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## INDUSTRY OVERVIEW

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*Please note that Hatch, an experienced consultant in the metals and mining industry, has been engaged to prepare an Iron Ore Industry Report, for use in whole or in part in this document. Hatch prepared its report based on Hatch's in-house database, independent third-party reports and publicly available data from reputable industry organizations. Where necessary, Hatch contacts companies operating in the industry to gather and synthesize information about market, prices and other relevant information. Hatch has assumed the completeness and accuracy of the information and data on which it relied.*

*Hatch has provided part of the statistical and graphical information contained in this Industry Overview. Hatch has advised that (i) some information in the Hatch's 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.*

*Please 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. We 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.*

## INTRODUCTION TO IRON ORE

Iron ore is mainly composed of compounds of iron and oxygen (iron oxides) mixed with impurities (gangue). It is a mineral that, when heated in the presence of a reductant, will yield metallic iron (Fe). Iron ore is graded as fines or lumps depending on whether the majority of individual particles have a diameter of less or more than six millimeters. Iron ore concentrates are the valuable fines that are separated commercially from crude iron ore in the format of rock with gangue by crushing, grinding, and beneficiation and can be agglomerated before being used in an iron making blast furnace or a direct reduction furnace. Iron ore concentrates are the iron ore that is actually counted and traded worldwide. Almost all of the iron ore mined globally (>98%) is used in the production of iron and, subsequently, steelmaking and other downstream processing. Iron ore is the only known source of primary iron and is used directly as lump ore, or as concentrates or fines converted into pellets or sinter.

Iron ore is characterized by the type of iron-oxygen compound as well as by the tramp elements, such as gangue and other non-metallic and non-ferrous oxides. The types of iron ore most commonly found and used are hematite and magnetite iron ore. Other iron ore types that are naturally occurring include limonite, siderite, goethite, pyrites, chamosite and greenalite.

Iron is produced from iron ore by one of three methods:

- blast furnaces;

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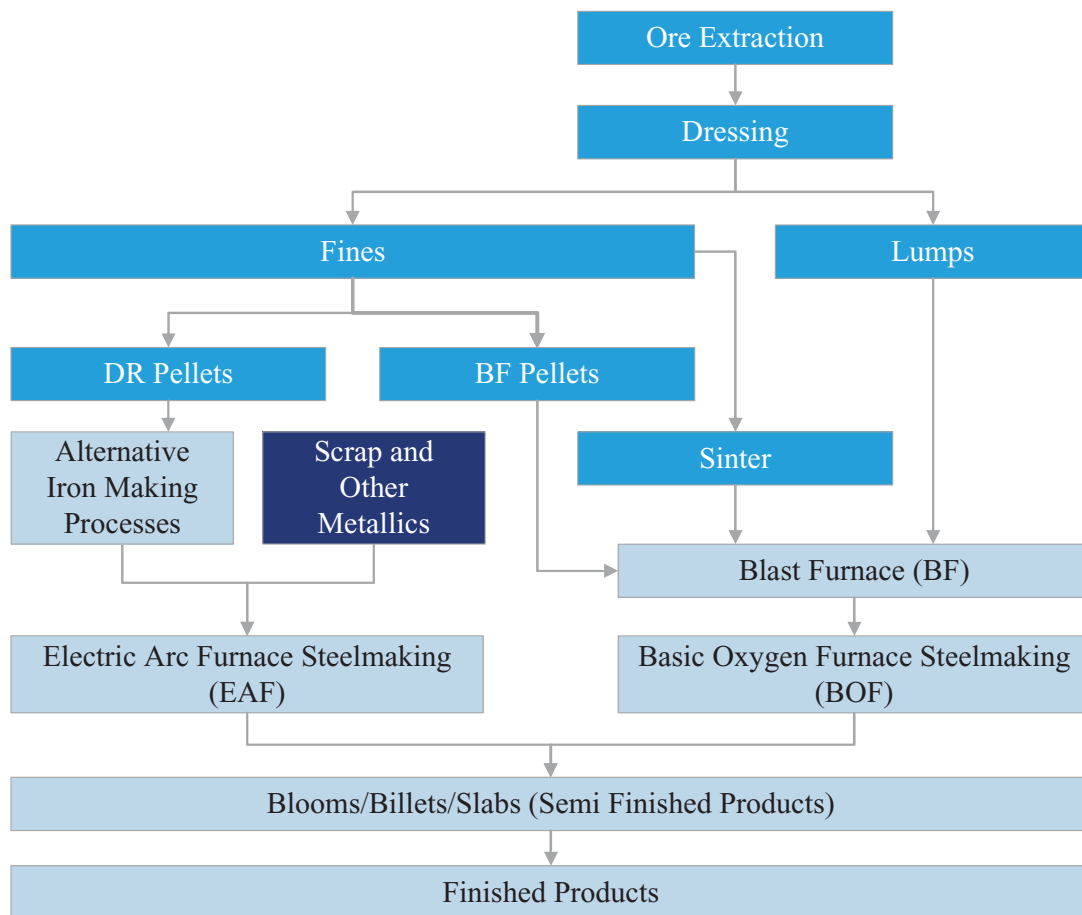
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- direct reduction processes (e.g. DRI, HBI); or
- direct smelting process (e.g. HISmelt, FINEX).

The latter two methods are often grouped together and referred to as “alternative iron making” processes, as they are relatively under-developed. The diagram below illustrates the overall production process.

### Process Routes from Ore to Steel



Source: Hatch

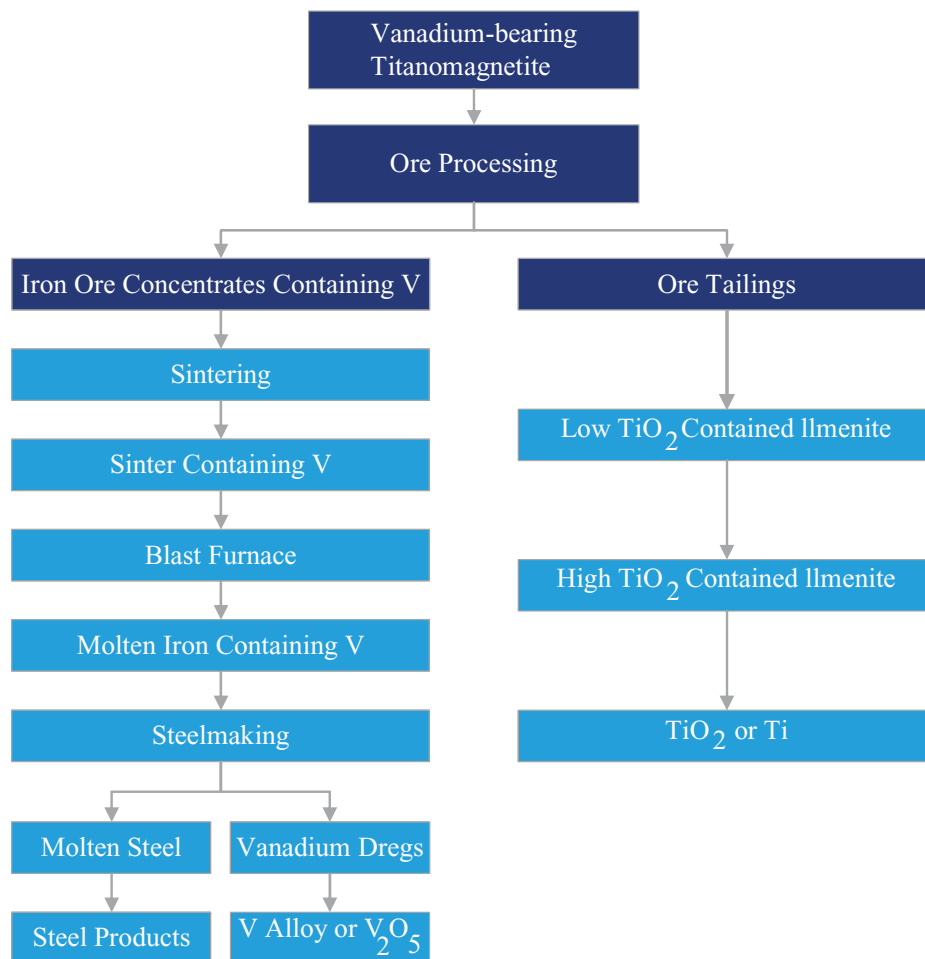
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### Vanadium-bearing titanomagnetite ore

Vanadium-bearing titanomagnetite is a type of magnetite that contains vanadium oxides and titanium oxides in addition to iron oxide. Its exact composition varies depending on each deposit and the region in which it is found. With such ore, the  $V_2O_5$  content is usually less than 2% and the  $TiO_2$  content is usually less than 16%. If the  $V_2O_5$  content exceeds 1.5%, it can be used to produce  $V_2O_5$  directly. The global vanadium reserve (contained  $V_2O_5$ ) is estimated to be approximately 13 billion tones, according to the U.S. Geological Survey ("USGS"). The top three countries, the PRC, Russia and South Africa have 38%, 38% and 23% of the world's reserve, respectively.

The following chart shows how the vanadium-bearing titanomagnetite is processed and used after extraction.

### Process Routes and Utilization of Vanadium-bearing Titanomagnetite



Source: Hatch

Two typical products of vanadium-bearing titanomagnetite are iron concentrates containing vanadium and titanium concentrates. The iron ore concentrates can be used in the production of iron, together with vanadium-bearing slag as a byproduct, and the titanium concentrates can be used to produce downstream titanium products such as pigment and sponge titanium.

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The vanadium-bearing titanomagnetite resources in the PRC are estimated to account for one-sixth of the world's total resources. Iron ore deposits containing this type of ore can also be found in Russia, South Africa and New Zealand. The technology to process vanadium-bearing iron concentrates in steel making is more prevalent in these countries, together with the PRC.

Vanadium-bearing titanomagnetite deposits in the PRC are mainly located in the Panxi Region (reaching from Panzhihua to Xichang, Sichuan Province) and in the Chengde region (Hebei Province). According to China Nonferrous Metal Industry Association Titanium Industry Council and Jin Qiu Cai Zhi, the vanadium-bearing titanomagnetite resource in the Panxi Region in 2007 was calculated to be approximately 8.87 billion tonnes<sup>(Note 1)</sup>.

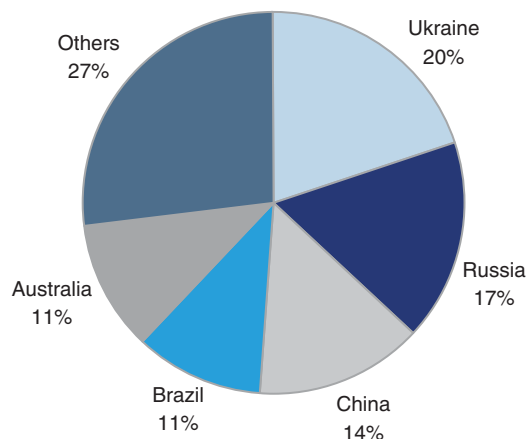
### OVERVIEW OF THE IRON ORE AND TITANIUM INDUSTRIES

#### Global iron ore industry

##### *Iron ore resource*

Global crude iron ore resources are currently estimated to be at 150 billion tonnes, according to the USGS. The top five countries (Ukraine, Russia, the PRC, Brazil and Australia) collectively account for 72% of the world's resource; although there are iron ore deposits distributed over the entire planet.

**World Iron Ore Resource (2008)**



Source: USGS

##### *Iron ore production*

Global iron ore production increased from 932 Mt to 1,645 Mt in the period from 2001 to 2007, representing a CAGR of 9.9%. In 2008, global iron ore production reached 1,807 Mt, according to preliminary estimates by USGS. This amount represents a 9.8% increase from 2007.

Note:

1. Because such figures are calculated once annually in the succeeding year, 2008 figures will not be available until fourth quarter 2009.

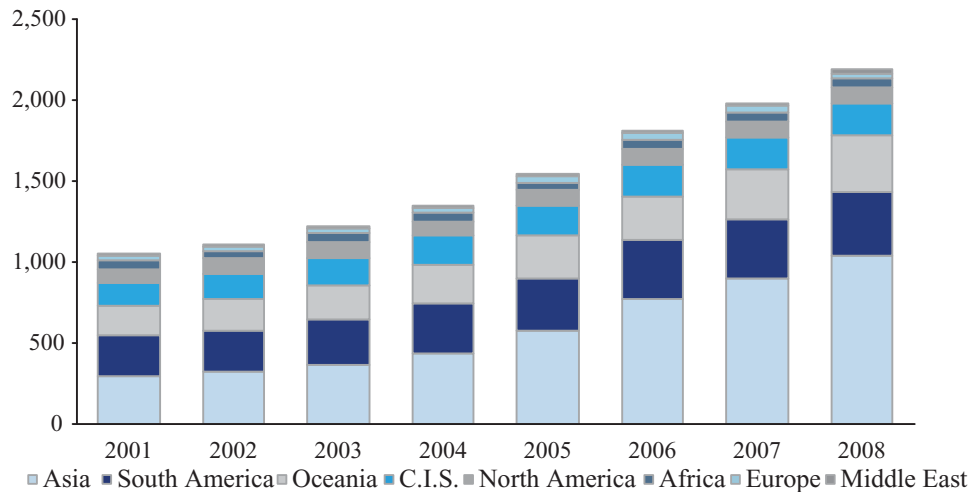
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According to the Hatch Report, Asia, South America, Oceania and C.I.S. are the major iron ore producing regions that together accounted for over 89.3% of the total world iron ore output in 2008. The increase in output came mainly from the PRC and Australia.

**World Iron Ore Output (Unit: Mt)**



Source: Hatch

Note: China's volume is quoted in terms of crude ore

### ***Iron ore demand***

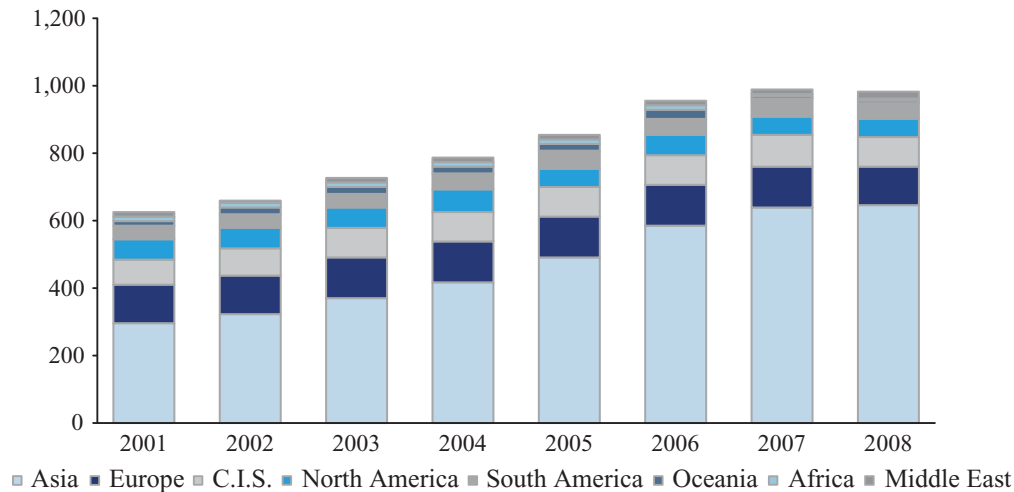
Iron ore is mainly used as blast furnace feedstock to produce iron but can also be used (after agglomeration) in direct reduction furnaces to produce directly reduced iron and hot briquetted iron (DRI/HBI). Most of the iron produced in a blast furnace is then transferred to the basic oxygen conversion process in integrated steelworks, whereas DRI/HBI is used mainly as a substitute for ferrous scrap in electric arc furnaces.

World Steel Association (the "WSA") statistics showed global pig iron and DRI/HBI output increased from 616 Mt to 984 Mt between 2001 and 2008 at a CAGR of 6.9% compared to the iron ore output growth at a CAGR of 9.9% over the same period.

## INDUSTRY OVERVIEW

Unlike iron ore, the production of pig iron and DRI/HBI is mainly geographically concentrated in Asia, Europe and the C.I.S.. The pig iron and DRI/HBI output in these areas accounted for approximately 80% of the world total during the period from 2001 to 2008.

**World Pig Iron and DRI/HBI Output (Unit: Mt)**



Source: WSA

**World Iron Ore Supply and Demand (Unit: Mt)**

	Year ended							
	2001	2002	2003	2004	2005	2006	2007	2008
World Iron Output . . . . .	616.19	654.22	715.96	777.53	842.04	940.61	1001.03	983.89
World Iron Ore Demand . . . .	985.90	1046.76	1145.54	1244.05	1347.26	1504.97	1601.65	1574.22
World Iron Ore Output . . . . .	932.05	986.39	1074.22	1184.24	1315.82	1482.44	1645.00	1807.00
Estimated Balance . . . . .	(53.86)	(60.36)	(71.31)	(59.81)	(31.44)	(22.53)	43.35	232.78

Source: WSA, NBSC, USGS and Hatch estimates

Note: Iron ore demand, ore/iron=1.60, iron ore refers to iron concentrates

### ***Iron ore trade and competition***

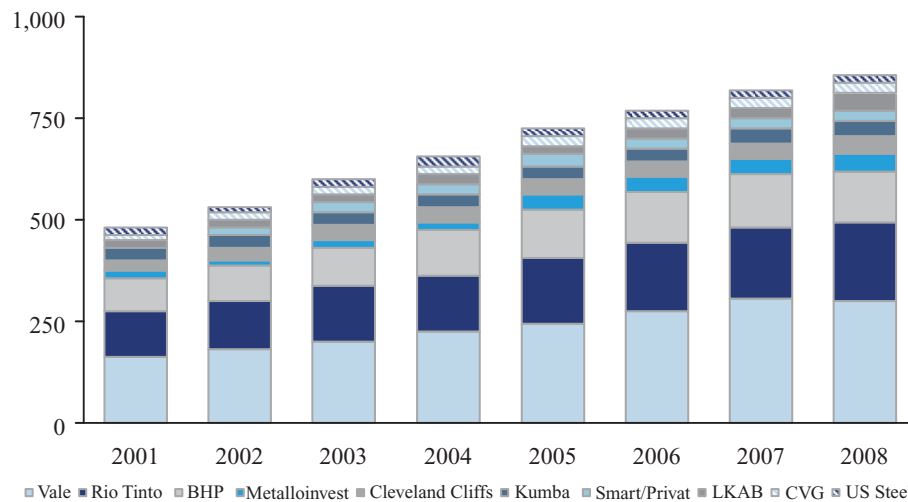
Since most of the world's accessible iron ore deposits are not located in the same countries as most steel production facilities are found, approximately 912 Mt of iron ore (or approximately 41% of total global production) was internationally traded in 2008, representing a CAGR of 8.7% from 2001.

Australia and Brazil accounted for 33.7% and 28.6% of world iron ore exports, respectively, and together they were the source of over 60% of world shipments; while the PRC, Japan and Europe accounted for 48.5%, 15.3% and 18.1% of world iron ore imports in 2008, respectively, according to Iron and Steel Statistics Bureau ("ISSB").

## INDUSTRY OVERVIEW

The iron ore industry has been consolidating more or less continuously since the 1970s and is dominated by three large global suppliers, Vale (formerly CVRD), Rio Tinto and BHP Billiton. From 2001 to 2005, the market share of the top three iron ore suppliers' was maintained at above 30%. However, as more marginal players entered the market, their market share decreased to 28.1% in 2008. The top three iron ore suppliers dominated 64% of the seaborne trade in 2008.

**Output of the Top Ten Iron Ore Suppliers 2001-2008 (Unit: Mt)**



Source: Hatch, Tex Report and Company data.

### PRC iron ore industry

#### *Iron ore resource*

According to the data provided by the China Geological Survey Department (中國地質調查局) in February 2008, the PRC iron ore inferred resource base was estimated to be in excess of 100 billion tonnes, with the resource base estimated to be 60.7 billion tonnes, of which 20 billion tonnes can be economically extracted or produced in the short-term.

#### *Iron ore production*

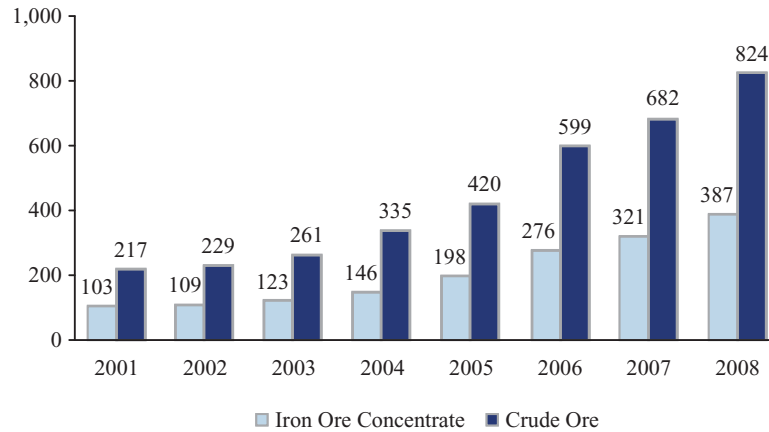
The PRC is the world's leading producer of iron ore on a gross tonnage basis. Crude iron ore output reached 824 Mt in 2008, achieving a year-on-year rise of 20.7%, according to the National Bureau of Statistics of China (the "NBSC").

However, because the iron content (or ore grade) of the PRC's resource is generally lower than the world average, the PRC's crude ore output figures are usually discounted to enable reasonable comparisons with other countries.

## INDUSTRY OVERVIEW

On an iron content-adjusted basis, the PRC's iron ore output reached 387 Mt in 2008, positioning it to become the top iron ore producer globally, as estimated by Metallurgical Mines' Association of China ("MMAC").

**PRC Iron Ore Output (Unit: Mt)**



Source: NBSC, WSA and MMAC

### ***Iron ore demand***

Overall, the PRC has significant shortfall in terms of the available domestic supply of iron ore.

**PRC Iron Ore Supply and Demand (Unit: Mt)**

	Years Ended								Six months ended June 30,
	2001	2002	2003	2004	2005	2006	2007	2008	2009
PRC Iron									
Output . . . . .	147.18	170.97	214.10	257.17	330.72	413.85	471.42	470.67	258.80
PRC Iron Ore									
Demand . . . . .	235.49	273.55	342.56	411.47	529.15	662.16	754.27	753.07	414.08
PRC Iron Ore									
Output . . . . .	102.60	108.76	122.71	145.75	200.33	276.44	320.77	387.29	178.56
Supply									
Shortfall . . . . .	(132.89)	(164.79)	(219.85)	(265.72)	(328.82)	(385.72)	(443.51)	(365.79)	(235.52)
PRC Iron Ore									
Import . . . . .	92.30	111.49	148.13	208.09	275.26	326.30	384.76	443.66	297.22

Source: WSA, NBSC, USGS, AME and Hatch estimates

Note: Iron ore demand, ore/iron = 1.60, iron ore refers to iron concentrates

The vast majority of iron in the PRC is produced using the blast furnace method, with DRI/HBI output in the PRC is extremely limited with a share of no more than 1% of total PRC iron product output.

The PRC's pig iron output increased from 147 Mt in 2001 to 471 Mt in 2008 at a CAGR at 18.1%, according to WSA. The PRC is the fastest growing country in terms of iron ore demand and has been the main driver behind the growth of the iron ore sector globally.



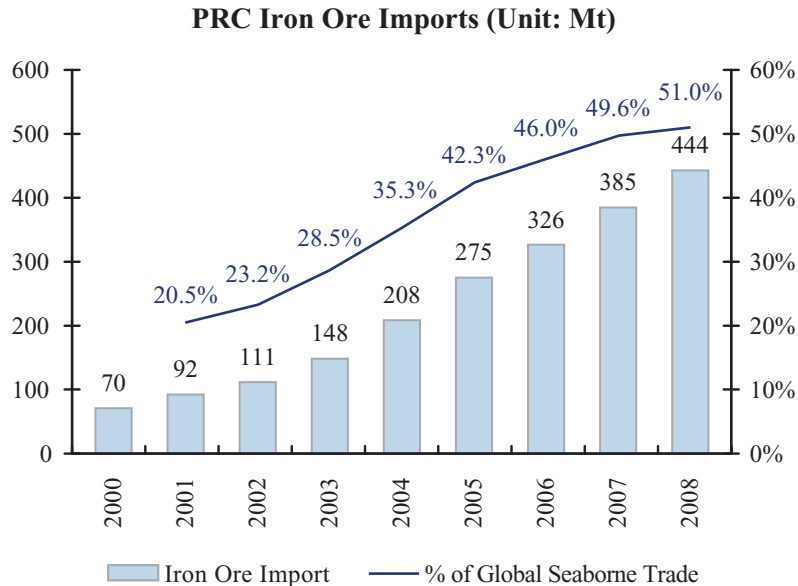
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### *Iron ore trade and competition*

The PRC continues to be the main destination for global iron ore shipments, with 444 Mt entering PRC ports in 2008, representing an increase of 15.3% over 2007. The PRC's share of the global iron ore trade reached 51% in 2008, a significant increase from 2001 when it accounted for only 20.5%. Australia, Brazil and India are three main sources of iron ore imports in the PRC.



Source: China Customs Statistics and Clarkson Research Services

The PRC's iron and steel production will remain reliant on imported ore, although, according to the Ministry of Land and Resources of the PRC, domestic ore output capacity is forecast to increase, albeit at a reduced rate, to 1,100 Mt in crude ore terms by 2015.

The PRC has over 8,000 iron mines, most of which are small in scale. According to MMAC, the output from small and medium sized mines in 2008 was 634 Mt, accounting for approximately 77% of total iron ore output in the PRC. The other 23% was produced by large mines, most of which belong to state-owned steel companies.

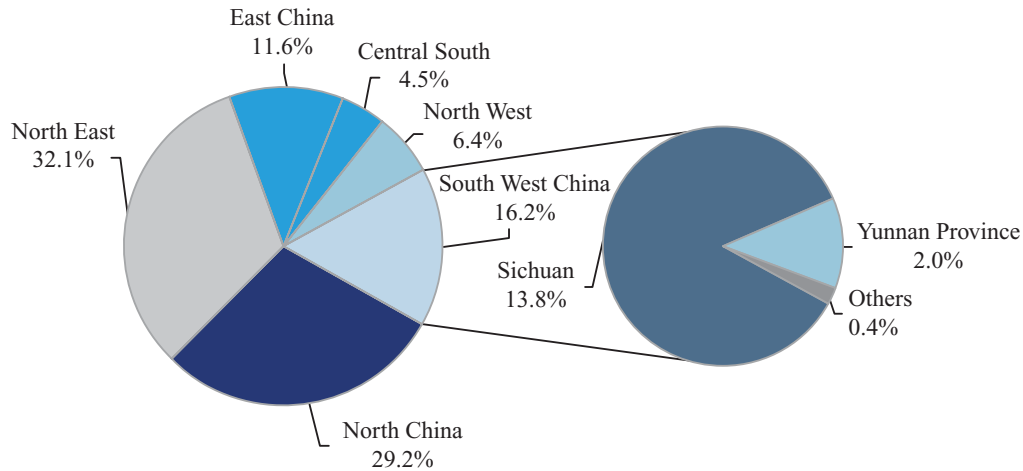
### **Sichuan iron ore industry**

#### *Iron ore resource*

The PRC's iron ore resources are mainly found in the northeastern, northern and southwestern regions. These three regions account for 78% of the PRC's iron ore resources. Sichuan has the third largest iron ore resources at 3.1 billion tonnes, representing approximately 13.8% of the national resources in 2007, according to the NBSC.

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### Geographic Distribution of PRC Iron Ore Resources (2007)



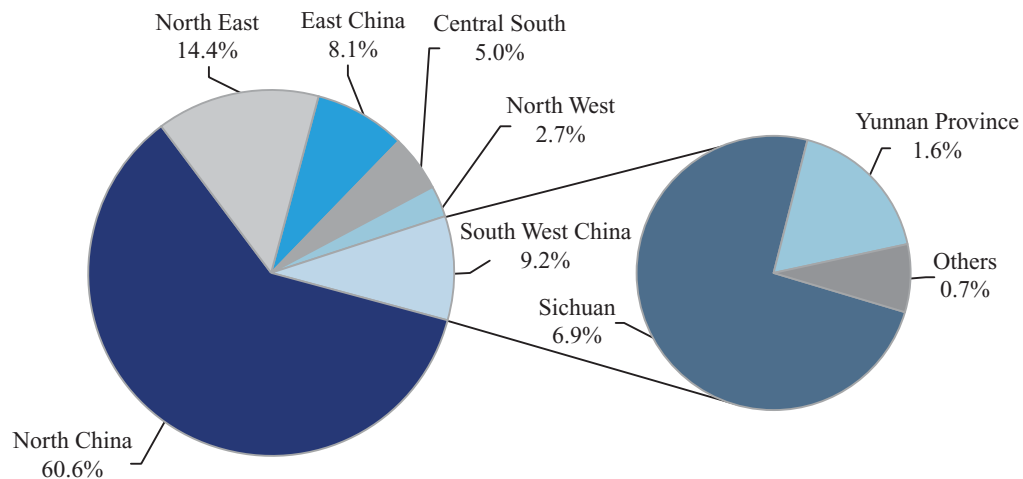
Source: NBSC

The iron ore resources in Sichuan are comprised mainly of vanadium-bearing titanomagnetite deposits and Sichuan has the largest resources of this type in the PRC, with the province representing approximately 83.2% of the PRC's vanadium-bearing titanomagnetite resources.

#### ***Iron ore production***

According to NBSC, in 2008, the southwest region contributed 9.2% of the total output of crude iron ore in the PRC. According to NBSC, Sichuan ranked No. 4 in the PRC in 2008 with a crude iron ore output of 57 Mt, representing 6.9% of the total output of crude iron ore in the PRC and a year-on-year increase of 22.9%.

### PRC Crude Iron Ore Output by Region (2008)



Source: NBSC

According to the Sichuan Metallurgy Economic Association (四川省冶金經濟協會), our market share of iron ore output in Sichuan in 2007 and 2008 was 3.6% and 10.7%, respectively. The increase in our market share from 2007 to 2008 was due to the increase in our iron ore production. See the

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"Business — Products" and "Business — Our Production Facilities and Operations — Production facilities" sections in this document.

### *Iron ore demand*

Local iron ore output in Sichuan has been insufficient to meet local demand over the past several years. Despite being the major producer of iron ore in the southwest region, Sichuan remains a net importer of iron ore. According to data provided by Chengdu's railroad logistics company, the inflow of iron ore into Sichuan from other regions in the PRC by railroad was around 7.6 Mt while the outflow to other regions was only 1.3 Mt. PRC's customs data also shows that Sichuan has imported 2.3 Mt of iron ore in 2008.

Within Sichuan, according to the Sichuan Province Iron and Steel Industry 11th 5-Year Plan, the Pangang Group will install two additional blast furnaces of 1,300 m<sup>3</sup> each by 2010. Further, Chuan Wei Iron & Steel Group will expand its No. 2 BF to 2,000 m<sup>3</sup>; Xichang New Steel plans to build two 1,000 m<sup>3</sup> blast furnaces; and Desheng Iron and Steel Corporation plans to install one 1,500 m<sup>3</sup> blast furnace. As a result of these expansion plans, demand for iron ore in Sichuan is expected to increase.

### Sichuan Iron Concentrates Supply and Consumption (Unit: Mt)

	Years ended				Six months ended June 30,
	2005	2006	2007	2008	2009
Sichuan Iron Output .....	10.61	13.08	14.46	14.25	7.57
Sichuan Iron concentrates Consumed .....	18.86	23.25	25.71	25.33	14.77
Sichuan Iron concentrates Output .....	6.79	10.66	17.19	21.12	11.22
Supply Shortfall .....	(12.07)	(12.60)	(8.52)	(4.22)	(3.55)

Source: NBSC, Sichuan Metallurgy Economic Association and Hatch estimates

Note: For data from 2001 to 2008, iron concentrate consumed/iron output = 1.78, iron ore concentrate output is calculated by using average Fe content of Sichuan crude iron ore of 27%, iron ore concentrate of 54% and a recovery ratio of 74%. The data for six months ended June 30, 2009 is provided by Sichuan Metallurgy Economic Association.

### *Sichuan crude steel production*

The growth in steel production in Sichuan averaged around 10.3% per annum between 2001 and 2008, reaching 13.7 Mt in 2008. The top three producers in 2008 were as follows:

### Crude Steel Output by Plant for the Top Three Producers in Sichuan Province (Unit: Mt)

	Crude Steel Output		Y-O-Y Change (%)	
	2007	2008	Volume	
Panzhuhua Iron and Steel Company (Pangang Group) .....	7.46	7.51	0.05	0.72%
Chuanwei Iron and Steel .....	2.63	2.63	0.00	0.08%
Dazhou Iron and Steel .....	2.00	2.02	0.02	1.10%
Total .....	<u>12.09</u>	<u>12.16</u>	<u>0.07</u>	<u>0.58%</u>

Source: NBSC, CISA, Jin Qiu Cai Zhi (锦秋财智) and Sichuan Metallurgy Economic Association

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### *Competition*

According to Sichuan Metallurgy Economic Association, there were 54 iron ore mines in Sichuan as of December 31, 2008. The iron ore output of these 54 mines reached 44.3 Mt in the aggregate in 2008.

Among the top 10 iron ore mines, there were five state-owned mines which account for approximately 52% of Sichuan iron ore output. The major regional steel companies, Panzhihua Steel Group and Chongqing Steel, accounted for 36.2% and 4.6% of Sichuan iron ore output in 2008, respectively.

The top 10 iron ore producers in Sichuan as of December 31, 2008 were as follows:

<u>Company</u>	<u>Location</u>	<u>Iron ore output (2008)</u>	<u>Ownership</u>	<u>Market share</u>
1. Panzhihua Iron & Steel Company (攀枝花鋼鐵(集團)公司) .....	Panzhihua	16,199,801 tonnes	State-owned	36.2%
2. Our Group .....	Liangshan zhou	4,771,371 tonnes	Non State-owned	10.7%
3. Sichuan Lomon Corporation (四川龍蟒礦冶有限責任公司) .....	Panzhihua	4,601,898 tonnes	Non State-owned	10.3%
4. Huili Xiaoba Jingzhi Iron Ore Mining of Panzhihua Jingzhi Kuangchan Co., Ltd. (攀枝花市經質礦產有限責任公司會理小黑箐經質鐵礦) ..	Liangshan zhou	2,436,221 tonnes	Non State-owned	5.4%
5. Sichuan Huidongmanyangou Mining Ltd. (四川會東滿銀溝礦業集團有限公司) .....	Liangshan zhou	2,146,074 tonnes	State-owned	4.8%
6. Taihe Iron Mining, Chongqing Iron & Steel Mining Industry Co., Ltd. (重慶鋼鐵集團礦業有限公司太和鐵礦) .....	Liangshan zhou	2,048,442 tonnes	State-owned	4.6%
7. Yanyuan Pinchuan Iron Ore Mining (鹽源縣平川鐵礦) .....	Liangshan zhou	1,453,381 tonnes	State-owned	3.3%
8. Sichuan Nanjiang Mining Co., Ltd. (四川南江礦業集團有限公司) .....	Bazhong	1,446,808 tonnes	State-owned	3.2%
9. Huili County Xiaoheqing Village Maanshan Iron Ore Mining (會理縣小黑箐鄉馬鞍山鐵礦) .....	Liangshan zhou	1,210,682 tonnes	Non State-owned	2.7%
10. Desheng Group Iron & Steel Corporation (四川德勝集團鋼鐵有限公司) .....	Leshan	1,205,083 tonnes	Non State-owned	2.7%

Source: Sichuan Metallurgy Economic Association

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### Global titanium mineral industry

#### *Titanium resources*

In addition to iron concentrates, vanadium-bearing titanomagnetite ore is also used to produce ilmenite. Ilmenite supplies about 92% of the world's demand for titanium minerals. World resources of ilmenite, anatase and rutile total more than two billion tons. Titanium resources globally are extensive. The USGS estimates that, based on current production levels and existing identified titanium resources, there are approximately 730 Mt of titanium resources (of contained TiO<sub>2</sub>).

#### Titanium Resources (2008) (Mt, TiO<sub>2</sub> equivalent)

	Ilmenite		Rutile	
	Resource	Resource Base	Resource	Resource Base
United States .....	6.0	59.0	0.4	1.8
Australia .....	130.0	150.0	22.0	31.0
Brazil .....	43.0	84.0	1.2	2.5
Canada .....	31.0	36.0	—	—
PRC .....	200.0	350.0	—	—
India .....	85.0	210.0	7.4	20.0
Mozambique .....	16.0	21.0	0.5	0.6
Norway .....	37.0	60.0	—	—
South Africa .....	63.0	220.0	8.3	24.0
Sierra Leone .....	—	—	2.5	3.6
Ukraine .....	5.9	13.0	2.5	2.5
Vietnam .....	1.6	14.0	—	—
Other countries .....	66.0	150.0	0.4	1.0
World total (rounded) .....	<u>680.0</u>	<u>1,400</u>	<u>45.0</u>	<u>87.0</u>

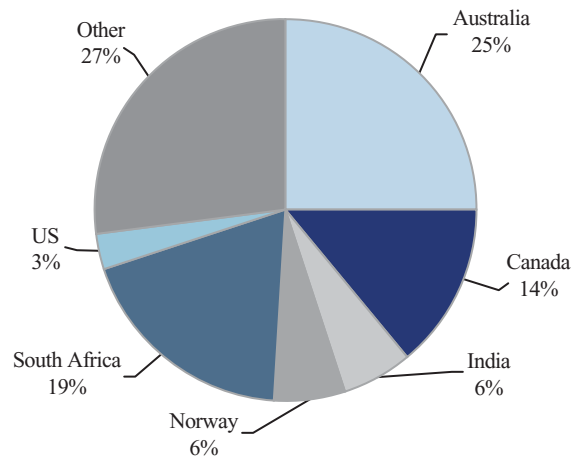
Source: USGS

#### *Titanium mineral supply*

In 2008, global production of titanium mineral concentrates were estimated to have decreased slightly compared with that of 2007. Yet new mining projects are being developed in Australia, Canada, Chile, India, Kenya, Madagascar, Mozambique, Senegal, and South Africa.

Australia is the world's largest supplier of titanium minerals, accounting for 25% of the global supply. South Africa is the second largest supplier, accounting for 19% of the global supply.

#### Titanium Minerals: Supply by Country (2008)



Source: USGS

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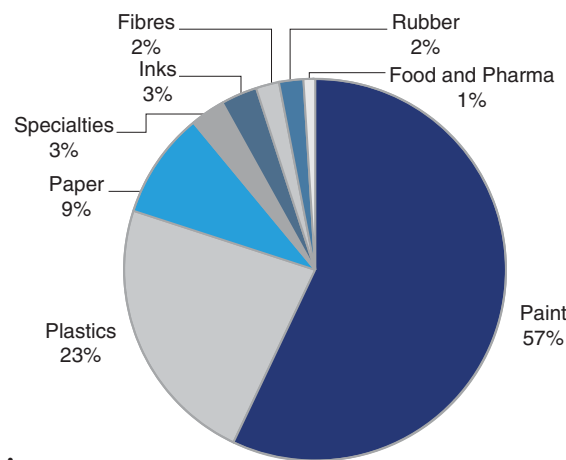
### *Titanium mineral demand*

Titanium-related products exhibit strength and ensure resistance and are widely used in many industries, such as the painting, paper manufacturing, plastic, chemistry, aviation and metallurgy industries, which are expected to continue to grow.

Titanium dioxide pigment accounts for more than 90% of the consumption of titanium minerals. It is a white powder with high opacity, brilliant whiteness, excellent covering power and resistance to color change. These properties have made it a valuable pigment and opacifier for a broad range of applications, including paints, plastic goods, inks and paper.

The global demand for this pigment, by sector, is shown below.

**Consumption of Titanium Dioxide Pigment by Sector in 2008**



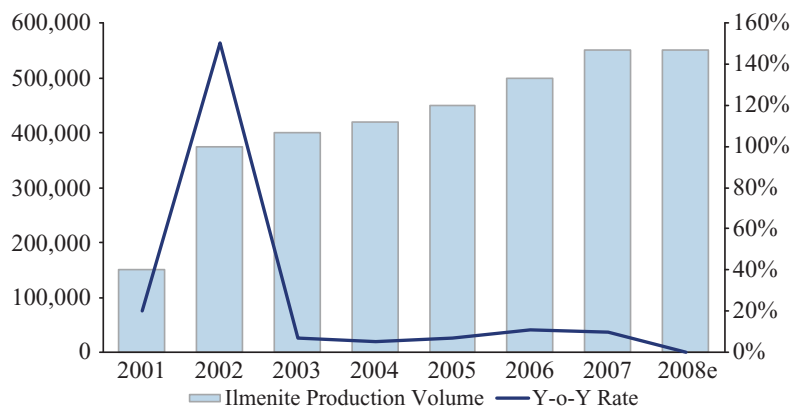
Source: TZMI

### **PRC titanium mineral industry**

#### *Titanium mineral supply*

The PRC's ilmenite output was 550 Kt in 2007, an increase of 50 Kt from 2006. Preliminary estimates indicate that the PRC produced approximately the same volume in 2008.

**Production volume of Ilmenite (TiO<sub>2</sub> Equivalent, Unit: Tonne)**



Source: USGS

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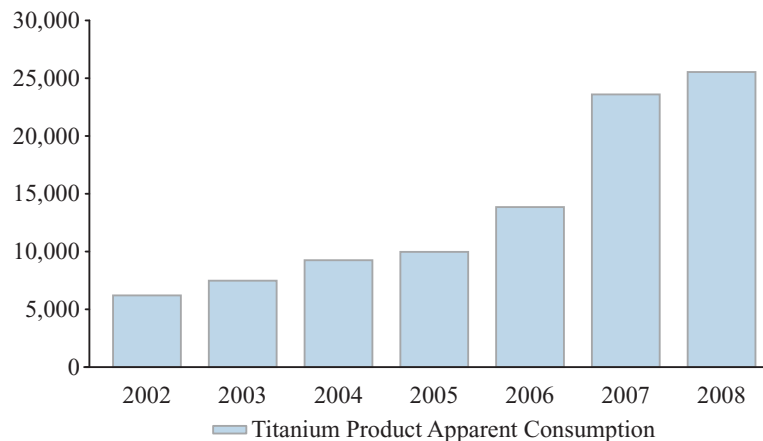
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### *Titanium mineral demand*

In 2008, consumption of titanium finished products in China was 25,554 tonnes, which represented an increase of 8.1% from 2007, according to data supplied by the China Nonferrous Metal Industry Association Titanium Industry Council.

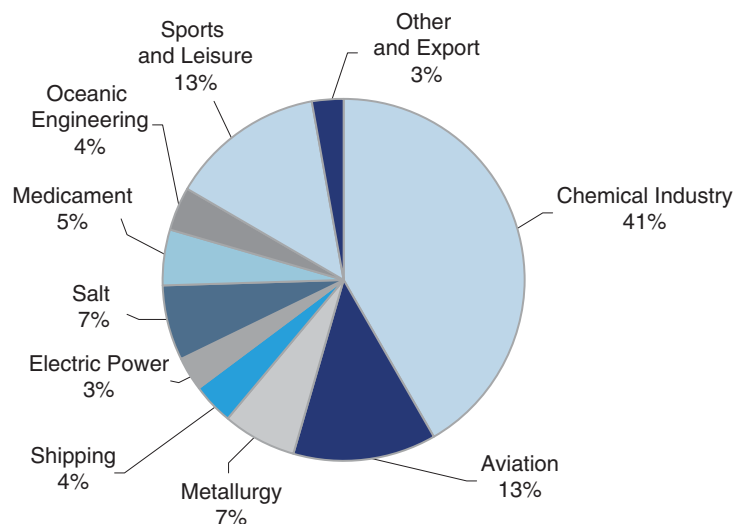
**Consumption of Titanium Products in China (Unit: Tons)**



Source: China Nonferrous Metal Industry Association Titanium Industry Council

In terms of the types of consumers, the chemical, aviation and sports and leisure industries account for the highest demand for titanium products.

**PRC Titanium Finished Products Consumption Breakdown by Sector in 2008**



Source: China Nonferrous Metal Industry Association Titanium Industry Council

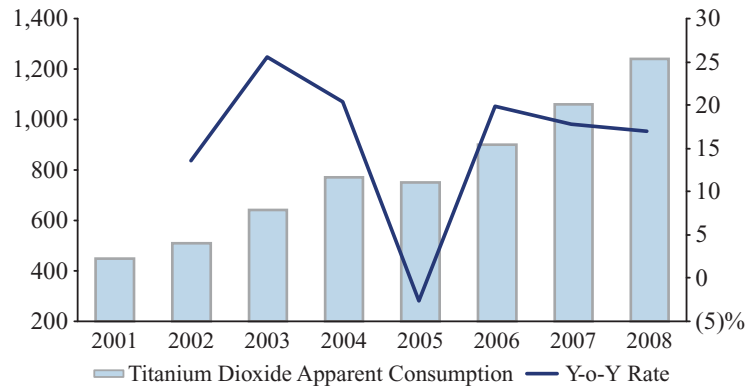
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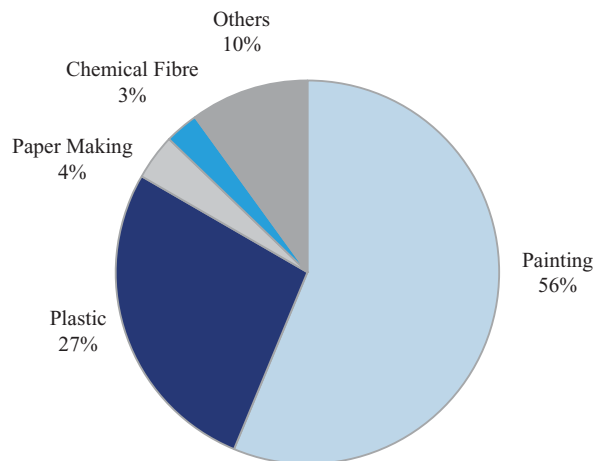
The apparent consumption of TiO<sub>2</sub> in the PRC was 1,240 Kt in 2008, representing an increase of 17% when compared with 2007, according to the Hatch Report.

**PRC TiO<sub>2</sub> Consumption (Unit: Thousand Tons, %)**



Source: China Petroleum and Chemical Industry Association and Hatch

**China Titanium Pigment Consumption Breakdown by Sector in 2008**



Source: Journal of Electronic Science and Technology of China, and Hatch estimates



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### Sichuan titanium mineral industry

#### Supply

There are almost 70 companies in Sichuan which produce titanium products and the total output capacity of titanium concentrates, titanium slag, pigment (TiO<sub>2</sub>), titanium ferrous, and nano-meter pigment in Sichuan is 1.5 Mt, 0.3 Mt, 0.6 Mt, 10 Kt and 0.3 Kt, respectively.

#### Production of Titanium Concentrates, Pigment and Titanium Slag from 2003 to 2008 in Sichuan (Unit: Kt)

Titanium Products	Years Ended					
	2003	2004	2005	2006	2007	2008
Titanium Concentrates	120	300	500	800	1,000	974
Pigment	12	20	35	75	150	129
Titanium Slag	0	0	0	40	80	128

Source: Jin Qiu Cai Zhi (錦秋財智)

#### Demand

Demand for titanium concentrates and titanium finished products from 2005 to 2008 is shown in the following table.

#### Demand for Titanium Concentrates and Titanium Finished Products in Sichuan (Unit: Kt)

Products	Years Ended			
	2005	2006	2007	2008
Titanium Concentrates	91	195	390	553
Titanium Finished Products	0.2	0.8	1.5	2.7

Source: Jin Qiu Cai Zhi (錦秋財智)

In 2008, demand for titanium finished products, titanium slag and titanium concentrates in Sichuan were 2.68 Kt, 0.23 Mt and 0.55 Mt, respectively.

The main products and associated grade of titanium of producers in Sichuan are shown below.

#### Main Products of Titanium Producers in Sichuan

Producer	Main Products	Composition
Panzhuhua Iron and Steel Company (Pangang Group)	Titanium concentrates	TiO <sub>2</sub> 46-48%
Sichuan Lomon Titanium Industry Co. Ltd	Pigment	TiO <sub>2</sub> 94-97%
Chongqing Titanium Industry Co. Ltd of Pangang Group	Pigment	
Xingzhong Titanium Industry Co. Ltd	Pigment	
Yuantong Titanium Industry Co. Ltd	Titanium Slag	TiO <sub>2</sub> 90-92%
Pangang Titanium Industry	Titanium Slag	TiO <sub>2</sub> 85%
Pangang Titanium Industry	Pigment	
Panjin Titanium Industry	Pigment	

Source: Jin Qiu Cai Zhi (錦秋財智)

## INDUSTRY OVERVIEW

### Main Producers and Output Capacity

Producer	Output Capacity
Panzhuhua Iron and Steel Company (Pangang Group) . . .	Titanium Concentrates: 300 Kt, titanium slag: 180 Kt; Pigment 126 Kt
Sichuan Lomon Titanium Industry Co. Ltd . . . . .	80 Kt sulfate rutile pigment
Chongqing Titanium Industry Co. Ltd of Pangang Group . . . . .	40 Kt sulfate rutile pigment
Xingzhong Titanium Industry Co. Ltd . . . . .	36 Kt high-grade rutile
Yuantong Titanium Industry Co. Ltd . . . . .	20 Kt high-grade titanium slag
Pangang Titanium Industry . . . . .	16 Kt sulfate pigment, 40 Kt sulfate rutile, 60 Kt high-grade titanium slag
Panjin Titanium Industry . . . . .	30 Kt chloride pigment

Source: *Jin Qiu Cai Zhi* (錦秋財智)

### Titanium Produces Output of Main Producers in Sichuan (Unit: Kt)

Producer	Product	2005	2006	2007	2008
Panzhuhua Iron and Steel Company (Pangang Group) . . . . .	Titanium Concentrates	215.0	240.0	255.0	306.6
Sichuan Lomon Titanium Industry Co. LTD . . . . .	Pigment	35.2	43.0	64.0	55.0
Chongqing Titanium Industry Co. LTD of Pangang Group . . . . .	Pigment	33.8	37.7	39.6	41.2
Xingzhong Titanium Industry Co. LTD . . . . .	Pigment	11.2	15.4	18.0	23.0
Yuantong Titanium Industry Co. LTD . . . . .	Titanium Slag	15.6	16.8	19.8	33.7
Pangang Titanium Industry . . . . .	Titanium Slag	21.0	26.0	33.0	54.0
Pangang Titanium Industry . . . . .	Pigment	13.6	15.0	17.9	28.0
Panjin Titanium Industry . . . . .	Pigment	14.7	15.1	16.0	25.0
Hengwei Titanium Industry . . . . .	Sponge Titanium	0.0	0.0	0.4	1.8

Source: *Jin Qiu Cai Zhi* (錦秋財智)

### Iron ore and titanium prices

#### *International iron ore prices*

Iron ore prices are generally negotiated directly between buyers and sellers and are mostly set on a yearly basis. The benchmark level for price negotiations is usually the first major sinter fine contract signed and announced by one of CVRD, BHPB or Rio Tinto with either a major European or Asian steelmaker. CVRD and Japan's Nippon Steel were the first to reach an agreement in 2008 at a price which represented an increase of 65% in comparison with the price in 2007.

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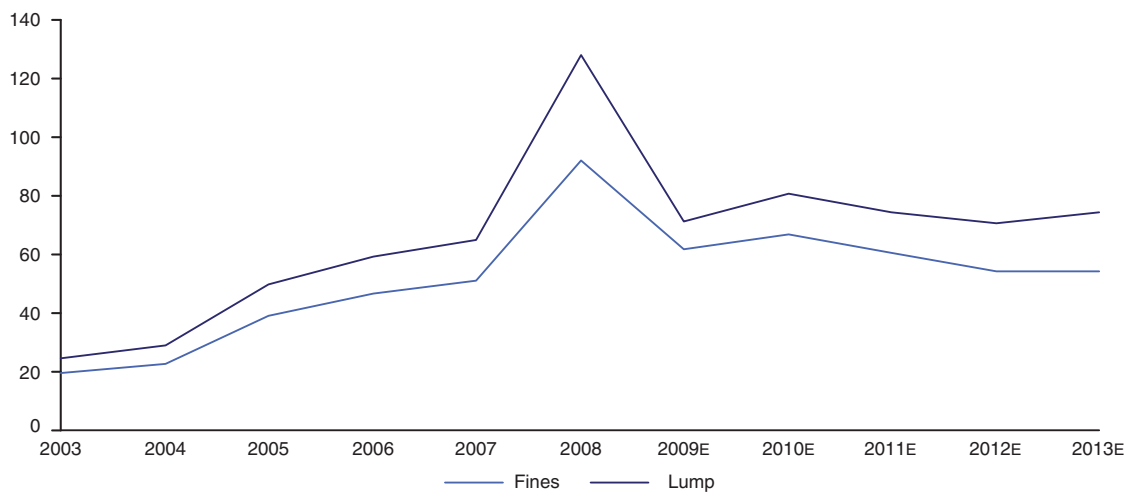
## INDUSTRY OVERVIEW

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The following chart represents the US\$ per tonne price for international benchmark contract prices that are calculated using a standard 63.5% iron content on a dry basis.

Historically, the prices of iron fines and lump from Australia to Asia have grown at a CAGR of 27.6% between 2003 and 2007. These prices reached peak in 2008 with US\$91.9/t and US\$128.1/t for iron fines and lumps, respectively. With the recent slowdown in the macro economy, prices retreated in the second half of 2008 before stabilizing at the end of 2008. In July 2009, most of the Asian and European steel makers have reached an agreement on new iron ore long-term prices with the largest iron ore producers, and iron ore prices even expected to achieve a stable price outlook thereafter. According to the Hatch Report, iron ore fines and lump prices are expected to increase in 2010 and then move towards a long-term equilibrium of US\$54.5/t and US\$74.3/t, respectively.

**Iron Ore Contract Prices**  
(Unit: US\$/t)



Source: Hatch

Note:

1. Prices are calculated on a 63.5% Fe grade, dry basis and are FOB prices from Australia to Asia.

### ***PRC domestic iron ore prices***

Globally, though most iron ore transactions are conducted using long term contractual arrangements, spot sales of individual iron ore cargoes may occur under certain conditions (unexpected furnace outages etc). In China, however, a large spot market exists and Chinese steel producers buy approximately 40% of all their iron ore requirements on a spot basis. Currently, India is one of the three biggest iron ore supply countries to the PRC and mostly sells iron ore products to the PRC at a spot price.

In July 2005, the prices for fines and pellets in the PRC hit a low of US\$57.5/t and US\$87.5/t, respectively, due to increases in supply. Prices remained low until the second quarter of 2007 when they began to increase due to sharp increases in demand from the infrastructure and real estate industries. Prices peaked at US\$194.0/t and US\$267.5/t for fines and pellets in March and May 2008, respectively. These prices represent a growth rate of 237.4% and 205.7% since the lows in 2005 for fines and pellets, respectively. With the slowdown in the macro economy, shrinking demand caused a sharp drop in prices in the third quarter of 2008. In October 2008, the prices for fines and pellets dropped to US\$63.5/t and US\$100.0/t, representing a decrease from the peak of 67.3% and 62.6%, respectively. Since then prices have begun to stabilize with fines and pellets prices reaching

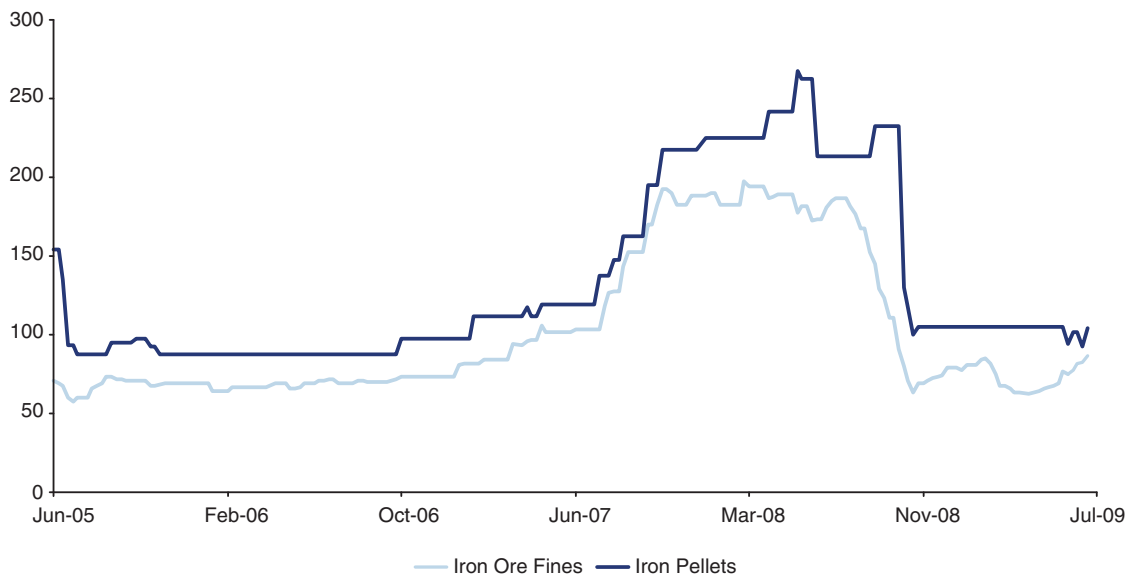
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US\$87.0/t and US\$104.5/t in mid July 2009, representing a growth rate of 37.0% and 4.5% compared to the low price in 2008.

### China Average Prices for Iron Ore Fines and Iron Pellets (Unit: US\$/tonne)



Source: *Metal Bulletin, Bloomberg*

Note: Prices are iron ore fines/pellets CFR main China port prices (63.5% Fe for fines and 65%-66% Fe for pellets).

Vanadium-bearing titanomagnetite ore is primarily produced in the Panzhihua region in Sichuan and the Hebei province in the PRC. Due to the recent severe shortage of iron ore in the PRC and the increasing use of vanadium-bearing titanomagnetite ore by steel producers arising from technological improvements, iron ore concentrates containing vanadium have been sold close to the prices of non vanadium-bearing iron ore. Although vanadium-bearing titanomagnetite ore can be more expensive to process than non vanadium-bearing iron ores, the revenue generated from the sale of such recovered vanadium can offset the production costs and may lead to an increase in the price of vanadium-bearing titanomagnetite ore in the future as producers become more accustomed to the processing requirement of the ore.

There are three methods of pricing iron ore in the PRC. First is the pricing set by the steel manufacturers which own mines. Each company has its own transfer pricing practice but iron ore is usually sold at a percentage discount to the then prevailing market prices. Second, mines and steelworks can enter into off-take agreements where both parties commit to a certain quantity. The transaction price is usually based on the market price, but can also be sold at a small discount or premium. The third, and the most common pricing method in the PRC, is spot pricing.

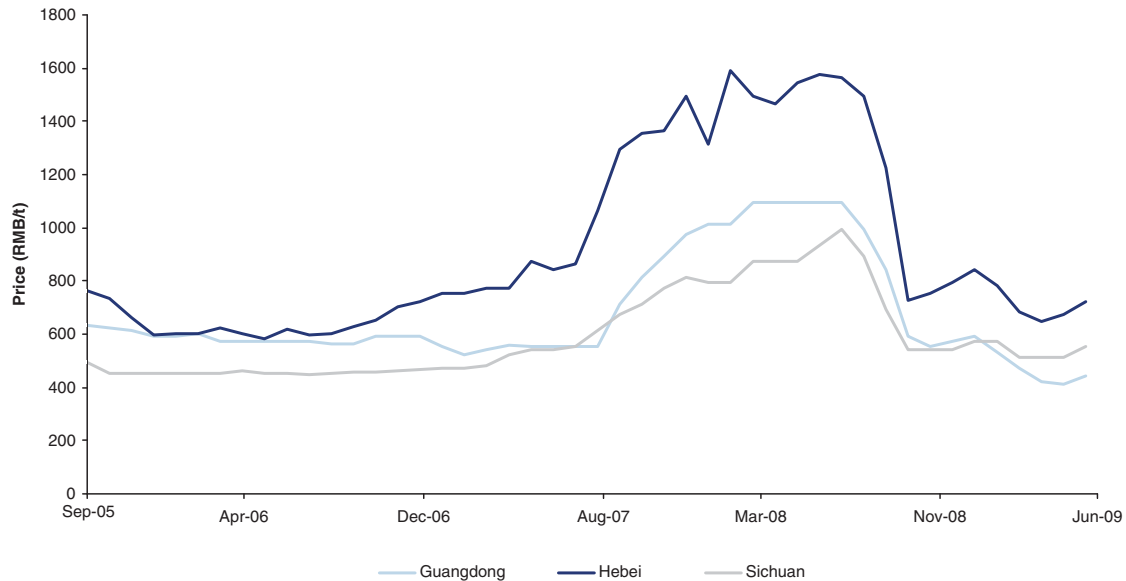
### *Sichuan iron ore prices*

Prices in Sichuan follow the same trends as those in other regions because the transportation costs across provinces become cost effective only once a sufficiently large price gap develops. Domestic prices are largely influenced by imported ore prices, especially those imported on a spot

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basis. Prices in Sichuan were low, with an average price of RMB491/t between 2005 and the second quarter of 2007. Prices began to rise after the second quarter of 2007 to reach a peak of RMB1,000/t in the early third quarter of 2008. With the slowdown in the macro economy, prices dropped sharply between September and October 2008, with average prices of RMB700/t in September dropping to RMB550/t in October 2008. However, prices started to stabilize in March 2009 at RMB520/t and increased to RMB560/t in June 2009.

**Iron Ore Prices in Guangdong, Hebei and Sichuan (Unit: RMB/ton)**



Source: Hatch

Notes:

1. Guangdong Province (Huajiji): excluding VAT.
2. Hebei Province (Tangshan): including 13% VAT and 17% VAT before and after January 1, 2009.
3. Sichuan Province: including 13% VAT and 17% VAT before and after January 1, 2009.

Due to the economic slowdown in the second half of 2008, there was a decrease in demand for iron ore products globally and in the PRC. Despite a decrease in the second half of 2008, iron ore prices have begun to stabilize since March 2009 in Sichuan as well as in other regions in the PRC due to the PRC government's stimulus policy and fixed asset investment growth in China. Following the Sichuan earthquake in May 2008, the PRC government announced reconstruction plans for the areas affected by the earthquake. Specifically, the PRC government plans to construct 54.9 million sq.m of residential buildings, repair 2,548 km of highway, construct 1,509 km of new highway, repair 728 bridges and construct 123 new bridges in the areas mainly in Sichuan, Gansu and Shaanxi provinces that were affected by the Sichuan earthquake. As of April 30, 2009, the planned investment for the Sichuan General Reconstruction Plan had reached RMB1,700 billion. For details concerning such policies and investment, see "— Economic reconstruction and stimulus policies affecting the iron and steel industry — Sichuan Reconstruction Plan" in this section.

In addition, as a result of the PRC government's Sichuan reconstruction plans, Sichuan's steel producers increased their steel production volume since late 2008 and demand for iron ore has also increased. We believe that the outlook for iron ore prices in Sichuan remains positive in the near future.

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### *Global and the PRC titanium products prices*

Towards the end of 2006, titanium concentrates prices showed a strong upward movement. They reached a peak of RMB1,000/t in March 2007, representing an increase of 62.8% when compared to the average prices between 2004 and 2006 of RMB614/t. Titanium concentrates prices retreated to RMB870/t in August 2007 due to an increase in supply, representing a decrease of 13.0%. Prices began to increase again toward the end of 2007 to reach a new peak of RMB1,100/t in March 2008 partly due to the rising production costs and increase in demand from downstream industries. With the slowdown in the macro economy in the second half of 2008, the prices of titanium concentrates dropped sharply by 45.5% to RMB600/t in November 2008. The prices of titanium concentrates have showed signs of stabilization with prices at RMB655/t in June 2009.

**Titanium Oxide Concentrates Price in PRC (Unit: RMB/ton)**



Source: Chinacem

Note: Prices are ex-work price at Panzihua in Sichuan Province, excluding VAT for Titanium oxide concentrates ( $\text{TiO}_2 > 47\%$ ,  $\text{Fe}_2\text{O}_3 < 7\%$ ,  $\text{P} < 0.01\%$ ).

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### PRC POLICIES AND REGULATIONS SUPPORTING GROWTH IN THE MINING AND STEEL INDUSTRIES

Facing the rapid development of the steel and mining industries in the PRC, the PRC government has focused on establishing and implementing policies to regulate the industry's development, its impact on the environment and international trade.

#### **Policies for the Development of the PRC Iron and Steel Industry**

##### *Development policy for the PRC iron and steel industry*

Since 2003, the PRC has imposed adjustments and controls at a micro level over the steel industry. The State Council promulgated the "Decisions of State Council on Promulgation and Implementation of Interim Provisions for Promoting Adjustment on Industry Structure" (Guo Fa [2005] No. 40) (《國務院關於發佈實施〈促進產業結構調整暫行規定〉的決定》) (國發 [2005] 40 號) in 2005 and the "Notice of State Council on Accelerating and Pushing the Structural Adjustment of Industries with Excess Capacity" (Guo Fa [2006] No. 11) (《國務院關於加快推進產能過剩行業結構調整的通知》) (國發 [2006] 11 號) in 2006 and the NDRC issued the "Development Policy for Iron and Steel Industry" (NDRC Decree No. 35) (《鋼鐵產業發展政策》) (國家發改委第 35 號令) in 2005 (the "Development Policy").

Regarding the national geological distribution of iron and steel industry, it is expressly reiterated in Article 11, Chapter 3 of the Development Policy that the Panxi Region has large iron ore and coal resources. However, the Development Policy also states that transportation is inconvenient in the southwestern region and the existing key enterprises must focus on improving facilities; adjusting the product mix; and developing high value-added products in addition to focusing on increasing their output volumes so that their output volumes can be adjusted in accordance with the sustainability of ore supply. As to the import and export of steel products and semi-finished products, the Development Policy provides that the State shall restrict the export of primary products which consume lots of energy and results in a large amount of pollution, such as coke, ferrous alloy, pig iron, scrap, steel billets and ingots. As to research and development of steel products, the Development Policy provides that iron and steel enterprises are encouraged to manufacture high-strength steel and hot rolled ribbed bars of Grade III (400MPa) and above.

China's State Council approved the "Steel Industry Support Plan" in principle on January 14, 2009, to help revitalize the steel industry (the "Support Plan"). The Support Plan seeks to control national steel output, continue to eliminate inefficient steelmaking facilities, encourage industry consolidation, upgrade technology and optimize the geographic placement of steel plants to strengthen the Chinese steel industry. The Support Plan clarifies that: (a) the PRC will adopt moderately flexible export systems to further develop the overseas and domestic markets; (b) it is necessary to control the national total steel capacity, retire inefficient factories, and restrict permission for capacity expansion projects; (c) it is vital to spur industrial consolidation by encouraging leading steel enterprises to engage in merger and acquisition activities; (d) technology is to be transformed and upgraded and more effort placed on research and development and the introduction of new technologies; and (e) both the iron ore import market and steel sales must be regulated to establish risk reduction and marketing risk-sharing mechanisms.

##### *The 11th five year development program for Sichuan's iron and steel industry*

The "11th Five Year Development Program for Sichuan's Iron and Steel Industry" (四川省鋼鐵工業 "十一五" 發展規劃) (the "Program") was issued on April 30, 2007. The Program



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## INDUSTRY OVERVIEW

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stipulates that crude steel and finished steel production will reach 20 Mt in Sichuan by 2010. Production targets are given for the vanadium and titanium industries as well, with vanadium slag production to reach 600 Kt; vanadium products to reach 50 Kt; titanium concentrates to reach 2.10 Mt; titanium pigment to reach 60 Kt; titanium sponge to reach 20 Kt; and titanium finished products to reach 10 Kt by 2010. Pangang Group is aiming to expand its total steel capacity to 9.0 Mt by 2010.

### **Policies for the Development of Mine Exploration and Mining**

#### *Policy and regulation of mine exploration and mining*

In addition to the development of the iron and steel industry, the Development Policy also gives directives related to raw materials. The Development Policy encourages large-scaled steel enterprises to explore and develop iron ore resources, although a mining license must be obtained for the mines. New mining projects with iron ore reserves of 50 Mt or more are subject to verification or approval by the NDRC.

As early as September 2000, six ministries, including the MLR, jointly issued the "Several Opinions about Further Encouraging Foreign Investment in Exploitation and Mining of Non-oil-or-gas Mineral Resource" (《關於進一步鼓勵外商投資勘查開採非油氣礦產資源的若干意見》), which provides for the further development of the exploration and mining rights market of domestic non-oil-or-gas mineral resources and the encouragement of foreign investment in exploration and mining of non-oil-or-gas mineral resources in the western region of the PRC.

In 2001, the MLR issued the "Circular of MLR on Promulgation and Implementation of National Plan of Mineral Resources" (the Guo Tu Zi Fa [2001] No. 134) (《國土資源部關於發佈實施〈全國礦產資源規劃〉的通知》) (國土資發[2001]134號), which states the overall objective of exploration, development, utilization and protection of mineral resource in the PRC, with the goal of further enhancing the investigation and the assessment and exploration of mineral resources to improve the availability of domestic mineral resources.

In December 2003, the Information Office of the State Council issued the white book, "China's Policy on Mineral Resources" (《中國的礦產資源政策》) and mentioned that the PRC will mainly rely on the development of domestic mineral resources to meet the demand of modern construction requirements. The PRC government encourages the exploration and development of mineral resources demanded by the market, especially the mineral resources found in the western region of the PRC, in order to improve the availability of domestic mineral products.

The State Council issued in 2006 the "State Council's Decision on Enhancing Geological Work" (Guo Fa [2006] No. 4) (《國務院關於加強地質工作的決定》) (國發[2006]4號), which further expresses that the PRC will enhance the exploration and mining of mineral resources.

While continuously enhancing the exploration and mining of mineral resources, the State has also issued, from time to time, policies to regulate the development and utilization of mineral resources.

In January 2004, the State Council officially issued the "Regulation on Safety Production Permits" (the State Council's Decree No. 397) (《安全生產許可證條例》) (國務院令(第397號)), which stipulates that the State has adopted the requirement for work safety licenses for certain enterprises.



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Mining enterprises are not allowed to participate in any production until work safety licenses have been obtained.

The MLR issued in December 2007 the "Notice on Adoption of Uniform Numbering of Exploration Rights across the Country" (《關於實行全國探礦權統一配號的通知》), which stipulates that as of January 1, 2008, the creation, modification, extension and continuance of exploration rights, as well as geological investigation, are subject to the registration and approval by the exploration rights registration authority after which an exploration permit number is electronically generated.

In 1999, the Ministry of Finance and the MLR jointly issued the "Measures on Administration of the Use Fee and Payment for Exploration Rights and Exploitation Rights" (《探礦權採礦權使用費和價款管理辦法》), which provides that the exploration rights utilization fee shall be calculated for the year of exploration and paid yearly according to the block area at a price of RMB100 per sq. km. each year starting from the first year of exploration through to the third year of exploration. In addition, RMB100 per sq. km. for every additional year starting from the fourth year of exploration will be paid, up to RMB500 per sq. km. each year. The mining rights utilization fee shall be paid yearly according to a mine area of RMB1,000 per sq. km. each year.

On March 3, 2008, the State Council published the "Regulation on Administration of Qualification for Geological Exploration" (中華人民共和國國務院令(第520號)《地質勘查資質管理條例》), which became effective on July 1, 2008. It stipulates that no geological exploration activity is allowed until consignors obtain a mineral resource exploration license.

On March 3, 2008, the MLR issued the notice on "National Plan on Geological Exploration" (《全國地質勘查規劃》), containing the objectives planned for geological exploration in the PRC by 2010 including major breakthroughs in mineral exploration, large increases in the availability of domestic mineral resource, establishment of backup areas in the western region of the PRC for the exploration and development of important resources and increases in newly-identified iron ore reserves by five billion tonnes.

The MLR officially issued the "National Mineral Resources Plan (2008~2015)" on December 31, 2008 in an attempt to promote mineral resources sustainability. The "National Mineral Resources Plan (2008~2015)" stipulates that the national newly-added iron ore ensured reserve will amount to 3 billion tonnes during 2008-2010 and further expanded to 6 billion tonnes during 2011-2015. Meanwhile, the iron ore production will rise to 940 million tonnes in 2010 and to 1,100 million tonnes in 2015.

### *Sichuan's 11<sup>th</sup> five year plan*

Sichuan's "11<sup>th</sup> Five Year Plan" (四川省國民經濟和社會發展第十一個五年規劃綱要) (the "Plan") was passed on January 20, 2006. The Plan expressly mentions that the mining industry in Sichuan will take the opportunities created by the State's enhancement of exploration of mineral resources to increase the mineral exploration in the Sanjiang, South Qinling and Panxi areas in the southwest region of the PRC. By 2010, the utilization of associated minerals is expected to reach 40% through the increase of technical achievements in mining and processing of associated minerals.

The Plan also mentions the development of new materials; the promotion of the efficient use of vanadium-bearing titanomagnetite ore; and the establishment of a world-class vanadium and titanium industry based in the Panxi Region as soon as possible.

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Panzhuhua Steel Group will use its ore, which has a high vanadium content, to develop the vanadium and titanium industries. Vanadium products will be developed for the steel industry and other vanadium products will also be actively developed. The titanium industry will develop titanium and sponge titanium and titanium products. Sichuan Changcheng Special Steel Co., Ltd. of Panzhuhua Steel Group is expected to focus on the development of its competitive products, such as steel used for oil extraction, petrochemical and chemical fibre industries, and high-temperature alloy steel. It plans to expand its alloy rod line and associated finishing facilities and build a new 10.0 Kt titanium product line.

### **Economic reconstruction and stimulus policies affecting the iron and steel industry**

#### *General economic stimulus plan*

In November 2008, the PRC government announced a RMB4.0 trillion economic stimulus plan and further revised this plan in March 2009 (四萬億元經濟刺激計劃). This plan stipulates that, among other projects, RMB1.5 trillion will be invested in the construction of railroads, highways, airports, and urban and rural electricity grids; RMB1.0 trillion will be invested in areas affected by the Sichuan Earthquake; RMB400.0 billion will be invested in affordable housing projects and RMB370.0 billion will be invested into rural infrastructure.

#### *Sichuan reconstruction plans*

Following the Sichuan earthquake in May 2008, the PRC government announced reconstruction plans for the areas affected by the earthquake. According to the general reconstruction plan issued by the State Council dated September 19, 2008 (the "Sichuan General Reconstruction Plan"), the PRC government will invest broadly in three areas, namely, the reconstruction of residential buildings in urban and rural areas; the reconstruction of public utilities; and the reconstruction of infrastructure and rebuilding of industries. Specifically, the PRC government plans to construct 54.9 million sq.m. of residential buildings, repair 2,548 km of highway, construct 1,509 km of new highway, repair 728 bridges and construct 123 new bridges in the areas mainly in Sichuan, Gansu and Shaanxi provinces that were affected by the Sichuan earthquake. As of April 30, 2009, the demand for investment for the Sichuan General Reconstruction Plan was expected to reach RMB1.7 trillion, representing approximately 2.2 times of the total fixed assets investment in Sichuan in 2008. According to the Sichuan Development and Reform Commission, the demand for steel products in Sichuan in 2009 and 2010 is projected to be 36.7 Mt and 32.6 Mt, respectively, out of which approximately 16.7 Mt and 12.6 Mt, respectively, is expected to be needed for reconstruction.

The Sichuan provincial government has also drawn up a schedule of reconstruction projects that include 470 projects with an expected total investment of RMB430.3 billion. According to the schedule, it is expected that the total investment for reconstruction will reach RMB40.0 billion in 2009. According to recent press statements, Sichuan has also reached an understanding with the Railroad Ministry on the construction or reconstruction of the following railroads: Chengdu — Lanzhou Railroad (成都—蘭州鐵路), Chengdu — Mianyang — Leshan Railroad (成都—綿陽—樂山城際鐵路), Chengdu — Dujiangyan Speed Passenger Transportation Railroad (成都—都江堰快速客運鐵路), Lanyu Railroad (蘭渝鐵路) and Chengwen Lateral Railroad (成汶支綫鐵路).

The Chengdu municipal government has also recently announced a comprehensive plan to invest RMB258.9 billion in reconstruction projects. The Chengdu municipal government also intends to allocate RMB77.3 billion for the reconstruction of Chengdu transportation facilities.

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### *Policies on the use of high-strength steel in construction*

The PRC government has recently announced various policies to promote the use of high-strength steel. On March 20, 2009, the PRC State Council announced the "Adjustment and Revitalization Plan for the Steel Industry" (《鋼鐵產業調整和振興規劃》) to support the steel industry. The details of the plan include the following: (a) steel consumed in construction projects in the PRC is expected to constitute approximately 50% of total steel consumed; (b) to promote the use of high-strength steel products of 400MPa or above in construction; and (c) by 2011, high-strength steel products of 400MPa or above to constitute 60% of hot rolled ribbed steel bars consumed in the PRC.

On July 30, 2008, the PRC government promulgated various standards relating to the seismic protection of building construction, such as the "Standard for classification of seismic protection of building construction" (《建築抗震設計規範》), which raises the standard for the strength of steel used in building construction.

### **Source of information**

#### ***Hatch Report***

Hatch, an experienced consultant in the mining & metals industry, has been engaged to provide the Hatch Report for use in whole or in part in this document.

The research and writing of the Hatch Report was a desktop exercise carried out by experienced Hatch professionals who have extensive knowledge of the iron ore sector. Hatch utilizes its in-house database, independent third-party reports and publicly available data from reputable industry organizations 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 its Hatch Report, Hatch has assumed the completeness and accuracy of the information and data that Hatch 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 operates at strict international standards of moral, legal and professional conduct. Hatch guards its reputation for independence and confidentiality with great care. Hatch has more than 15 years of project experience in the PRC and has successfully undertaken assignments on over 150 projects with a capital value in excess of US\$3.0 billion.

This document contains information extracted from the Hatch Report in sections such as "Summary", "Risk Factors", "Industry Overview", "Business" and "Financial Information".

We have paid Hatch a total of RMB544,400 in fees for the preparation and update of the Hatch Report.

#### ***Others***

We have not engaged USGS, IISI, AME NBSC, MMAC, Clarkson Research Services, MLR, NBSC, CISA, TZMI, China Nonferrous Metal Industry Association Titanium Industry Council, China Petroleum and Chemical Industry Association, Journal of Electronic Science and Technology of China, Jin Qiu Cai Zhi, Tex Report, China Customs, Steelhome, Mysteel and Chinacom when preparing data quoted in this document. Data from these sources were not prepared on a commissioned basis by us.