

Current Issues of China's Coal Industry: The Case of Shanxi

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Abstract

China has been playing an important role in the international energy market. This is even more obvious in recent years because of the set industrial structure and the government's new development policy in favor of western China, which is rich in coal, oil and other natural resources.

This paper illustrates the current situation of the coal industry in China from a worldwide point of view. It reveals the existing problems in China's coal industry, in particular coking coal from Shanxi Province, one of the major coal suppliers in the domestic and international markets. To meet the challenges facing the Shanxi coking coal, it appears a process of internationalization of the local coal industry is inevitable. It also suggests that both the government and trade association should take measures to ensure sustainable growth and ways in which to bring new initiatives into the industry.

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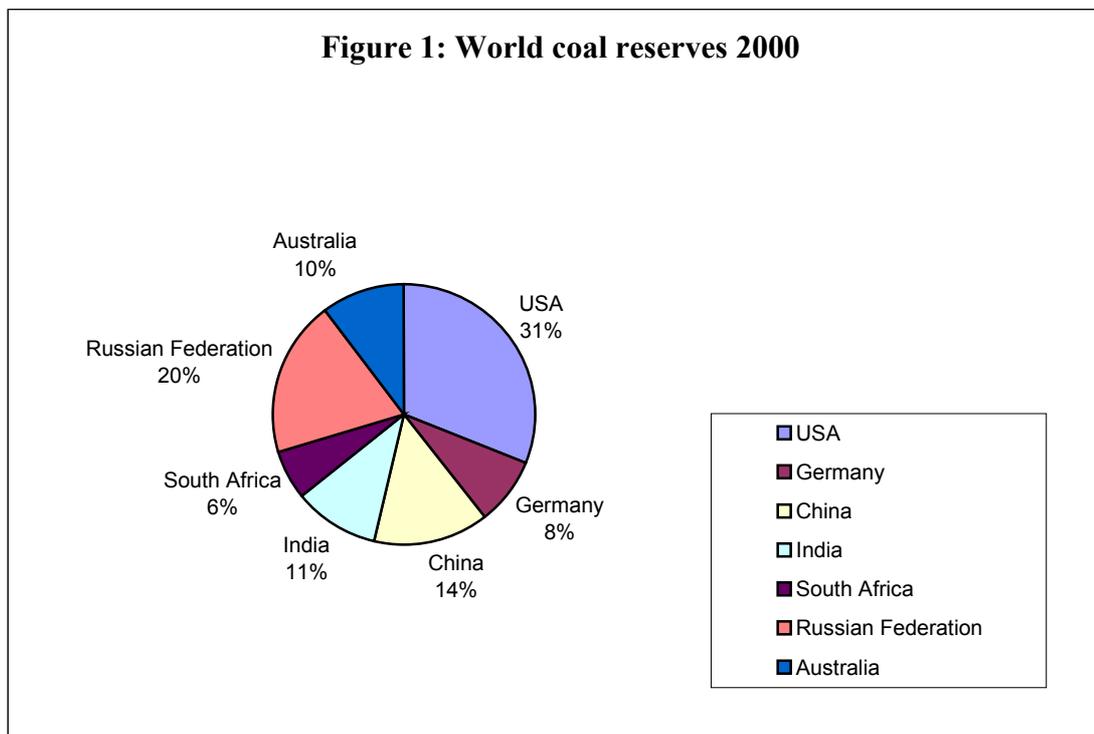
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Introduction and Overview of China's Coal Industry

With a population of nearly 1.25 billion and a recent record of high economic growth, the Chinese economy is standing on a sound footing to maintain growth. As an economy that consumes it as its main energy, coal is playing a vital role in securing China's rapid economic expansion.

In a ranking of coal reserves, China is third in the world after the USA and Russian. China has 14% of the world's proven recoverable reserves with 114.5 billion tons. Figure 1 indicates clearly the different percentage of the world's coal reserves.



Source: *China Coal Industry*: December 2001, Beijing

With coal accounting for 73.4% of the proven reserves of conventional energy in China and 93.4% of fossil energy, it is inevitable that the fuel is playing, and will continue to play the major role in supplying China's energy needs in the future. Coal reserves at the end of 2000 were estimated at 988.0 billion tons, of which 114.5 billion tons are proven reserves, which, accounts for 90% of the total proven fossil energy

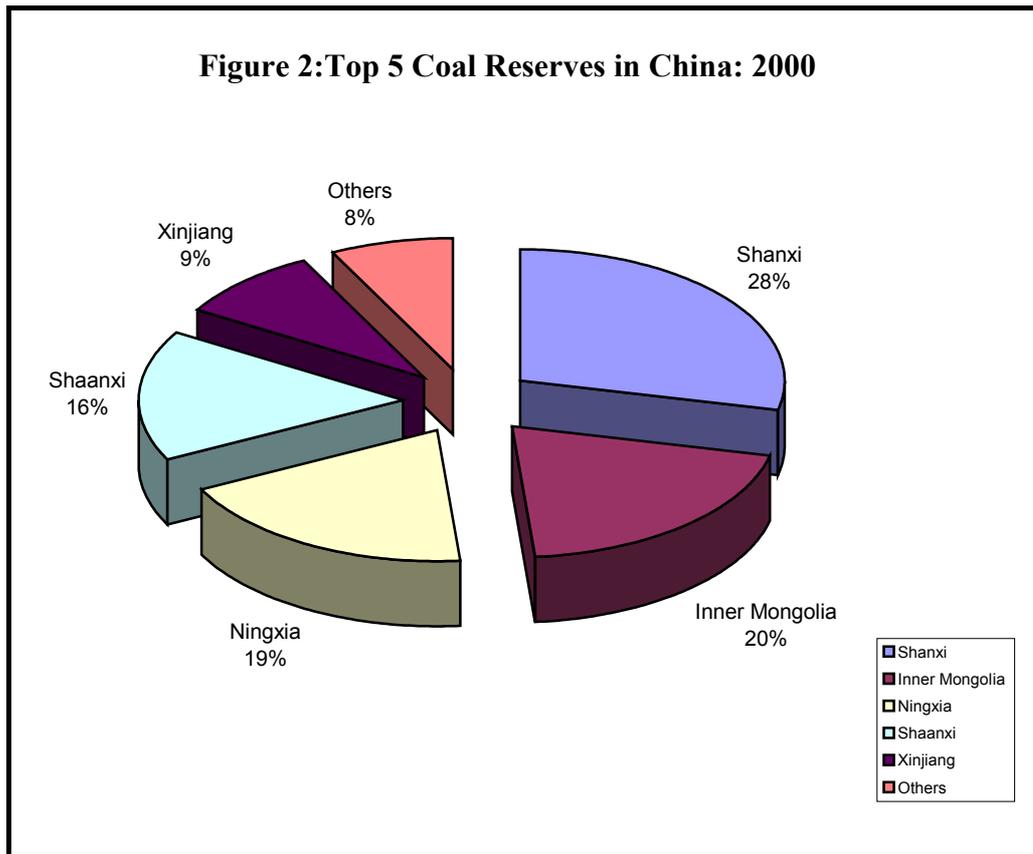
reserves of China and, at the current rates of production, would last for nearly a century. (China Coal Industry Yearbook 1999, 2000)

The distribution of coal resources (see Table I) varies widely from region to region, with nearly 67% of coal reserves situated in north and northwestern China. Some 65% of all proven recoverable reserves occur in the provinces of Shanxi, Shaanxi and Inner Mongolia, among which, Shanxi ranks No. 1 in coal reserves (See Figure 2).

Table I: Regional distribution of Chinese fossil energy resources in 1995: percentage of national resources

Region	Coal	Oil & Gas	Hydro	Total
Northwest China	23.6	11.1	9.9	20.0
North China	43.2	10.0	1.2	32.3
Northeast China	5.8	47.8	2.0	5.9
East china	11.4	18.4	3.6	9.6
Center-southern China	6.2	8.0	15.5	8.5
Southwest China	9.9	4.7	67.8	23.7

Source: *China Energy Annual Review 1998*



Source: *China Coal Industry Yearbook 2000*

The largest coal mining area is Datong in Shanxi province, with production in 2000 at over 38 million tons. Other major coal mining areas, producing over 10 million tons in 2000, were: Xishan 32 million tons, Yangquan 12.85 million tons, Pingshuo 12.2 million tons, and Jincheng 10.7 million tons. (Liu, 2000)

Between 1970 and 1988, China's share of world energy consumption doubled from 4% to 8%. From 1980 to 1996, coal consumption increased in China at an average rate of 5.6% a year, faster than the average growth rate of 5.3% a year for total primary commercial energy consumption. It is now ranked the second largest energy consuming country in the world after the United States, with coal accounting for 68% of the total primary energy consumption and over 63% of the final commercial energy consumption in 2000. Coal consumption is expected to increase to 14% by the year 2010 and 16% by 2020, accounting for 67% of total primary energy demand in the year 2020. (Browne, 2000)

Since the reform and “open-door policy” started in China in order to cater for the development of the national economy, China’s coal industry adopted the so-called “Letting the large, medium and small size coal mines develop simultaneously ” policy, This policy caused huge increases in coal production and coal supply and consequently resolved the coal shortage problem that had fettered the development of China’s economy for a long time, with state-owned coal mines, provincial coal mines and small township coal mines setting up at the same time. After breaking the record of 1 billion tons of raw coal production in 1989, China has been the leading economy in coal production in the world for ten years. The increase in coal production has not only met the needs of China’s fast economic development, but also provided strong support for the world economy, especially in the steady supply of coal to the Asian regions. During the eighth five-year-plan starting from 1991 to 1995, the nation-wide coal production increased by 40 million tons yearly and reached 1.39 billion tons by 1996, when it hit the peak in the history of China’s coal industry.

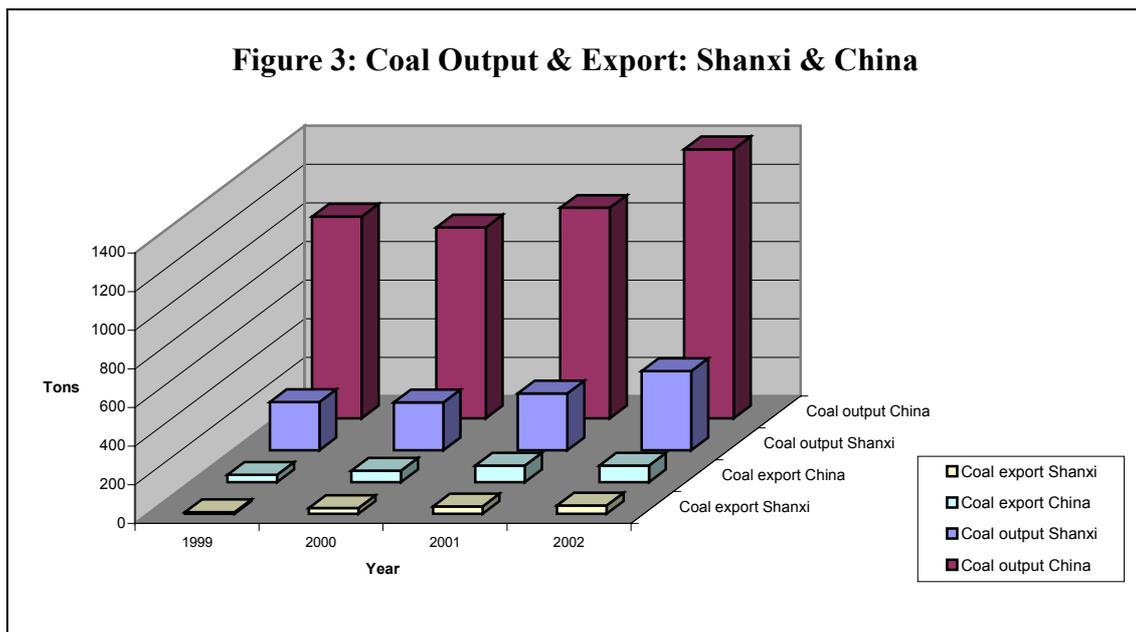
The more-than-doubled Chinese coal production from 620 million tons in 1980 to nearly 1,397 million tons of hard coal in 1996 did help to fuel the country’s spectacular economic growth. In the early 1990’s the annual growth rate was around 2.7%, and with the peak of 9.6% in 1996. With a considerable surplus in the weak market during that period, the state government started the adjustment of coal production and implemented a programme of small mine closure from 1997, thus halting the trend of the coal output increase. Coal production in that year decreased to 1.33 billion tons, 1.25 billion tons in 1998, 1.1 billion tons in 1999 and 988 million tons in 2000 respectively. There has been a slight increase is coming back in the last two years which is stimulated by the market.

Eleven Chinese provinces produced over 50 million tons a year of coal in 1996, and over 60% of the production came from seven of the 26 producing provinces. Shanxi province is both the leading coal producing and coal consuming region in the country, producing nearly 25% of total Chinese production (349 million tons) and exporting

nearly 63% of its output to other provinces (and 5% overseas).

Background of Shanxi: Position in Coal Industry

Since 1999, the coal output in Shanxi province has been retained at about 250 million tons per annum. This represents 25% of the national total output and 5.6% of the world's production. In 2001 the production of hard coal was 294 million tons, an increase of 18.9% compared with the year 2000. That covers 6% of coal trading worldwide and 46.17% of the national total exports in 2001, thus making Shanxi the second largest coal exporter in the world. (See Figure 3) 90% of Shanxi coal is exported to the Asian market and nearly 10% to Europe.



Source: *Shanxi Coal Industry Yearbook 2002*

Korea is the biggest importer, accounting for 56%, followed by 16% to HK and Taiwan, 14% to Philippine and 9% to Japan.

The 3 biggest coalmining companies in Shanxi represents 6% of the national coal production and 38% of the output of the top 10 coalmining companies in 1990. In

2000, the figures were similar and covered nearly 1/3 of the top 10 coalmines' production nationwide. See Table II.

Table II: Coal output of the 10 largest coal producers in China: 1990 & 2000)

	Company	Year 1990		Company	Year 2000	
		Output (Mt)	Market share (%)		Output (Mt)	Market share (%)
	National total	1079.3	100	National total	988.69	100
1	Datong*	34.94	3.24	Shenhua	38.11	3.85
2	Jixi	18.52	1.72	Datong*	32	3.24
3	Pingdingshan	18.3	1.7	Yanzhou	28.01	2.83
4	Kailuan	17.82	1.65	Kailuan	19.18	1.94
5	Hegang	17.5	1.62	Pingdingshan	18.34	1.85
6	Yangquan*	16.23	1.5	Huaibei	16.93	1.71
7	Xishan*	15.72	1.46	Xishan*	16.73	1.69
8	Huaibei	14.19	1.31	Tiefa	14.66	1.48
9	Xuzhou	13.17	1.22	Huainan	14.28	1.44
10	Fengfeng	11.46	1.06	Yangquan*	12.85	1.3
Total		177.85	16.48		211.09	21.33

* Coalmines within in the territory of Shanxi province

Source: Huang S & Hu, Y, 2001

Coke production, as a new source of energy, coke production is becoming more attractive than the other products in the industry, because China is now one of the most intensive steel producers in the world. The Chinese steel industry uses, on average, one-third more energy per ton of steel in the form of coking coal than the US industry.

China is now the world's largest coke exporter; with export have increased to around 1 million tons from 1991 to 1997(almost half of the world trade). With the increasing application of PCI in the domestic steel business since 1994, more coke is becoming available for export and a number of the large steel mill, such as Baosteel, have been developing an export business for their surplus coke (Feng, 1998).

Shanxi province has attracted the attentions of coke consumers. In recent years, Shanxi coke keeps on surpassing many coke factories in Japan and India. It has come to be considered the most competitive in the world. Among the total production of 65 million tons in the first half of 2003, nearly 50% of Chinese coke is produced in this coal-producing province of Shanxi, with an increase of 20% compared with the same period last year. Especially in 1997, exports of Shanxi coke topped its record to 45% out of the international trading of coke. The biggest coke company in China's coke area, Shanxi Coke Group Corp., an alliance of four major coal producing companies in Shanxi, which was set up in November 2002, produces 6 million tons per annum. It is expected to expand its production ability to 30 million tons by the year 2005, thus making it the leading company in the world coke industry.

The Case of Shanxi: Current Issues in Coal Industry

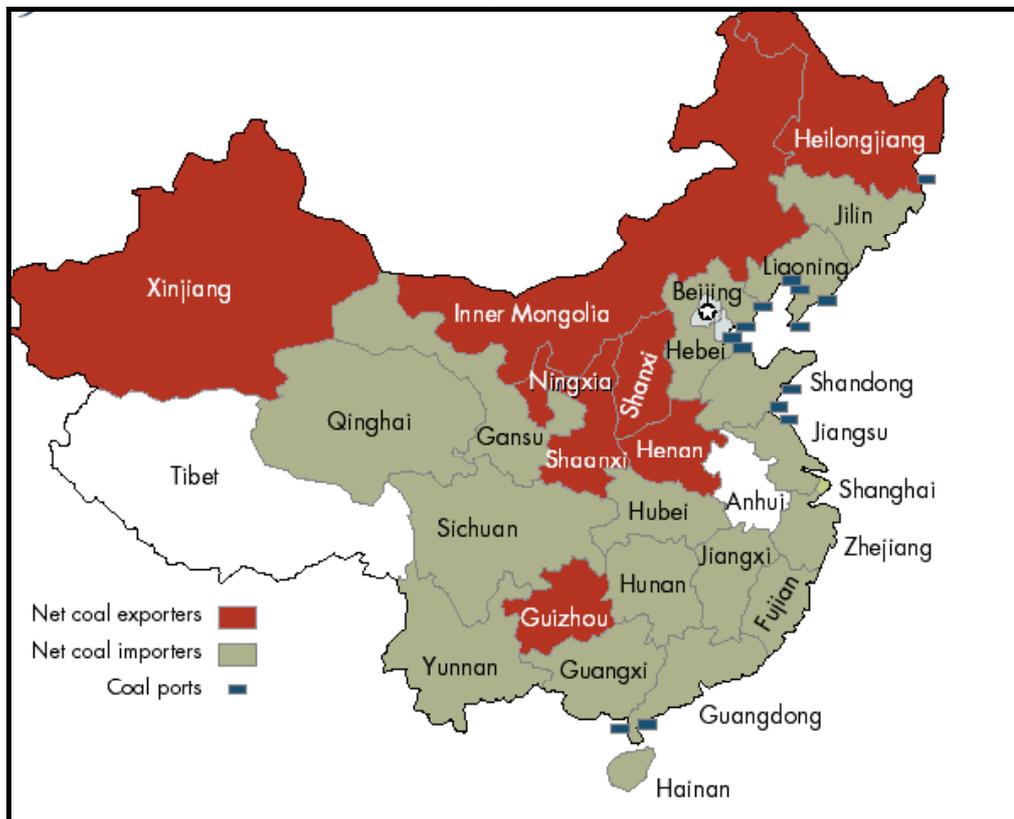
Although coal is the key industry in boosting Shanxi's economy, there are still factors that are affecting its development, especially in terms of internationalization.

1. Inconsistence among the portals of coal production, exporting and importing

The transporting of coal from Shanxi to the coastal east and southeast region has been a big burden in the domestic trading, due to the limited traffic capacity, (see Figure 4), while exporting under supervision of China National Coal Industry Import & Export Corporation (CNCIEC) set another obstacle for exporting of the indigenous coal to the international market. Though since 1993, Chinese Government has authorized Shanxi Coal Import and Export Corporation (SCIEC), except Shenhua Group Company and China Minmetal, to export some of their own coal products, the authorized tonnage of coal for export is still limited and should be undertaken under the guidance of CNCIEC. On the other hand, as the biggest coal exporter, CNCIEC will only look after the state-owned coalmines. There are no direct business contacts between CNCIEC and other local coalmines; hence, 60% of the provincial coal from

the collective or private owned mines has lost many chances to be accepted by the international market.

Figure 4: Net Coal Importing and Exporting Provinces 2001 & Location of Major Coal Ports



Sources: Hui, (2002)

Shanxi coal exported on independent basis has long been refused by Taiwan market, although 80% of China's export coal goes to Japan, Korea, Taiwan and other Asian countries and regions. Similarly, Datong coal exported on independent basis can't enter Japanese market on account of the stipulations in the China-Japan long term trade agreement that places coal trade under the administration of CNCIEC. This leaves SCIEC, the exclusive coal export devoted company of Shanxi Province, far from enjoying the indiscriminating treatment and policies enjoyed by other coal import & export companies in China. Under this impact, the independent export coal competitiveness of Shanxi province is much lower in terms of the quantity expansion of its exported coal and/or its pricing. The situation with Shanxi independent coal

exports is worsened by the fact that coal as a bulk mineral product, it is always very difficult to tap the far-away overseas markets. This also contributes to the difficulty in enlarging coal export scale of Shanxi Province.

2. Mismatching in quoting system

Before 1999, China has taken the former USSR's standards in rating coking coal, with the main items of caking index, plastometer and proximate analysis, while in the international market, all the components are required detailed specifications and the main standards are maximum reflectance, Gieseler Fluidity and Crucible Swelling Number (CSN). All the work, from geological reconnoitering, coalmining to quoting, is led by the former system, which produces a great gap for Shanxi local coal to find the matching demanders and vice versa, the international market can't find its needs in Shanxi market.

Not until the recent 3 years, has the coal exporters, like CNCIEC, SCIEC and the industry association set to the relative work to catch up with the general international system. But there is a lot of work to do and there is a long way to go, except for the full comprehension and proper application of the international rating mechanism.

3. Emissions and environment issues

Not surprisingly, given China's high dependency on coal, 83% of CO₂ emissions in 1996 came from coal combustion. Between 1990 and 1996, CO₂ emissions from coal-fired public electricity and heat generating plants nearly doubled, whilst the emissions from the use of coal in the manufacturing industries and construction increased by 42%. Emissions of sulphur-dioxide from coal burning have risen from 16 million tons in 1990 to 30 million tons for the year 2002. Carbon dioxide emissions per person have risen from 2.08 tons in 1990 to 2.59 tons. Though much lower than the Japanese figure of 9.36 tons per capita or the US figure of 20.05 tons per capita in 1996, the CO₂ growth rate of 24.5% is higher compared to the Japanese increase of 9% or the US increase of 2.8% over the same period. In addition, accompanying

particulate emissions have had an adverse effect on the air quality in major population centers. (Ye, 2002)

Coal mining and production activity also lead to disruption of aquifers, freshwater consumption and wastewater disposal problems. Increases in the amount of coal mined and washed in the northern coal production areas will have a major impact due to serious water storage problems in the region. Mining water is drained into the river system with only 15% treated prior to discharge. Compounding the problem is the large volume of coal washing effluent, which is all freely discharged. It is estimated that 30 million cubic meters of water containing 300,000 tons of coal is discharged each year.

Though serious water shortages and quality problems in the northern coal basin are critical to promoting the efficiency of coal mines, a wastage of water is still existing in up to one third of the plants as they are not recycling the water.

4. Issue of safe production

Mining safety has come to be more serious in recent six or seven years of the mining history. Because of the tempting high profit of running coalmines and a need by cash-strapped local governments for taxation income from coalmining operation, plus a lack of coordinated government supervision, localism and a basic lack of inspectors, most bloody catastrophes took place in the private owned, small coalmines, which are now covering nearly two thirds of the provincial output.

The following figures are shocking: China's coal production is one third of the world's total but the rate of fatal mine accidents is four-fifths of the world's total. In China, the fatality rate in 2000 went up to 14 deaths per million tons of coal mined, which is 11 times higher than that in Russia, 15 times higher than in India and 182 times higher than in the US. More than 4547 miners were killed in 2378 mine accidents during the first ten months of 2001. In 2002, catastrophes happened one by

one, and spread from the northern Shanxi to the southern coalmining areas, and many of them were forced to close by the state or local governments. Recently in August 2003, there are 7 accidents happened around China with the reported dead above 5.

These bloody disasters have alerted the central and local governments to divert coalmine operating to a more ethical and normative path. All the people in the world hope the Chinese miners can work under a better and safer condition. It is the one of the backbone of Shanxi economic development, after all.

Case of Shanxi: Inevitability Analysis of Internationalization

Though there are many difficulties and restrictions in exporting, Shanxi coal does have apparent and potential advantages for export over that produced by other countries for dozens of reasons.

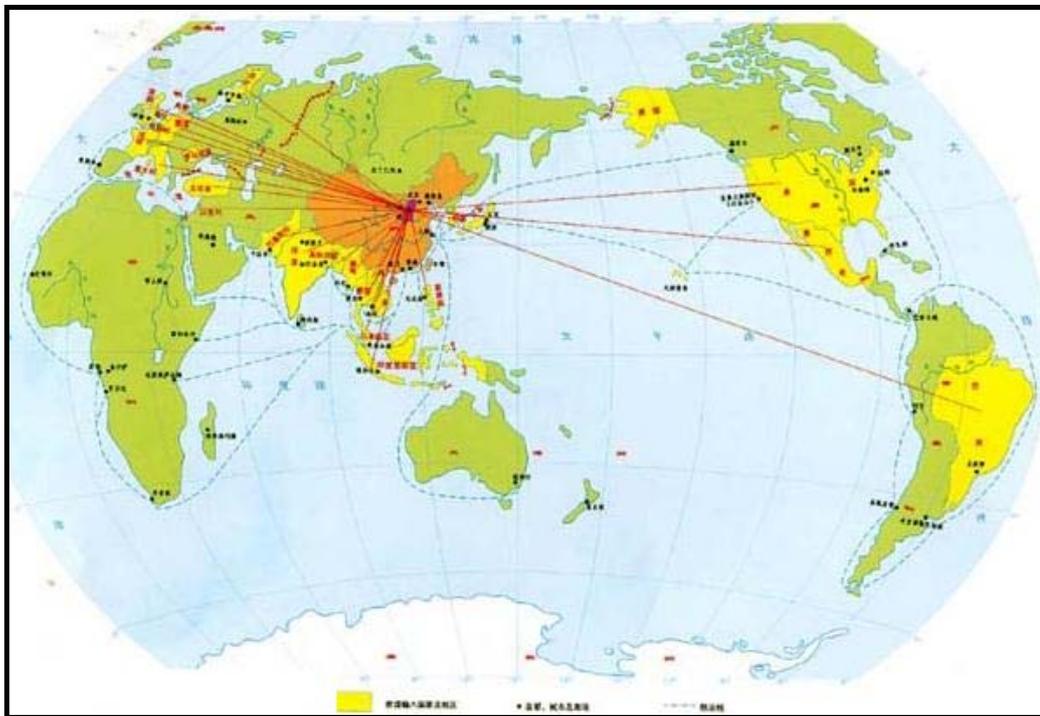
- **Natural and historical predominance**

As stated in the previous parts, China has abundant coal resources and a long history of coal mining, which is also the strongest industry in China. Particularly, Shanxi province alone has proven coal reserves of 200 billion tons, including half of the nation's metallurgical and anthracite coal reserves. Shenfu coalfield in Shanxi province has coal reserves of more than 80 billion tons with a high energy (about 12,600 BTU), low ash (6 to 7 percent before washing), and low sulphur (0.5 to 0.6 percent) content, which make it attractive both in the domestic and international markets. In addition, with the aim of improving coal quality, the government has plans to build a number of new coal preparation plants and at the same time to upgrade some existing coal washing plants to make its coal more acceptable to the international market.

- **Geographical proximity**

Many countries in Asia and the Pacific are major coal buyers, and because of China's proximity and accessibility by sea, coal shipment by this route is practical. For example, the distance between China and Japan is about 2,600 to 5,700 nautical miles, shorter than that between Japan and the United States, Australia, or South Africa. This is especially important because freight charges make up a considerable percentage of the cost of imported coal. However, while China focuses on markets in Asia and the Pacific, it will not ignore markets in Europe and on other continents. See Figure 5 below.

Figure 5: Shanxi coal exports



Source: Shanxi Economy: Out of the Blind (1999)

- **Low production Cost**

Compared with other major coal-producing countries, coal production costs are low in China, mainly because labor costs are low. Labor only accounts for about 20 percent of the total production costs of Chinese coal mines, whereas in other countries labor sometimes constitutes as much as 60 percent of production costs.

- **Transportation enhancement**

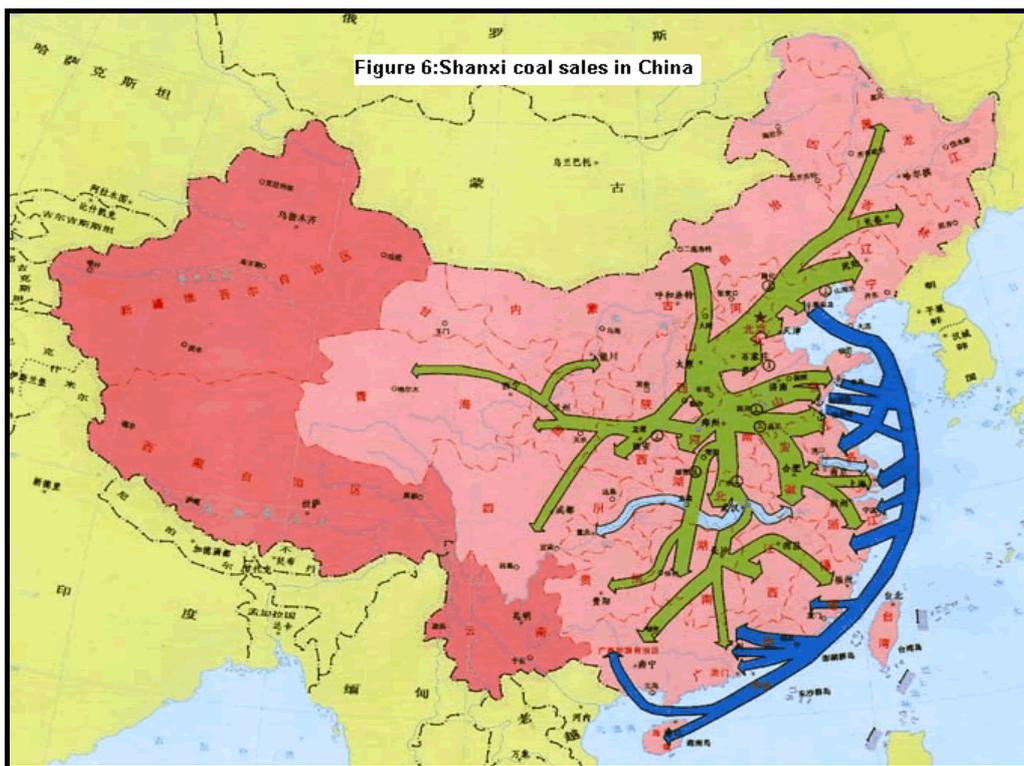
As the major means of transporting coal, Shanxi has improved the existing railway network to make it more efficient with easier access to the other part of China. The coal-dedicated 638 kilometers Da-Qin electrified railway, from the largest coal mining area, Datong, north of Shanxi Province, to the largest coal export port at Qinhangdao, east of Beijing, is now fully operational. This facility has an annual transport capacity of 100 million tons. Construction of a second dedicated railway began in 1997. This 600 kilometer double track electrified line, running from Shuozhou in Shanxi Province to Huanghua on the coast of Hebei province, will have a capacity of between 30 to 60 million tons per annum in the short term and up to 100 million tons in the longer run. Shuo-Huang railway and Huanghua coal terminal will provide up to 60 million tones per year of new coal transport capacity. Once completed, it will significantly expand the transport capacity of coal produced in the Shenfu-Dongsheng coalfield and the central region of Shanxi Province. In 2003, the total capacity of coal ports achieved to 22 million tons, with the loading areas mainly located in Qinhuangdao, Qingdao, Rizhao from Shandong province, Lianyungang from Jiangsu, and Zhanjiang from Fujian. All of these facilities enable Shanxi coal to be transported to markets much faster than before.

With the completion of an 800-kilometer slurry pipeline from Shanxi to Qingdao in the coastal Shandong province will be more convenient for coal and coke transportation to other parts of the world. The pipeline, with annual capacity of 15 million tons, will help export coal to South Korea, Taiwan and Japan. The slurry pipeline will provide several advantages to both the provincial government and the public, despite the cost. For example, extra environmental benefits including minimal noise, no dust and no loss due to transport or handling when compared to alternate transport methods, lower pollution and higher efficiency during combustion when compared to burning the equivalent amount of unwashed coal, as the coal is cleaned for transport via the pipeline.

Inland navigation has also expanded the coal transport ability. An all-year navigable distance of nearly 3000 kilometers in Changjiang (Yangtze River), with service section between Hubei and Nantong (Jiangsu Province) and rail connections to the north, helps to dispatch coal in Shanxi to the coastal provinces of Jiangsu, Zhejiang and Shanghai.

The construction of highways linking Shanxi and the other provinces in China, typically, Taiyuan-Jiuguan Highway, contributes a lot to transport Shanxi coal to the coal ports located in different parts of China. Meanwhile, it really acts as a necessary and effective supplementary to the railway transport system. See Figure 6.

Figure 6: Shanxi Coal Sales in China



Source: *Shanxi Economy: Out of the Blind* (1999)

- **The professional administration and skilled workers**

The prosperity of the domestic coal market has helped greatly to train of professional administration personnel and skilled workers for Shanxi province in the last few years.

This ensures that the production of Shanxi coal and coke meet the international market criteria. The priority policy and supports from the local government also provide great value in the internationalization of the local coal. Hence, the internationalization of coal and coke in Shanxi will be the trend of future. Both the government and the industrial groups will contribute more to accelerate this.

The progress of the Shanxi coal industry into the international market appears to be inevitable, either for the industry or to boost local economic development. Although some drawbacks do exist at the present time, both the government and the industry association are doing their utmost to take it to a more rational direction.

Shanxi Coal Industry: Ways to Go

China's present massive demand for coal, and its heavy reliance on the fuel, sets it apart from other economies. While China's future options for energy sources may broaden, coal will continue to fuel China's future economic growth for the foreseeable future. How coal is used in China, especially in Shanxi province, as the biggest producer, in terms of efficiency and emissions control, will be of important both to the Chinese society and to other nations. The focus would lie on efficient use of coal to protect the environment and ensure a stable supply of energy. Thus, understandings of the areas where co-operation can be achieved with Shanxi will be the way for its future economic development. The most effective ways will be laid on technological innovation and the management reform.

1. Technological innovation

Technological innovation is always the center of coal industry. Since it will still take a share of 60% in the energy consumption market in China and over 80% of the coal and coke produced is used for power generating, the research and development of power generating systems and pollution control equipment in the process of power

generating come to be critically important, thus, the national government formulate “Agenda 21” plan and “the Ninth Five-Year-Plan of China’s Clean Coal Technology and Development Compendium 2010” to ensure the sustainable development of coal industry and boost a stable economic prosperity.

The strategies cover the whole procedure of coal processing and disposal:

- The field of high-efficiency clean coal combustion technology, including, Circulating Fluidized bed Combustion (CFBC), Pressurized Fluidized Bed Combustion (PFBC), and Integrated Gasification Combined Cycle (IGCC);
- The field of coal processing and transform technology, ranging from coal selecting, molding to mixing; the technology of gasification and liquidation of coal to retrofitting projects; a new technique of coal water mixture; development of coal bed methane and combustion batteries;
- The field concerning with the controlling system and equipments of waste disposal and exhaustion, such as, SO₂ and NO_x removal technologies for conventional coal-fired plants, utilization of gangue, ash and slag etc;
- Promote the development and dissemination of energy saving and environmental protection measures and technologies such as retrofitting old power plants with more efficient boilers and other equipment. Add de-sulfurization equipment and electrostatic precipitators.

Among them, the technology of “Coal Water Mixture” (CWM) has been sponsored and developed in China since 1982. Now 6 plants have been built with a total capacity of 1 million tons a year. It uses coal slime or coal fines from a wash plant as its feed material. The mixed product, containing 62~70% coal, 29~37% water and 1% additive, is used as an oil replacement fuel. It provides distinct advantages, especially for its higher energy efficiency and the much lower cost, plus the bonus of environmental benefits.

The Ninth Five-Year-Plan requires all new and many existing coal mines to install

coal preparation facilities, with the aims of reducing sulphur dioxide and nitrous oxide emissions and with efficiencies of 28% in a pulverized coal boiler burning raw coal increasing up towards 35% when burning cleaned coal. By the end of this year, 35% of all coal is supposed to be washed and that will cover 61% of the coal produced by state-owned enterprises.

Installation of low-polluting boilers with fluidized bed combustors will remove the largest part of sulphur in the combustion bed. There are plans to develop both 60MW and 100 MW size units. There are a number of imported boilers ranging in size from 12MW to 100MW set up in Shanxi.

International cooperation projects have been in place for the development and use of lower cost FGD equipment. Demonstration projects for simplified FGD equipment of the wet limestone-gypsum and semi-dry spray drier types are operating at the 300MW unit at Taiyuan No. 1 Power Plant. The two FGD systems will remove SO₂ by 80%. Funding is provided under the Green Aid Plan managed by the Ministry of International Trade and Industry in Japan.

During the Tenth-five-year Plan, Shanxi will promote to form a CWM production base of 300 million tons. The production scale of CWM will be expanded to 800,000 tons in Datong Coalfield, as an initiative of this area. In 2001, China Academy of Science and Shanxi government came to a MOU of 1 million tons per annum coal-to-oil commercialization project in Shuozhou, with the expectation of increasing the value of coal by RMB 300 Yuan per ton or, even over RMB 1000 Yuan per ton. It will be finished in 2006 and go on stream in 2008. A large-scale shareholding company with coal synthesis as the core will then be established. (Zheng, 2001)

With its enormous coal resources there is a good chance that China will be able to commercially exploit significant quantities of methane trapped within the coalfields. The coal bed methane from Qinshui, Yonghong, Panzhuang and Liulin Coalfields in

Shanxi province, where there is a deposit of 30 billion cubic meters, are good examples. It is estimated that the total demand will achieve 530 million cubic meters by 2005. Four American Companies and one Australian company have signed the contract to develop the coal bed methane in Shanxi with China United Coal bed Methane Coop. since 1997. Since the coal bed methane is technically qualified to infect into the natural gas pipeline system, it can helpfully be transported through the national 3900 kilometers long “west-east gas pipeline”, which passes through exactly the coal bed methane accumulating areas of Shanxi province. As a clean energy resource, the development of methane will obviously and significantly bring many benefits to the economy and society. It definitely provides a substantial boost to China’s drive for clean energy.

Concentrating on these areas could deliver significant improvements across a wide range of issues: cost saving for both the producers and consumers, more efficient and effective use of the coal resources, ultimately cheaper and more reliable power, efficient and safer mining operations, economic use of the transport and distribution system for coal products, higher energy efficiency in the combustion of the fuel, a reduction in pollution and emissions levels, better water and land management practice, etc. These advanced technologies and processing will definitely help to boost the national and local economic growth, thus to achieve the China’s strategy of sustainable development.

2. Reconstructing of administrative system

Since 1998 the government has succeeded in substantially reducing the national output of coal to below 1000 million tones by closing some of the illegal coal mines due to the reason of the big stock pile left over from years before and for the sake of ensuring safe production. Meanwhile, the State Administration Bureau of Coal Industry, which in now the State Coal Industry Association, has directed that the future emphasis should be on the development of new large, efficient, mines so as to improve the industrial competitive capability from the international perspective.

Effective measures are taken to encourage investing and restructuring the new large mines to secure high-quality safe coal production for the long-term. Up till now, basing in different coal producing areas, there are 8 groups and coalmining organizations have been set in Datong, Taiyuan, Jincheng, Yangquan, and Liulin. Under the supervision of Coal Industry Association, they have adopted the advanced experience of modern corporative system. This is a good start to bring the industry to a more normative way of developing and improve some disappointments in the current coal industry.

3. Enhancing the pace of development of coke production

As a most competitive product in coal industry, Shanxi has its dominant ranking in coke production and export. In 2000, the coke export totaled 7.3 million tons, which covered 73% of the total volume exported from China and nearly 50% in international coke trading. For a number of reasons that Shanxi coke takes a lead in the world trade, Shanxi has set out a long-term strategy to regulate its coke production. More effective and powerful measures are being taken in enhancing the development of coking coal production. The total output of coke would be restrained at 40 million tons this year, which was 47 million tons in 2001, to ensure the better quality.

As a predominant product in coal industry, the provincial government and the trade union should pave the way for coke producers in Shanxi, which will definitely increase the local GDP and the income of foreign exchange. The setup of Shanxi Provincial Coke Group Co. Ltd., the largest of its kind, does function more than enhancing the local economic. The group is a result of the restructuring of major coke producers and dealers in Shanxi, according to officials. (Which is the theme from the Working Conference of Shanxi Coal Industry, held once a year to sketch the provincial strategy, December 2001) Currently, the group has an annual capacity of 6 million tons, but by 2005 it is expected to become the world's largest coke producer with its capacity reaching 30 million tons. Many other local coke companies would join the group in the years ahead, the sources said. The group has been authorized by

the provincial government to monopolize coal exports in the province, so it can compete on the international coke market. Shanxi exports approximately 10 million tons of coke a year, compared with the world's annual coke trade of approximately 22 million tons.

As a part of the globe, it becomes more and more important to bring itself to the integration of the world, especially in the changing era and the time China entering WTO. China has made priority policies to encourage foreign investment to China's coal industry. From the provincial perspective, it is more important to get help from foreign investment and direct it to the development of technological transformation and well-organized state-owned coal enterprises, which would be a great push to the reorganizing and regulating of Shanxi industrial structures.

Summary and Conclusion

After two decades of reform, China, the largest developing economy, has changed greatly and is getting closer and closer to the international regulation and standards. As the world's largest coal producer and already a significant exporter, China's performance will have implications on the world coal market, in terms of the balance between internal supply and demand, as well as the outcome of the government's policies and the willingness to embrace market principles in the management of the industry.

To boost the development of coal industry, conflicts between environmental issues and economic growth will have to be resolved by reconciling economic growth with greater environmental protection. The dilemma for coal industry in the short term is how to balance the conflicting demands of sustained economic growth with a reasonable commitment to the environment. This is of typical importance for Shanxi

coal industry, for it seems Shanxi is dependent on its coal resourced to get economic development other than anything else. Though we all know this will be a hard way to go, we could go nowhere.

References

Albouy, Y., (1999) “Coal pricing in China: issues & reform strategy”, World Bank discussion paper: China & Mongolia Department series, Vol. 571, pp. 13-49

Browne, P. (2000), “Statistic Review of World Energy” IEA World Energy Outlook, OECD, Paris, pp275-280

“China Coal Industry Yearbooks 1999 & 2000” (2000, 2001) China Coal Industry Publishing House, Beijing

“China Energy Statistical Yearbook 1997-1999”, (2000), National Bureau of Statistics of China, China Statistics Press, Beijing

“China Statistical Yearbook 1995-2000” (2001) China Statistics Press, Beijing

Curtotti, R., Ye, Q., (2000), “Global Coal Markets: Prospects to 2010”, ABR Research Report, Vol 3, Canberra

Feng, M., (1998), “Chinese coke exports: turning point or crisis?” World Coal, 3 Oct.

Huang S., Hu, Y., (2001), “Restructuring of Coal Industry in China”, China Coal Information Institute, Beijing. pp. 36-49

Hui, A 2002, “China Power Sector”, UBS Warburg Asia Limited, Hong Kong, October

IEA , (1998), “CO2 Emission from Fuel Combustion 1971~1996”, IEA working paper, OECD, Paris, pp. 35-47

Platts (2002a) “Safety, technology, dispersed production hamper coal growth”,
International Coal Report, Issue 587, 11 November p.7

Platts, (2002b) “China rail cost national average at 8 cents/mt per km”, International
Coal Report, Issue 580, 23 September, p. 8

Platts, (2002c) “Huanghua’s silt problem persists and some fear it can’t be fixed”,
International Coal Report, Issue 558, 22 April, p. 10-13

Platts, (2002d) “China’s imports doubled in first half due to unique market”,
International Coal Report, Issue 581, 23 December, pp. 4-7

Platts, (2002e) “Domestic coal price \$6/mt above exports, keeping coal at home?”,
International Coal Report, Issue 589, 25 November, pp. 7-8

Platts, (2003f) “China to have four new licensed exporters in a year or two”,
International Coal Report, Issue 567, 24 June, pp. 10-12

Liu, C., (2001), “Review of Recent Coalmine Catastrophe”, China Daily, 11 May

Non-stated, (1996), “Some Important Areas in the Sustainable Development of the
Coal Industry”, study under the research programme of the China Coal Industry
Association, Beijing, pp. 34-51

Not-stated, “A Study on World Coal Industry Development Trends and China’s
Counter-Measures”, (2000), China Coal Information Institution, Vol. 4

Not-stated, (2000), “China Coal Output & Export”, China Market Series Coal Market
Review & Outlook, Vol. 3, No. 3, pp. 27-41

Ren, D., Zhao, F., (1999), “Distributions of minor and trace elements in Chinese coals”, *International Journal of Coal Geology*, Vol. 40, pp. 109-20

“Report on World Resources 1992-1993”, (1994), China Environment Publishing House, Beijing

Schneider, K., Phamduc, T., (1999), “Supplying Coal to South East China: Impacts of China’s Market Liberalisation” ABR Research Report 99.13., Canberra

“Shanxi Coal Industry Yearbooks 1995-2000” (1996-2001)

Shanxi Coal Industry Yearbook 1995 ~ 2000, (1996~2001), Shanxi People’s Publishing House, Taiyuan

Shenhua Group Corporation Limited, (2000), “Shenhua Group Corp.”, Beijing

Sinton, J.E., Fridley, D.G., (2000), “What goes up: recent trends in China’s energy consumption”, *Energy Policy*, vol. 28, no. 10, pp. 670-87

State Economic and Trade Commission, (2001), “New Progress has been made in closing down and suspending the production of ‘Five Small’ and obsolescing the backward in the first half of 2001”, Beijing

State Economic and Trade Commission, (1998) “China Energy Annual Review 1997”, Beijing

State Economic & Trade Commission, (2001) “The Statistic Gazette of Domestic Economy & Social Development in “the Seventh Five-Year-Plan” 26 October, Beijing

“Steel Statistics Yearbook 1996”, International Iron and Steel Institute, Committee on Economic Studies, Brussels, pp. 36-129

Wang, Q., (2000), ”Coal industry in China: environment and prospects”, paper presented at The Nautilus Institute Workshop, Tsinghua University, Beijing, 14-15 June

Williams, M.F., (1998), “The cost of clean power: can natural gas compete with coal in China”, paper presented at China’s Petroleum Conference 98, Beijing, March

Wright, T., (2000), “The political economy of prices in China’s planned and market economies: competition and control in the coal industry”, Asian Studies Review, Vol. 24, No. 3, pp.349-76

Wu, Z., (1998) “Chinese Coke Exports: turning point or crisis?”, World Coal, Vol. 3 No. 3, pp. 25-36

Xie, Y., (2002), “China: coal faces challenges despite current profits”, Business Weekly (China), 30 July

Yahallasia, I., (1994) “Chinese Coal Prospects to 2010”, IEA Coal Research, London

Yan, M., (1999), “China’s Coal Sector Seeks to Get Back into Black”, China Daily, 8 January

Yang, L., (2001), “Overview of China’s Coal Exporting”, China Coal Market Review and Outlook, Vol. 1, Beijing, pp. 15-27

Yin, W., (2001) “Restructuring: Realistic Choice of the Coal Sector During the “Tenth Five-Year-Plan” Period”, China Coal, Vol. 8

Zhang, B., (2001), "Strengthen management, control total output and adjust structure to meet the new century challenges", China Coal Industry Yearbook 2001. China Coal Industry Publishing House, Beijing, pp. 5-9

Zhang, L. (2003) "Operation Overview of the China's Coal Market in the Ninth Five-Year-Plan", China Coal Industry, Vol. 3, No. 1, pp.14-19

Zheng L., (2001), "China Coal Market in the Next Ten Years", China Coal Market Review and Outlook, Vol. 2, No. 4, Beijing, pp. 15-22

Zhu, D., (2001), "Prospect of China coal industry facing the new century", paper presented at the 18th World Energy Congress in Buenos Aires, Argentina, October