 - ◆ Exploration for copper resources has been intensified.
 - ◆ Newly-constructed copper mines come on stream and old mines expansion.



Major new copper mines in 2001-2010

kt

Leading Information Provider and Consultant for Metal and Mining Industry

Mine	Province	Reserve base	Grade	Commissioning date	Capacity
Ashele	Xinjiang	919	2.43%	200409	30
Deerni	Qinghai	522	1.21%	200701	30
Yangla	Yunan	800	1.02	200711	20
Yulong	Tibet	6500*	0.96%	200810	10
Wunugetu shan	Inner Mongolia	2670*	0.46%	200909	30
Jiama	Tibet	1912*	0.66%	201007	11

Source: Antaiko

Note: * resource

17

Overseas copper mine investment/development

Leading Information Provider and Consultant for Metal and Mining Industry

- In recent years, in order to secure copper raw material supply, Several Chinese companies obtained copper resource through investment in large undeveloped copper mines outside of China, especially those copper mines in Peru, Afghanistan and Myanmar, etc. And some get access to overseas copper resource through acquisition to foreign mining companies, for example, CNMC acquired Chambishi Copper Mine and Luanshya Copper Mine, China Minmetals was involved in development of Sepon Copper Mine through acquired OZ Minerals.

18

Overseas copper mines with Chinese investment

Leading Information Provider and Consultant for Metal and Mining Industry

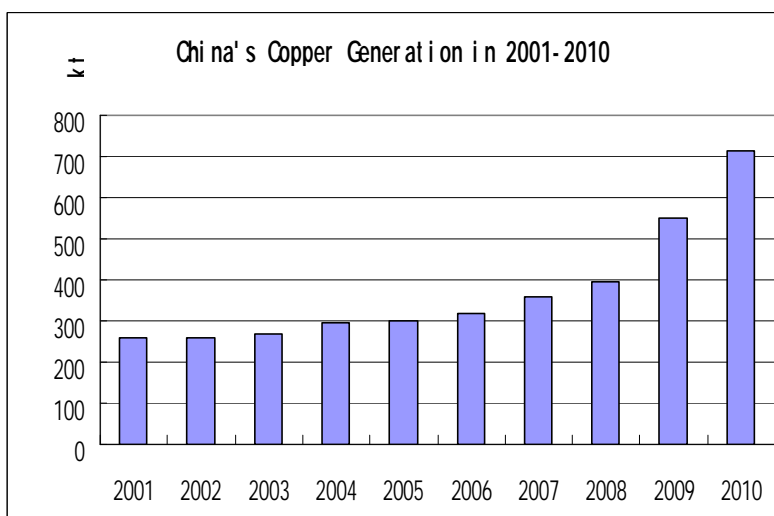
Copper Mine	Group	Country	Start in	Commissioning date	Product	Capacity, kt
Chambishi	CNMC	Zambia	2000	2003	Concentrate	50
Luanshya	CNMC	Zambia	2009	2011	Concentrate	60
<u>Sepon</u>	Minmetals	Laos	-	2005	SX-EW	65
Aynak	MCC\Jiangxi Copper	Afghanistan	July 2009	2013	Concentrate	220
Galeno	Minmetals\Jiangxi Copper	Peru	2010	2015	Concentrate	144
Toromocho	CHINALCO	Peru	2010	2014	Concentrate	220
Monywa	Wanbao Mining Ltd.	Myanmar	2010	2014	SX-EW	100
Corriente	CRCC\Tongling	Ecuador	-	-	Concentrate	250

Source: Antaiko, ICSG

19

China's Copper Scrap Generation

Leading Information Provider and Consultant for Metal and Mining Industry

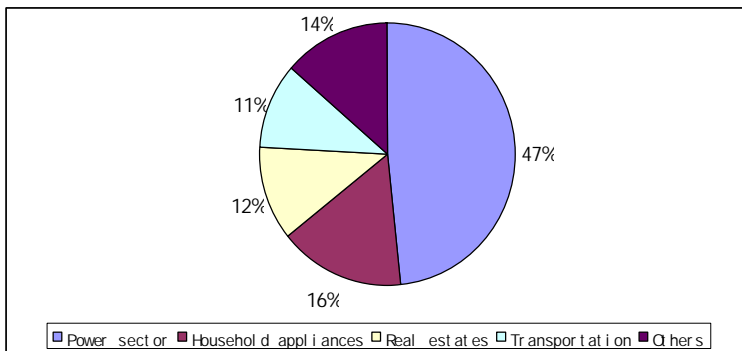


Source: Antaiko

20

Copper scrap generation in China

Leading Information Provider and Consultant for Metal and Mining Industry



- In China, most of copper scraps are recycled from the electric power industry, real estate sector and the fields of house-hold electric appliances and transportation.
- The major copper scrap recycling bases are mainly located in the developed regions such as the East China and the South China and other large and medium cities.
- The major dismantling and copper scrap recycling regions are Zhejiang, Guangdong provinces and Tianjin municipality. Besides, Jiangxi, Henan, Shandong and Hunan also have industrial zones mainly engaged in dismantling and copper scrap recycling.

21

Outlook for Mine Copper supply in the future

Leading Information Provider and Consultant for Metal and Mining Industry

- In the Twelfth Five-Year Plan(2011-2015), China's copper mining capacity will continue to expand. But most of the copper mine projects will be small sized ones and brown-field ones. The greenfield copper mine projects include Pulang copper mine project in Yunnan, Xietongmen project in Tibet and Tuwu copper mine project in Xinjiang.
- Further increase investments in prospecting projects for mineral resources, especially copper. It is expected that the copper resource will continue to grow.
- The brownfield expansion project include Yulong copper mine project in Tibet and Dexing copper mine project in Jiangxi.

22

Major Copper Mine Copper Projects

kt

Leading Information Provider and Consultant for Metal and Mining Industry	Copper mine	Province	Identified resource	Status	Newly-added capacity
	Wunugetushan	Inner Mongolia	2670*	Expansion	30
	Tongkuangyu	Shanxi	1510	Expansion	10
	Jiama	Tibet	500	Expansion	27
	Yulong	Tibet	6500*	Expansion*	26
	Pulang	Yunnan	3000*	Greenfield	50
	Duobaoshan	Heilongjiang	810	Greenfield	29
	Tuwu-Yandong	Xinjiang	6000*	Greenfield	5000t/d*
	Xietongmen	Tibet	1000	Feasibility Study	30
	Qulong	Tibet	7900*	Exploration	NA

Source: Antaiko

23

Copper mine development

Leading Information Provider and Consultant for Metal and Mining Industry

- Besides the above projects, there are a number of large-scale copper mine projects in plan, such as Tinggong copper mine project, Chongjiang copper mine project and Bairong copper mine project, in Nimu county of Tibet, Zhunuo copper mine project, in Angren county of Tibet, Duobuza copper mine project in Gaize county of Tibet.

Baogutu copper mine project in Tuoli county of Xinjiang, Halasu copper mine project in Qinghe county of Xinjiang, Dabate copper mine project in Wenquan county of Xinjiang.

Narigongma copper mine project in Qinghai province.

- The inferred copper resource of above copper mines will be over 10.00 mInt, but most of them are in exploration stage.

24

	2010	2011	2012	2015
Copper Concentrate	1156	1230	1300	1510
Copper scrap	713	790	860	1100
Refined copper Consumption	6800	7340	7850	9100
Balance*	- 4931	- 5320	- 5690	- 6490

Source: Antaiko, note: direct use copper for copper semis production not included

- In the Twelfth Five-Year Plan(2011-2015), China will further increase investments in prospecting projects for mineral resources, especially for copper. It is expected that the copper resource will continue to grow.
- In the same period, China's copper-in-concentrate production will keep on growing and recycled copper scraps will increase too. It is anticipated that Chinese copper-in-concentrate output will reach 1.51 mlnt and the volume of copper scraps will be up to 1.10 mlnt in 2015.
- Chinese funded copper mine projects overseas will come on stream by 2015. The combined copper supply will exceed 1.0 mlnt (metal content).
- However, compared with Chinese copper demand, the supply shortage of copper raw materials is still enlarged and imports of copper raw materials will increase. So, China should accelerated development of the domestic copper resource and enhance copper scrap recycling. Moreover, China should participate in the development at abroad to share the global copper resource. And the copper semis, or other copper end-products made in China, will be consumed globally.

**Thank you
for your attention!**

About Antaiko

? Regular research reports ? Consultancy ?Metal Events

The Most Essential and Authoritative Source for Chinese Metals Market

The Leading Information Provider and Consultancy for the Global Metals and Mining Industry

Since being established in 1992, Antaiko has built a reputation for its authoritative, strategic, and in-depth analysis of the Chinese metals industries and markets. It also provides news, trade and production data, prices and forecast.

Working under China Nonferrous Metals Industry Association (CNIA) and directly overseen by the Information Center of China National Nonferrous Metals Industry, Antaiko has become a key center for information collection and delivery within the country and across the world.

Antaiko has a team of nearly 100 highly skilled employees, including more than 30 senior metals analysts, who have all been involved in the metals and mining industry for over a decade. It offers customized consulting assignments to deliver high quality and specialized advice and business intelligence.

Antaiko has built up good relationship with thousands of Chinese miners, smelters, refineries, fabricators, metals consumers and traders, as well as Chinese government departments. At the same time, it has been working with a large number of international metals and mining corporations, associated organizations and research institutes. It has more than 10,000 clients, both in China and abroad.

Antaiko's metal events have been attracting more and more attendees in recent years. They have become the biggest and most informative gatherings in China and even the world, with their focus on specific metals such as copper, aluminum, lead and zinc, nickel and cobalt, gold and silver, indium, and others.

Antaiko's motto is to supply the best services to our clients and to use our information to create business value.

China Metal Forum, September 21-22, 2001,
Stockholm, Sweden

China Metal Summit, October 19-21, 2011, Los
Angeles, USA

For more information, please visit <http://www.antaiko.com>

Contact:

Yusheng Li

Beijing Antaiko Information Co., Ltd.

2nd Floor, 12B Fuxing Road, Beijing 100814, CHINA

Tel: +86 10 6396 5357

Fax: +86 10 6397 1647

Email: liyusheng@antaiko.com

website: www.antaiko.com