

booz&co.

Coal Industry Trends
in China
*Achieving Sustainable
Growth*



Contact Information

Beijing

Chris McNally

Partner

+86-10-6563-8300

chris.mcnally@booz.com

Ken Zhong

Senior Associate

+86-10-6563-8300

ken.zhong@booz.com

Paul Pan

Project Advisor

+86-10-6563-8300

paul.pan@booz.com

EXECUTIVE SUMMARY

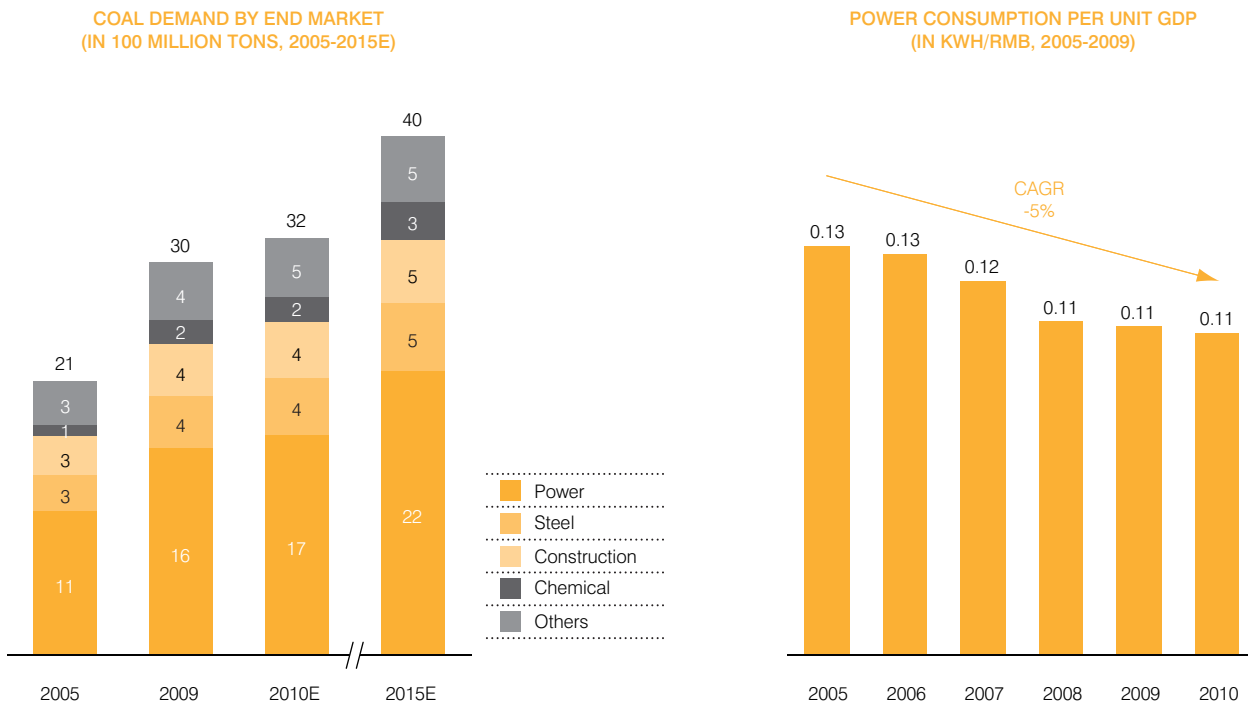
The continuing rapid growth of China's economy has seen the country become a net importer of both thermal and metallurgical coal in the last two years. This demand growth necessitates both improved efficiency in domestic production and the strategic acquisition of overseas reserves. The government has initiated a policy of consolidation in the coal industry, closing smaller mines and encouraging the formation of large mining groups. Improving mine safety and environmental awareness have also become leading priorities. This is further driving up operating costs and adding to the pressure to increase efficiency through improvements in infrastructure and management. Although demand growth will continue to escalate, shifting patterns of consumption are complex and hard to predict, with a growing importance of alternative energy sources and a likely expansion in EAF use in steel production. Electricity generators have begun to backward integrate into coal mining to secure their supplies and boost margins. Major coal producers are increasingly forward integrating into logistics and coal liquefaction and coal chemicals. The keynote for the industry will be attaining sustainability. China's leading coal producer, the large and increasingly diversified Shenhua Group, will provide a model for the development of other industry players.

OVERVIEW AND KEY TRENDS

Over the past decade or so, China has become one of the world's dominant coal markets. While consumption and production of coal fell steadily in Europe and the United States between 1999 and 2009, and even the major emerging economies in India and South America saw average annual growth in their coal markets of only around 5%-6%, China's production and consumption in this period have soared by around 9% per year. In 2009, China's production and consumption figures were around three times as great as the United States' and more than six times as great as the EU's. The country's rapid industrial growth, and the concomitant increase in demand for the generation of electricity, has been the main driver of the expansion in the coal market, although efforts to improve energy efficiency have slightly offset this demand growth (see Exhibit 1).

While China had long been a net exporter of coal, its output and consumption had become very finely balanced by the middle of the last decade, and in the past two years, it has become a net importer. The Chinese coal industry has suffered from operational difficulties that have limited its ability to increase production capacity in step with rising demand. In particular, many of the major coalfields are in remote areas with limited transport infrastructure. Moreover, while China has strong reserves of general thermal coal, domestic production is no longer able to meet the rapidly escalating requirements for high-quality metallurgical coal. In recent years, strategic concerns have thus prompted the Chinese to start acquiring interests in foreign coal reserves and to increase the volume of coal imports.

Exhibit 1
Coal Demand and Power Consumption in China



Source: China Coal Resources Database; industry reports; Booz & Company

Production within China is monopolized by local companies. Amongst the main global coal companies, only Peabody has engaged in a few joint ventures for coal extraction; the other major players only operate trading businesses in China. The market is divided between a multiplicity of small companies, with only a handful contributing a significant proportion of the total production: the leading producer, Shenhua, accounts for about 7.5% of China's production, well over twice as much as the next largest player (see Exhibit 2).

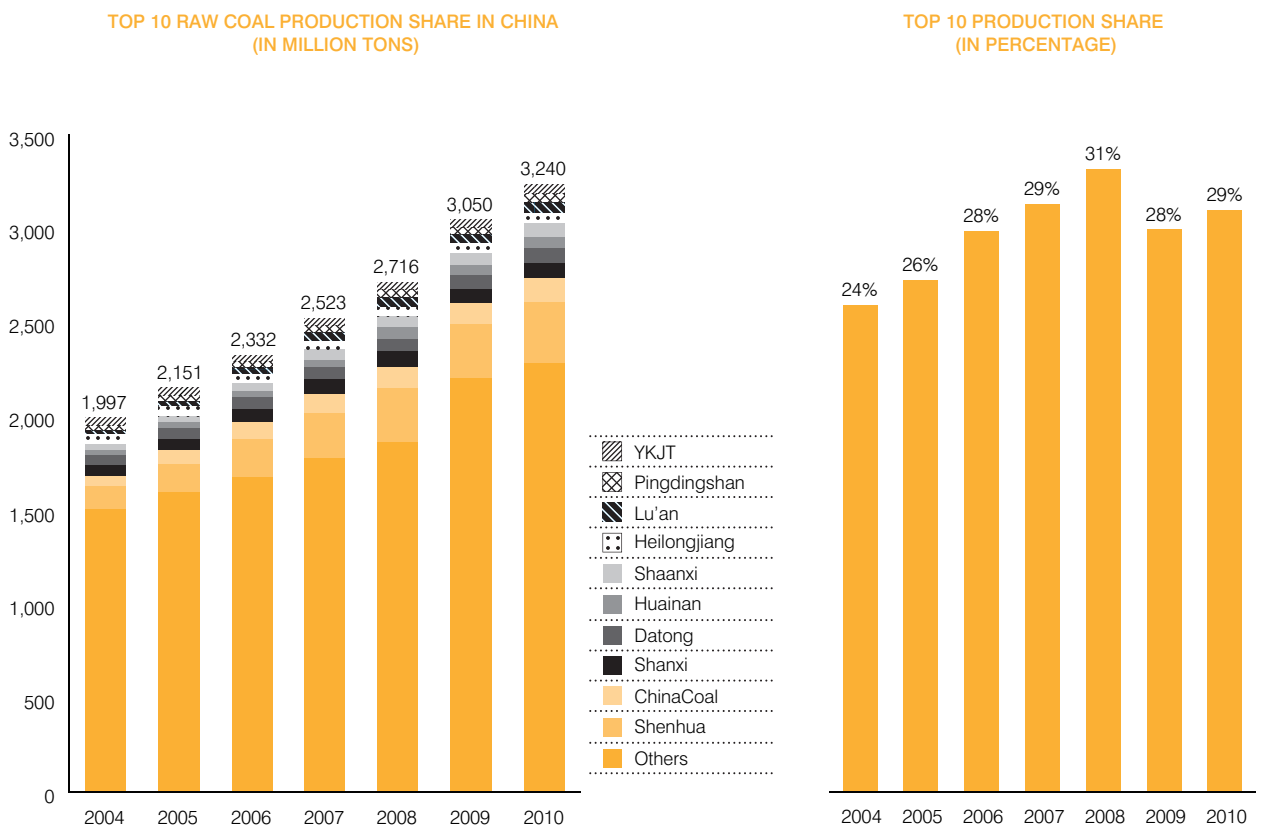
This highly fragmented market has exacerbated problems of low efficiency in the Chinese coal

industry. Chinese mines have a notoriously poor safety record, and a low rate of adoption of modern equipment and advanced management techniques. They also suffer from low productivity, low yields, and a relatively low revenue weight from high value-added coal products, while waste is often excessive and has led to massive environmental degradation in mining areas.

By the middle of the last decade, these concerns had become acute. Following recommendations from the National Development and Reform Commission (NDRC), the Ministry of Land and Resources (MLR), and 15 other government agencies, in 2008 the State Council rolled out a

new policy for coal mining in China. The key focus was on consolidation in the industry, with a targeted reduction in the number of mines from 11,000 to around 4,000, and an increase in the proportion of total output produced by large and medium-sized mining companies to >50% (with half a dozen or so large mining groups expected to establish themselves alongside the Shenhua Group as major producers extracting at least 100 million tons annually). Furthermore, an overall efficiency target was set, aiming to boost the industry's recovery rate from the current level of rather less than 35% to at least 40%. Other government policies are attempting to encourage the adoption of new technologies and

Exhibit 2
Relative Share of Top 10 Coal Producers in China



Source: Coal Industry Yearbooks; literature research; Booz & Company

to increase environmental protection efforts. This master plan, likely to be continued and extended under the next Five-Year Plan, involves boosting supply from the most coal-rich areas such as Shanxi and Henan provinces, maintaining stable production in eastern provinces like Anhui and Shandong, and accelerating exploration efforts in western regions like Shaanxi and Xinjiang.

Against this backdrop, there are now 6 strategic imperatives for the Chinese coal industry:

1. Managing shifts in demand

The 12th Five-Year Plan, coming into force this year, will have to take account of macro-shifts in patterns of consumption. In particular, demand forecasts for coal are being reduced, to allow for an increasing emphasis on the use of gas, nuclear reactors, and renewable energy sources for electricity generation, and for the growing use of Electric Arc Furnace (EAF) technology in steel production. However, the consequences of the

Fukushima disaster in Japan will likely necessitate further adjustments in these projections, as the use of nuclear power may now be radically scaled back.

2. Industry restructuring

The government needs to follow through on its initiatives to consolidate the industry in order to achieve economies of scale and improved efficiency of production. This is likely to involve the emergence of significant new players, and more and more backward integration by electricity producers. There are also likely to be increased calls for the reintroduction of market-based pricing.

3. Improving competitiveness and safety

Operating models need to be restructured to enhance cost effectiveness. There is likely to be increased pressure to meet more rigorous and more strictly enforced health & safety standards for the industry, adding to cost burdens.

4. Diversifying the pool of reserves

Improvements in domestic supply are unlikely to be able to fully meet China's soaring needs. The next few years will see an increasing emphasis on the strategic acquisition of overseas coal reserves and mining interests.

5. Increased exploitation of profit opportunities across the value chain

Larger coal producers will be able to diversify into related areas such as renewable energies, and to forward integrate into coal products such as syngas, liquid fuels, and olefins.

6. Achieving sustainability in mining operations

Environmental concerns are becoming urgent, particularly at the local level. It is likely that government regulation in this area will become more and more stringent in the next few years, and coal producers will have to meet this challenge.

This highly fragmented market has exacerbated problems of low efficiency in the Chinese coal industry.

MANAGING SHIFTS IN DEMAND

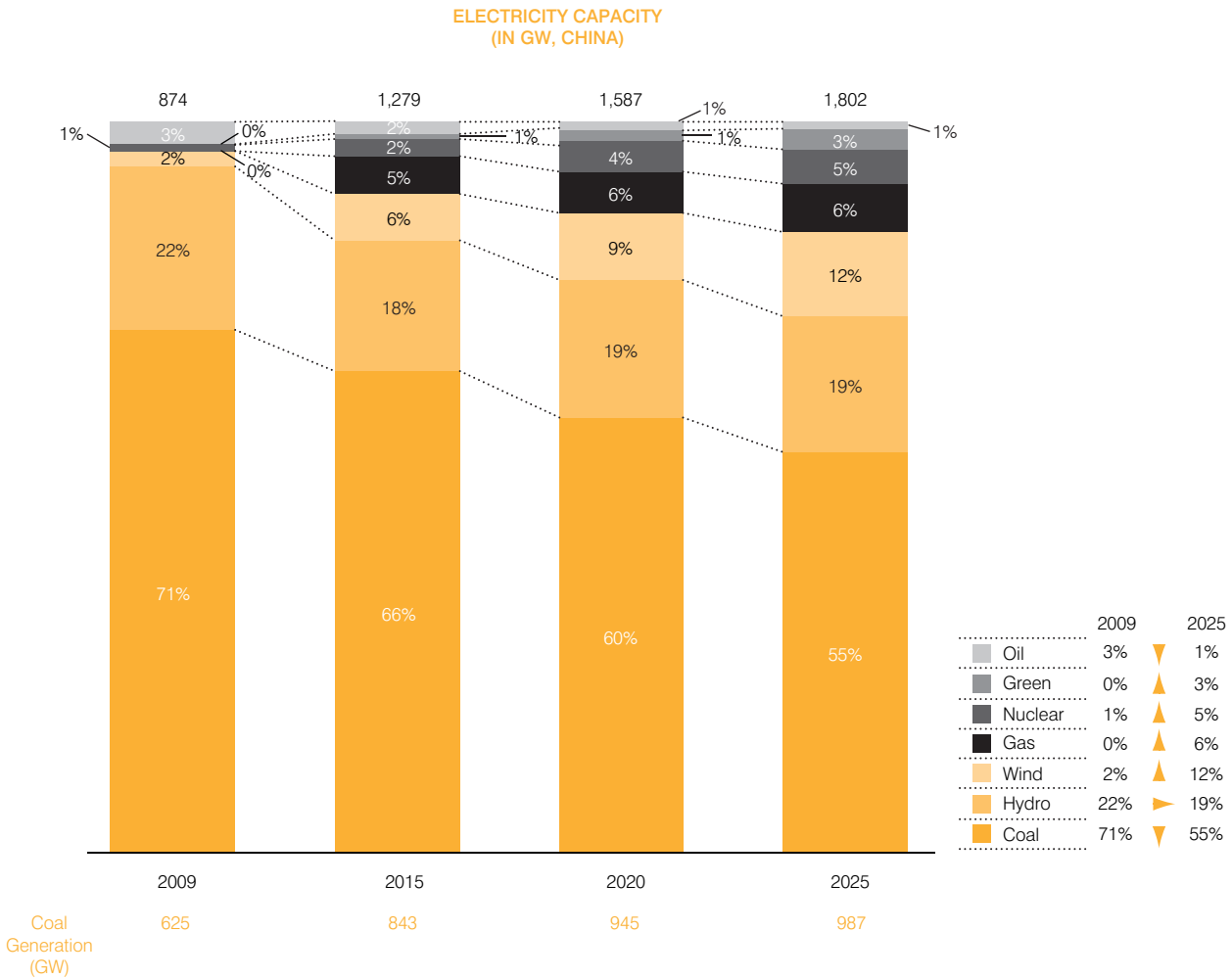
The outline of the 12th Five-Year Plan, to run from 2011 to 2015, was unveiled by the Communist Party's Central Committee in October 2010. Its main theme is a shift in the emphasis of China's economic and social policy towards sustainable development. Item 6 in its listed aims is "To build a resource-conserving and environment-friendly society, and promote the culture of ecological conservation." Reining in the rate of consumption growth will be a key element of this drive for long-term sustainability, but it is likely that there will also be major initiatives to reduce pollution and the over-exploitation of resources, and public education programs to increase environmental awareness. Technological innovation and improved energy efficiency will be encouraged across all industries through tax incentives, etc. The coal industry will be especially heavily impacted by such changes—both directly, in the need to adopt more environmentally responsible operating practices itself, and indirectly, in attenuated demand from industrial consumers.

Under the 12th Five-Year Plan, annual electricity generation is projected to have risen to 1,279 GW in 2015, more than 60% up on the 2008 total. However, the contribution of coal-fired power stations will have dropped from 72% in 2008 to 66% in 2015. By 2025, although total demand will have continued to rise to more

than 1,800 GW, the use of coal in electricity generation is predicted to fall to just 55%, and total electricity output from coal, having peaked at around twice the 2008 level of 470 GW, will have begun to fall. While the percentage contributions from gas-fired and hydroelectric generation are expected to remain fairly constant through this period, steady gains in the use of wind turbines, and green energy sources will start to erode demand growth for thermal coal. In the wake of Fukushima, the future percentage contribution of electricity generation from nuclear power—which had been projected to increase as much as fivefold by 2025—has become very uncertain (*see Exhibit 3, page 6*).

The use of EAF in China's steel industry had approached 20% of total production in the early years of the last decade, but in recent years it has contracted to barely 10%. There is now a ready availability of scrap steel, and the government's heightened emphasis on resource conservation and environmental protection is likely to produce significant incentives for the steel industry to increase recycling. Together with more reliable and lower cost electricity supply, this is likely to result in a steady increase in EAF's share of steel production, which should regain or exceed a level of 20% by 2020. This would still be a fairly low proportion, compared to EAF's share of steel production

Exhibit 3
Sources of Electricity Generation in China



¹ Average of 5 year CAGR; planned

² Compared with 2010 coal-fired base share, and other elements according to 12th 5YP or constant
Source: Government sources; Booz & Company

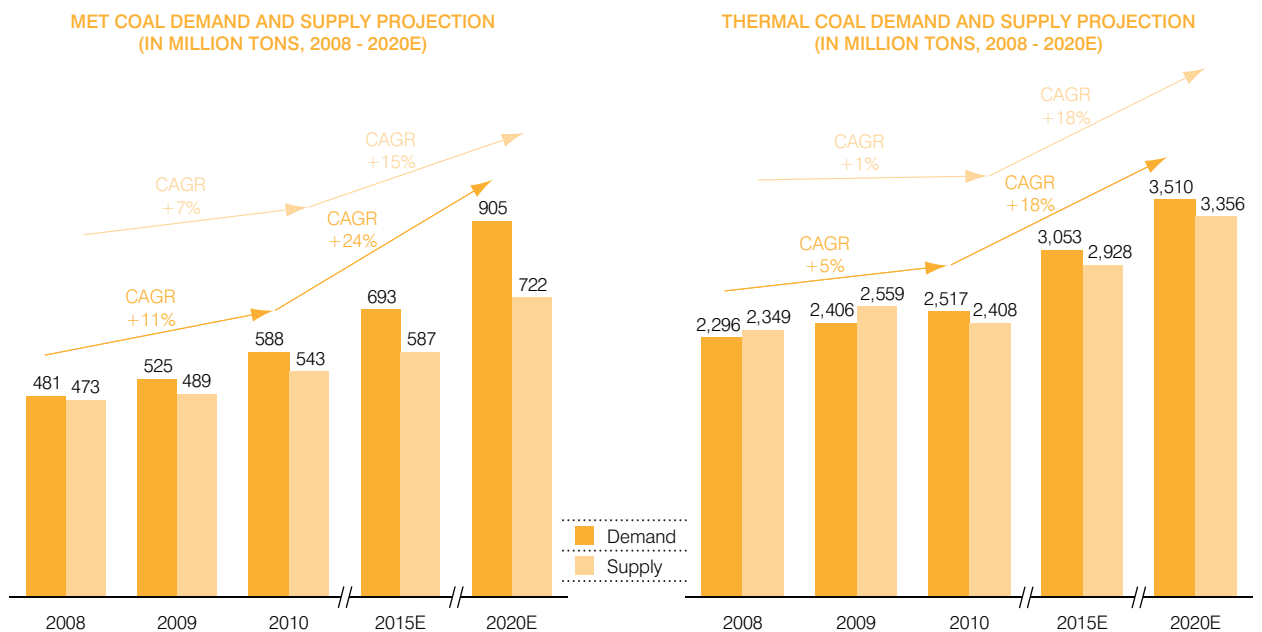
elsewhere: some 30%-35% worldwide, and around 60% in the United States.

We believe these factors will have a significant impact on demand projections for both thermal coal and metallurgical coal. Demand for thermal coal has been increasing by as much as 5% per annum in

recent years, while domestic supply has grown only at a sluggish 1%. However, we expect that over the next decade demand growth will slow to around 3% and supply growth will rise to a similar level. Demand will stay slightly ahead of domestic supply, but the gap will not widen. Demand for metallurgical coal has been increasing at a staggering 11% per

annum, far outstripping impressive annual supply growth of 7%. Over the next 10 years, we expect the wider use of EAF steel production to trim demand growth to 4%; but supply growth will also slow to around 3%, and the demand gap will have reached more than 180 million tons annually by 2020 (*see Exhibit 4*).

Exhibit 4
Supply & Demand Projections for Met Coal/Thermal Coal



Source: Literature research; expert interviews; Goldman Sachs; MOR China; Booz & Company

INDUSTRY RESTRUCTURING

Government regulation of coal prices was abandoned for the first time in 1993, but this soon led to unacceptably high prices, and regulation was quickly reintroduced for coal intended for use in power generation. The NDRC attempted to return price-setting mechanisms for coal fully to the market at the end of 2006, although it retained a supervisory role, seeking to set price guidelines and “facilitating” annual meetings between major coal producers and electricity producers to agree on pricing structures. Unfortunately, there was soon a big jump in prices. Coal producers had long enjoyed significantly better profit margins than the electricity producers, but in 2008 their margins leapt up to 15.3% (an increase of nearly 50% over the previous year), while electricity producers found their margins squeezed to an unviable 1.7%. The NDRC was obliged to step in to reimpose price caps on coal for electricity generation. Coal producers, naturally, continue to lobby for a return to unregulated pricing in all sectors. Larger producers emerging under the government’s industry consolidation initiative may gain more traction over the NDRC, and increase the likelihood that pricing will eventually be deregulated.

Electricity generators have now begun back integrating up the value chain. Of the five major producers, all are now heavily involved in the

trading and transportation of coal, and only Guodian has yet to acquire interests in mining. Hua Neng, for example, has made massive direct investments in mining in Shanxi, Inner Mongolia, Shaanxi, Xinjiang, Gansu and Yunnan, with its total capacity reaching 48 MTA by the end of 2010. These major players are also looking to acquire upper stream companies or competitor companies with desirable upper stream assets. In 2010, Hua Neng purchased multiple assets from the Shandong Electric Power & Luneng Group—including coal mines, power stations and ports—in a deal worth 8.6 billion RMB.

The production share of the top ten mining companies increased from 24% in 2004 to 31% in 2008, although that proportion has fallen back again slightly in the last two years. Shenhua, much the largest individual producer, has achieved particularly strong growth in the last five years. By September of 2010, it had accumulated cash reserves of more than 81 billion RMB, available for further acquisitions. The government is continuing to promote industry consolidation as a means to improve efficiency and safety.

IMPROVING COMPETITIVENESS AND SAFETY

Coal producers face an array of challenges. Several factors are driving up operating costs, and improvements in efficiency have become paramount. Long-standing logistical problems, both domestic and global, need to be addressed, particularly in the realm of transport infrastructure. There is also pressure to upgrade mining infrastructure. A large number of matured mines face rapidly rising operational costs, and there is an increasing need to develop more marginal coal resources. The accident rate remains unacceptably high, despite the closure of many smaller and more dangerous mines. There has been some tightening in the labor market, and also in the availability of bank credit.

The major producers are responding to these difficulties in a number of ways. They are taking more care to manage their supply chains, and are extending their reach into the ownership and operation of key transportation assets. They are introducing new and more environment-conscious mining processes, such as wet processing and advanced water management. They are also adopting new management techniques, making use of KPIs. They are striving to implement effective health & safety measures, and to

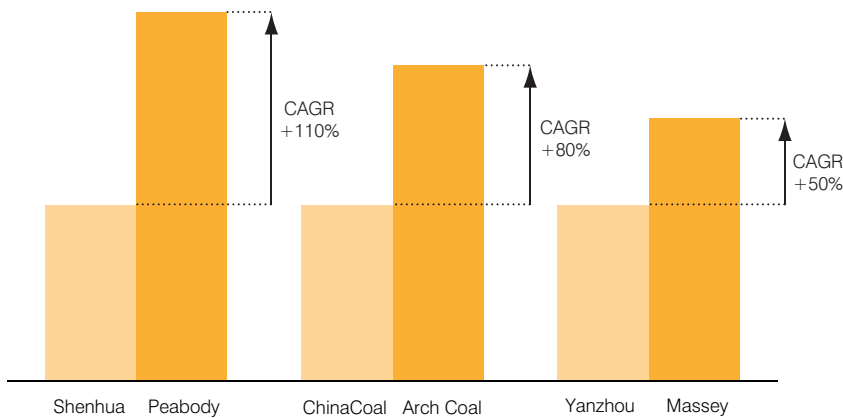
maintain consistent standards across all their operations—particularly when taking over smaller mines. They are exploring new approaches to attracting and retaining labor and talent, and to improving dispute resolution. They are planning their capital expenditure more thoroughly, and are investigating new sources of funding, such as the equity markets and FDI (*see Exhibit 5, page 10*).

Mine safety continues to be a key issue, and has been a major priority of government in recent years. Frequently updated ‘Safety Rules for Mines’ cover equipment, operating procedures, and management and monitoring processes. The State Council’s ‘Special Regulations on Coal Production Safety’ establish an inspection regime and a system of penalties, including the authority to order mine closures. Maintaining compliance with these safety requirements will prove increasingly demanding and costly for mine operators. China’s coal industry has made significant gains in safety, with an annual fall in the rate of fatalities of around 19% during the past decade. However, official figures for 2008 still put the number of deaths per million tons mined at well above 1, about 13 times higher than the rate in the United States.

DIVERSIFYING THE POOL OF RESERVES

Exhibit 5
Comparison of Gross Profit per Employee—US vs China

GROSS PROFIT PER STAFF OF CHINESE VS. US
(2009, IN THOUSANDS USD)



Source: Booz & Company

The world's emerging economies, particularly India and China, have seen a brisk increase in demand for imports of both thermal and metallurgical coal over the past decade. Although this demand growth was slowed by a sharp spike in prices in 2008, it has accelerated further since then. China's imports of thermal and metallurgical coal have more than doubled since 2007.

To meet this demand, outbound investment has become a major trend in recent years, and will continue to expand. In 2009, Shenhua purchased an Indonesian mine with a capacity of 1.5 MTA. Other Chinese coal companies have made acquisitions in Canada and Africa during the past two years. Australia has been a particular focus of activity, with China Huaneng and China Metallurgical Group acquiring targeted minority shares or establishing joint ventures with Australian coal mining concerns, while Yanzhou has now purchased three Australian mining companies outright. In 2009, Chinese companies accounted for 24% of mining acquisitions (in all types of mining) worldwide, and 66% of those in Australia.

ACHIEVING SUSTAINABILITY IN MINING OPERATIONS

INCREASED EXPLOITATION OF PROFIT OPPORTUNITIES ACROSS THE VALUE CHAIN

China's coal producers are starting to close the gap in coal liquefaction technology, enabling them to forward integrate further downstream in the energy supply value chain. Shenhua has already had two major CTL projects approved, while several others from companies such as Yongkuang Yulin, China Coal, and Shanxi Binchang are currently awaiting approval. The government will no longer greenlight CTL projects of <600 KTA capacity.

As coal companies grow larger, they are diversifying. The Shenhua Group is a prime example. Although it remains focused on coal production as its core business, it now has extensive interests in supporting businesses such as railways, shipping, and ports, and is moving downstream into power generation and coal chemicals. Through its Shenhua Guohua Energy Investment subsidiary, it is also expanding into investment, real estate and property development, and alternative energy sources such as wind and solar power.

Production costs are being driven up by more rigorous safety requirements, rising labor costs, and government-mandated targets for improved coal recovery rates. Rising fuel prices are adding to logistics costs. The tax burden is also becoming more onerous, with reform of resource taxes, the imposition of fees or fines under environmental protection regimes, and the threat of an introduction of a carbon tax during the coming decade. Improving end-customer coal efficiency is eroding demand growth, while competition is growing from the alternative energy sectors, supported by government tax incentives. The consolidation of the coal industry is also leading to fiercer internal competition.

China's coal industry faces massive challenges in seeking to meet the country's rapidly rising demand for coal to maintain its economic growth, while at the same time satisfying the requirements of the government and the public to improve safety, efficiency, and environmental awareness.

CONCLUSION

The business environment for Chinese coal producers is becoming increasingly complex, with uncertainties about the development of the macro economy adding to market risks. So far, only limited synergies have been achieved through the industry consolidation process, and operating procedures and management methods still fall well short of global best practice. The leading players have shown only a limited capability in diversifying their portfolios, and are only just starting to attain a global footprint.

The coal producers need to take action to meet these challenges. The complex economic situation requires better mechanisms to monitor and predict market trends. Growth strategies must retain flexibility and include provisions for mitigating potential risks. More needs to be done to capture and create value in the consolidation process, as part of the drive to improve core competencies. The need to reduce risk and improve margins will drive extension downstream in the value

chain. Coal producers will have to develop positions to enable them to capture the growth in new energy. They must also shift away from their current predominant focus on domestic production and diversify their overseas portfolios by seeking opportunities beyond feedstock supply.

The Shenhua Group provides the model for others to follow. Its smaller and less diversified competitor PMTA enjoyed a brief surge in revenue and profitability as a result of the coal price hike in 2008, but its profitability slumped as soon as price controls were reintroduced by the NDRC, and it achieved only minimal revenue growth in the following year. Shenhua, by contrast, increased its total revenues by more than 12% in 2009 and saw an improvement in its net margins as well. Shenhua has proven that coal producers can achieve cost efficiencies and growth even in a difficult market. Its peer companies in the industry can take encouragement from this.

About the Author

Chris McNally is a partner with Booz & Company based in Beijing, where he focuses on the Energy and Chemicals sectors. His project experience covers strategy development, M&A, strategic transformation, and operations improvement.

Paul Pan is a project advisor with Booz & Company based in Beijing, with over 20 years of experiences of corporate management and consulting, industry exposures include energy, retail and consumer goods, focusing on strategic planning, operation management, marketing and other areas.

Ken Zhong is a senior associate with Booz & Company based in Beijing. With over eight years experience in consulting, project management and investment analysis, his main focus is in energy and industrial goods.

The most recent list of our offices and affiliates, with addresses and telephone numbers, can be found on our website, booz.com.

Worldwide Offices

Asia	Brisbane	Istanbul	Middle East	Florham Park
Beijing	Canberra	London	Abu Dhabi	Houston
Delhi	Jakarta	Madrid	Beirut	Los Angeles
Hong Kong	Kuala Lumpur	Milan	Cairo	Mexico City
Mumbai	Melbourne	Moscow	Doha	New York City
Seoul	Sydney	Munich	Dubai	Parsippany
Shanghai		Oslo	Riyadh	San Francisco
Taipei	Europe	Paris		
Tokyo	Amsterdam	Rome	North America	South America
	Berlin	Stockholm	Atlanta	Buenos Aires
Australia,	Copenhagen	Stuttgart	Chicago	Rio de Janeiro
New Zealand &	Dublin	Vienna	Cleveland	Santiago
Southeast Asia	Düsseldorf	Warsaw	Dallas	São Paulo
Auckland	Frankfurt	Zurich	DC	
Bangkok	Helsinki		Detroit	

Booz & Company is a leading global management consulting firm, helping the world's top businesses, governments, and organizations. Our founder, Edwin Booz, defined the profession when he established the first management consulting firm in 1914.

Today, with more than 3,300 people in 60 offices around the world, we bring foresight and knowledge, deep functional expertise, and a practical approach to building capabilities and delivering real impact. We work closely with our clients to create and deliver essential advantage. The independent White Space report ranked Booz & Company #1 among consulting firms for "the best thought leadership" in 2011.

For our management magazine *strategy+business*, visit strategy-business.com.

Visit booz.com to learn more about Booz & Company.