

Perspective

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China's Energy Conundrum



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EXECUTIVE SUMMARY

It is commonly held that China's energy sector is straightforward to understand—massive demand growth driving a dramatic increase in production capacity, which in turn has made the country the world's biggest carbon dioxide emitter. As a consequence, the main issue facing the sector is maintaining growth while reducing its environmental impact.

As this paper shows, the reality is more complex. A better understanding of the various contradictions and predicaments China must resolve for it to meet its energy goals will help both foreign and domestic companies. International firms and potential investors need a stronger understanding to better shape their strategic thinking, while Chinese companies will find it beneficial for grasping the short- and longer-term opportunities and challenges the sector confronts as a result of the global financial crisis.

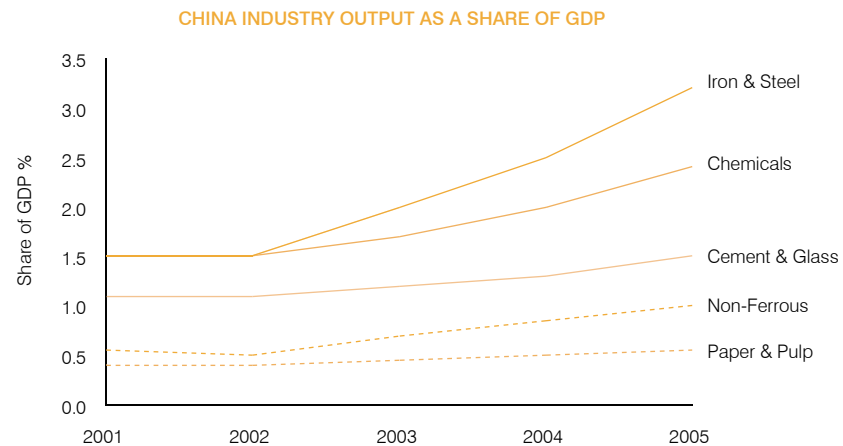
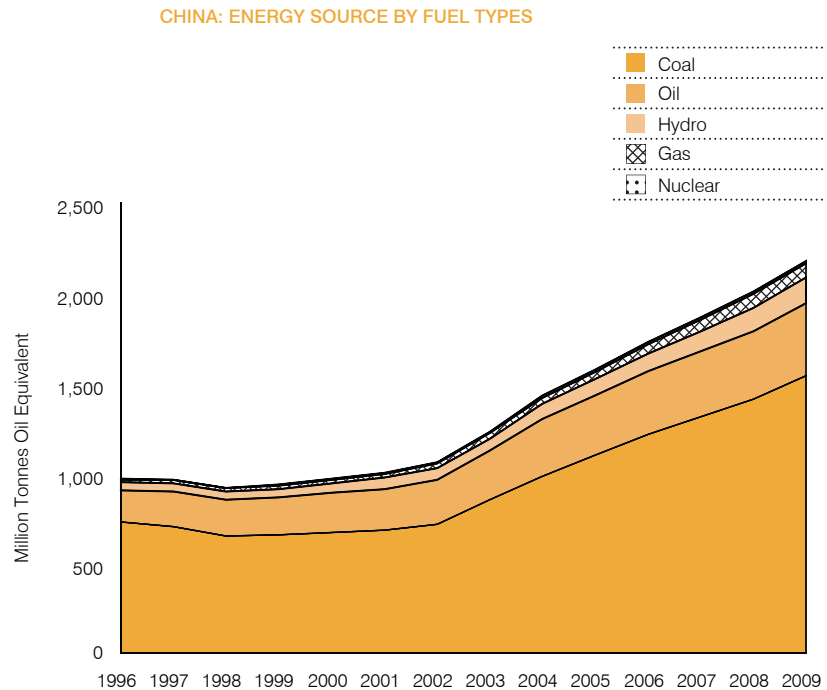
INTRODUCTION: A BRIEF HISTORY OF ENERGY IN CHINA

In the final years of the last century, despite recording rapid economic growth, China was largely successful in limiting growth in energy demand. Widespread closures of backward state-owned industrial operations combined with improved efficiency at new and ongoing operations kept the increases in demand low. In the period from 1996 to 2001, for example, average annual demand growth at less than 1%. This changed in 2002. Starting that year, demand

surged, rising at an annual average of around 9-10% (see Exhibit 1).

The principal reason for this jump was an enormous growth in heavy industry, above all in the iron and steel sector, but also in chemicals and non-ferrous metals, as China embarked on a massive increase in construction and infrastructure building that has continued unabated until now (see Exhibit 1).

Exhibit 1
Rapid Energy Growth Driven by Rising Heavy Industries



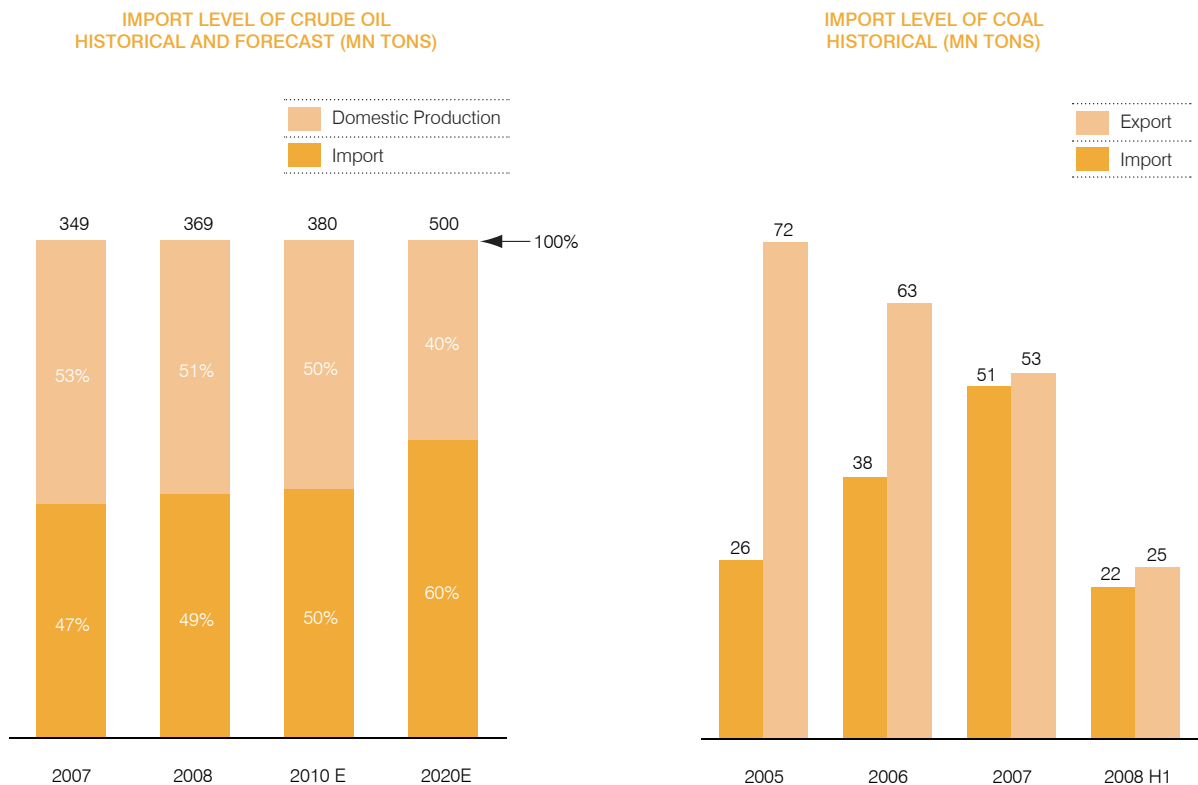
Source: BP Statistical Review of World Energy June 2010; China National Bureau of Statistics; Booz & Company

But other industries have also contributed. China's automotive industry, now the world's leading vehicle producer, as well as increasing demand for raw materials, has driven a massive rise in demand for gasoline

as tens of millions of new drivers have taken to the road. In turn, China has become highly energy import dependent, especially for crude oil, but also increasingly for coal (see *Exhibit 2*).

And simultaneously it has become the world's biggest single producer of carbon dioxide and other greenhouse gases.

Exhibit 2
Oil Security of Supply and Coal Security of Supply



Source: China Business Times Report; The Energy Development Report of China; China Petroleum and Chemical Industry; China Energy Statistic Year Book; China Customs Website; China Coal Resource; Chinaore; Booz & Company

POLICY PRIORITIES – SECURITY, SUSTAINABILITY

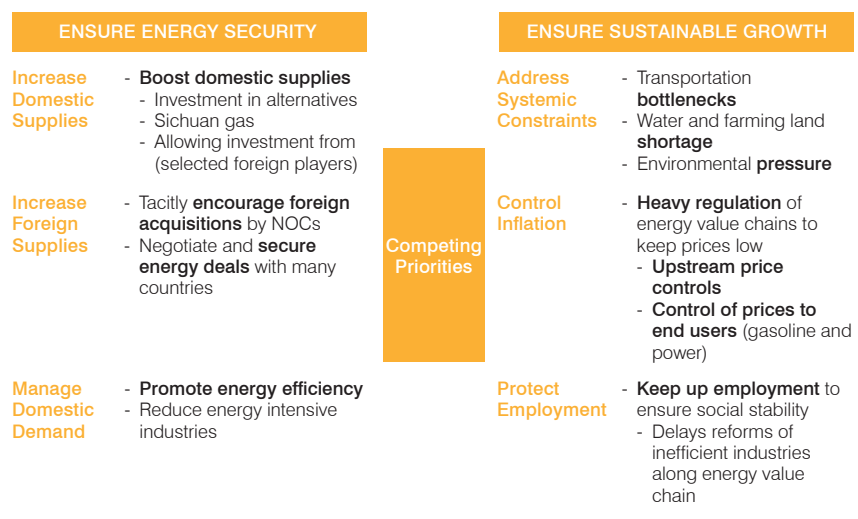
Alongside this sudden and sustained increase in energy demand and accompanying output of pollutants, China’s energy sector has rapidly increased in complexity—largely because of a need to tackle two pressing issues simultaneously (*see Exhibit 3*).

On the one hand, driven by its ravenous appetite for energy, the government has become increasingly concerned about national energy security. On the other, worried more and more by the threat of

environmental degradation, and especially the possible dangers of climate change—to which China, as the world’s biggest carbon dioxide emitter, would be a major contributor—it also is more and more worried about ensuring that its economic growth is sustainable in the long term.

Finding ways of trading off these two competing priorities is arguably the biggest issue facing Chinese energy planners and the strategic decisions they have to make.

Exhibit 3
China’s Two Major Competing Priorities



Source: Booz & Company

On the security side, they are pulling all possible supply- and demand-side levers. China has expanded its search of overseas resources, with the government tacitly encouraging foreign acquisitions by its state-owned oil companies, and negotiating energy deals with many countries, notably in Africa, South America and the Middle East. But it is also looking for ways to reduce its dependence on energy imports across a broad range of areas, including:

- Stepping up the development of indigenous resources through domestic exploration and development, for example in tapping gas reserves in the southwestern province of Sichuan and oil in the Bohai bay off its northeastern coast.
- Exploring the potential of alternative fuel technologies, including coal-to-liquids (CtL) and bio-fuels, and promoting the development and use of renewable power generation sources, particularly wind but also solar.
- Developing unconventional gas sources, such as coal-bed methane.
- Allowing investments from selected foreign players in the domestic market.

In parallel, it is implementing measures to curb domestic energy demand and raise energy efficiency levels. Its 11th Five Year Plan, which ran from 2006-10, set clear policy goals for energy saving, including targets for reductions in both energy intensity and coal consumption. The government is also promoting energy efficiency through disincentives aimed at reducing the attraction of investing in high energy consuming or polluting industries, and supporting the active development of new energy-saving sectors. As *Exhibit 4* (page 6) shows, it has plenty of room for improvement.

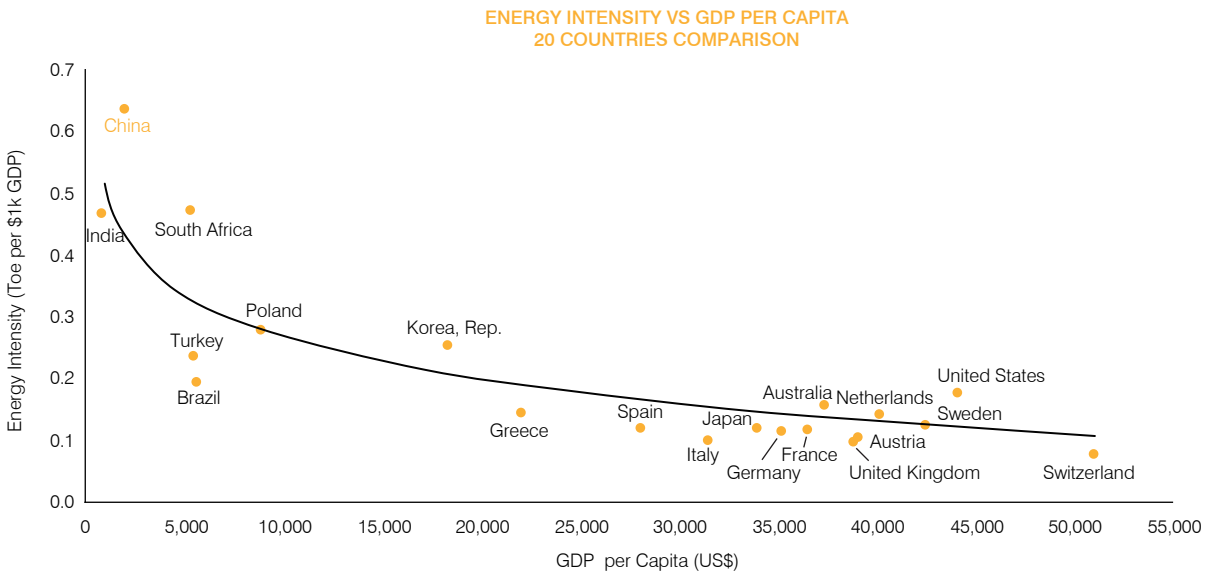
China is also striving to balance energy demand growth and the pursuit of new energy sources with a sustainable growth agenda. Measures include controlling the upstream prices for many raw materials, including coal and crude oil sold to power stations and refineries, and the downstream prices of gasoline and electricity to both industrial users and consumers. In recent years it has selectively deregulated, re-regulated, then again deregulated coal prices in response to perceptions that international energy pricing has detrimentally affected domestic pricing.

After an initial burst of experimentation, the government is now limiting the use of food crops for bio-fuels in order to avoid pushing

food prices up, and it is restricting the further deployment of CtL technology both to avoid depleting already enormously stressed water resources (*see Exhibit 5, page 6*) and to prevent domestic coal demand and so prices rising too strongly.

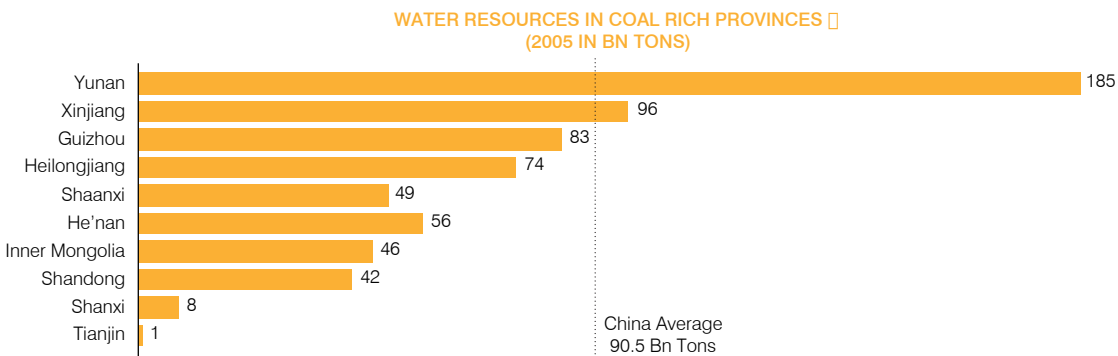
Finally, the government is also working to overcome China's constrained rail and river transportation infrastructure and the numerous bottlenecks this presents, especially for the coal industry. Although the country has plentiful coal reserves, these are concentrated in the north and west of the country—far from its main industrial centers along the eastern and southern coast (*see Exhibit 6, page 7*). As a consequence, southern provinces, notably Guangdong, find it easier to buy coal from overseas sources such as Indonesia and Australia. China's current investment in rolling out a high-speed passenger network will go some way to ease this by freeing up track for coal transport.

Exhibit 4
Relatively Inefficient Energy Usage



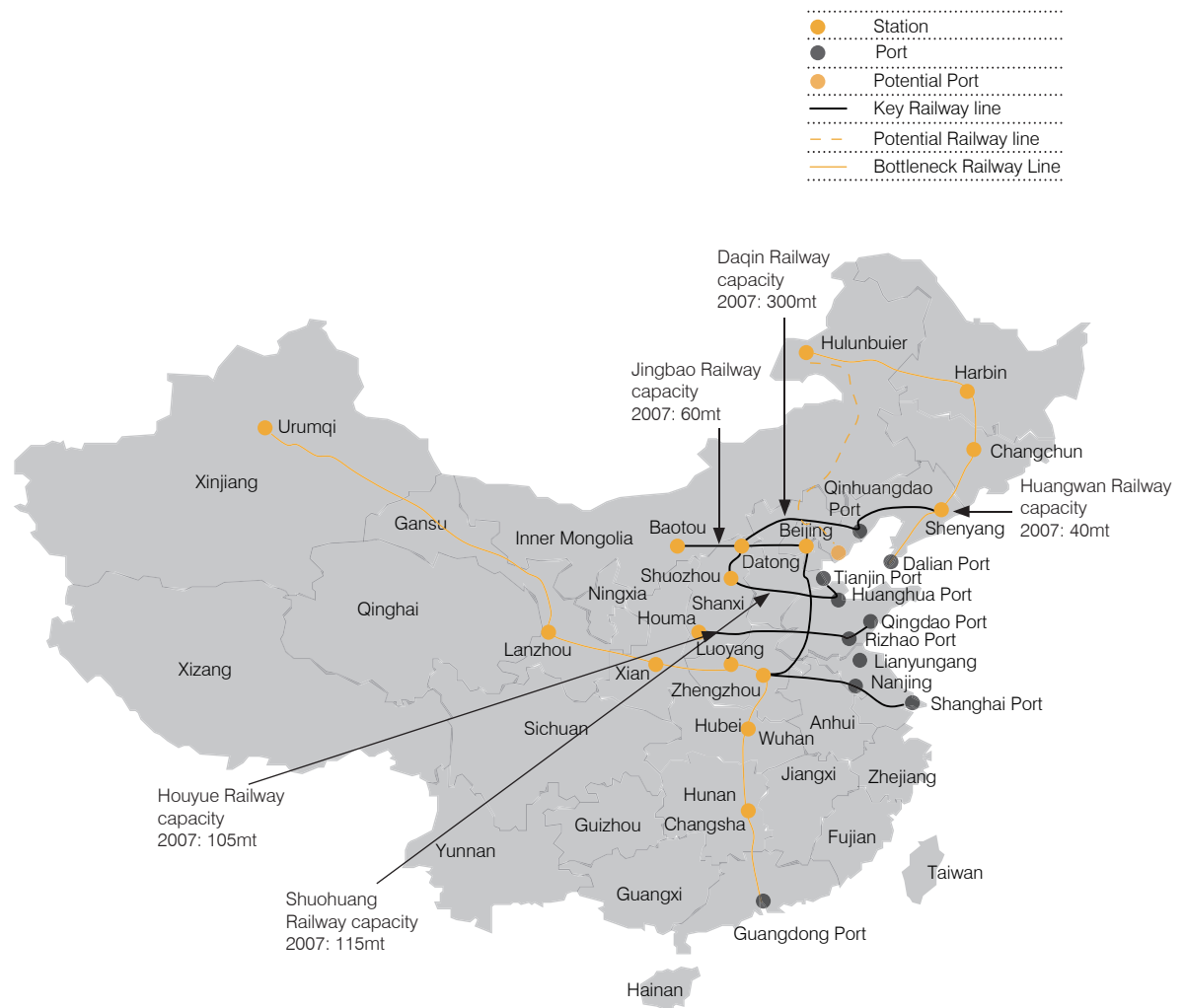
Source: BP Statistical Review of World Energy 2007; Booz & Company

Exhibit 5
Limited Water Resources Constraining CtL Development



Note: Water resources within the region; according to National Bureau of Statistics, water resources = surface water + underground water – the overlapped amount of the two
Source: Booz & Company

Exhibit 6
Transportation Infrastructure Constraints



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

THE IMPACT OF THE CRISIS

When the global financial crisis struck in 2008, it created a major discontinuity that also affected China's energy sector. Temporarily it restrained demand growth and energy pricing worldwide. It also pushed down the valuation of many international energy players worldwide, especially independent oil companies (see Exhibit 7), leaving China's cash-rich national oil companies, especially China National Petroleum Corp. (CNPC) and China National Offshore Oil Corp. (CNOOC), found themselves in a strong to acquire foreign assets (see Exhibit 8, page 9).

One of China's key responses was to issue a US\$588 billion stimulus package. This indirectly addressed some of the identified constraints to ensuring sustainable growth. In particular, investments in the transportation infrastructure and the environment will go a long way to compensate for inherent insufficiencies having delayed the development of China's energy sector (see Exhibit 9, page 9). Chinese oil

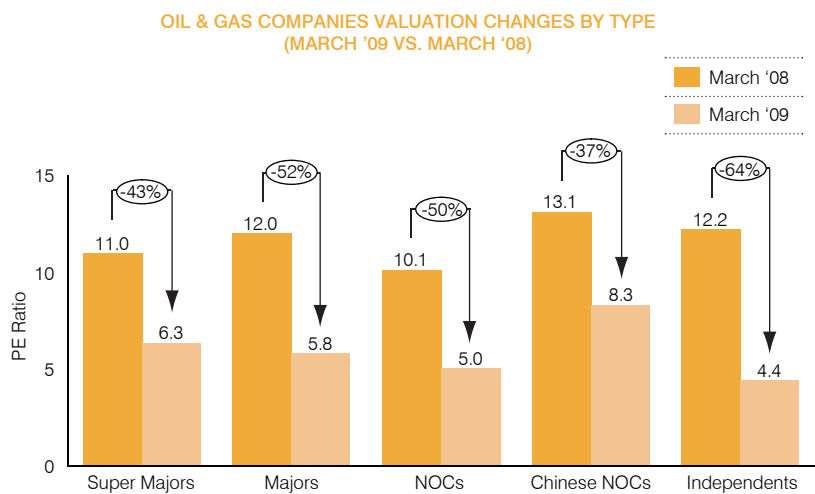
companies also snapped up several tens of billions of dollars of key assets in Iran, Brazil and Venezuela just in the first quarter of 2009¹.

The crisis's impact, however, has already proved smaller than many forecast, with commodity prices, including oil, recovering strongly by late 2010. Longer-term forecasts continue to foresee only further rises through the next decade and beyond (see Exhibit 10, page 10).

Nonetheless, business does not remain as it was before the crisis. Increasingly, we anticipate both commonalities and divergences of strategy for international oil companies and China's national oil companies.

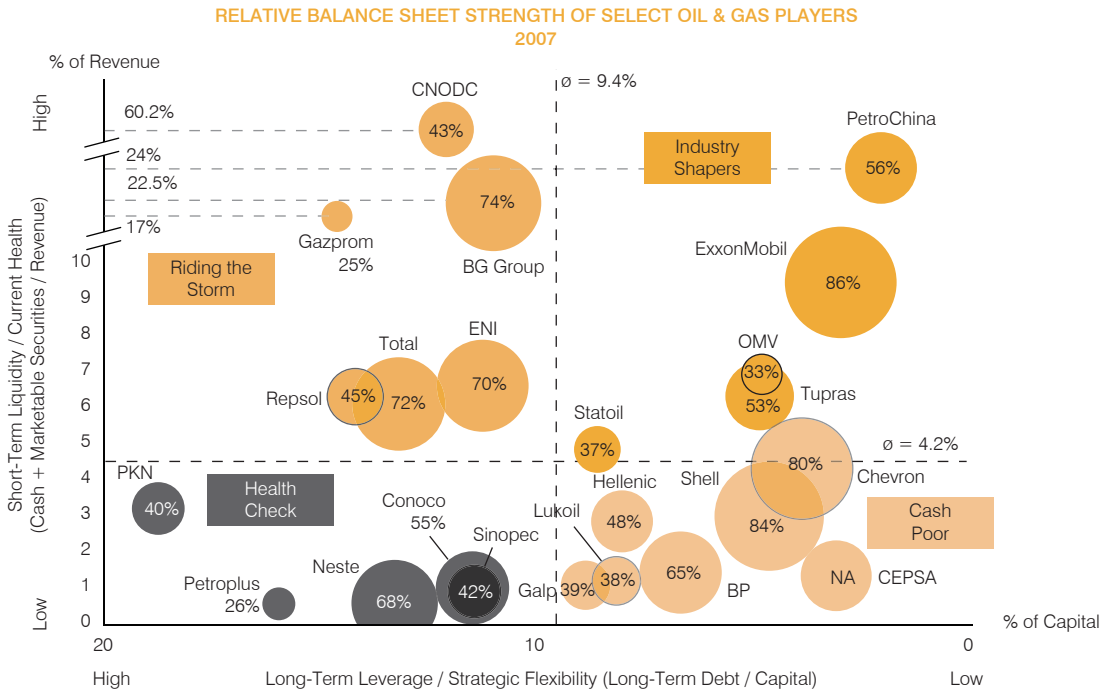
- Companies with strong cash balances—which include “industry shapers” such as the Chinese national oil companies—continue to be better positioned to take advantage of inorganic growth opportunities, especially through the acquisition of independent oil companies.

Exhibit 7
Depressed Company Valuations



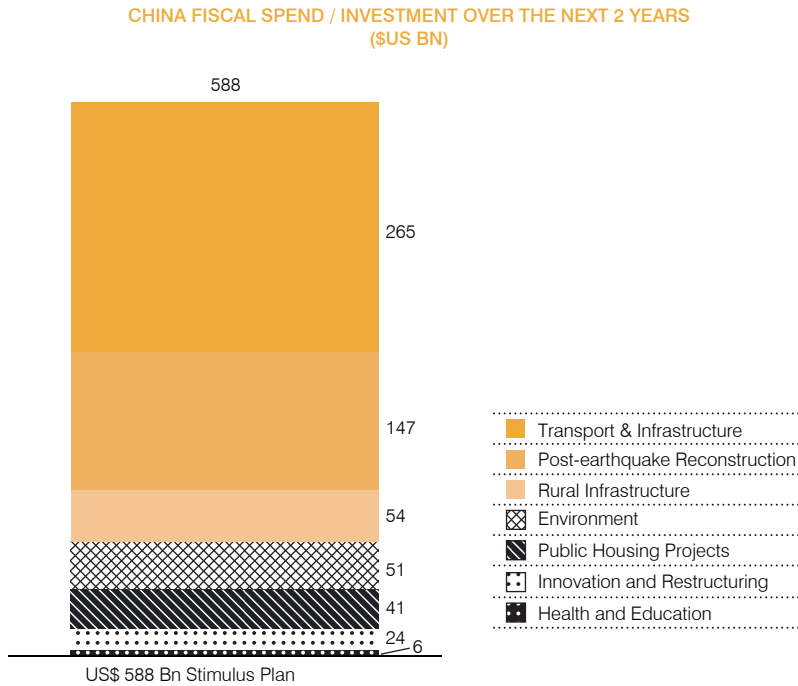
Note: For PE ratio average values in each category, super majors include Exxon Mobile, BP Total; majors include Chevron, ENI, ConocoPhillips; NOCs include Petrobras, StatoilHydro, PetroCanada; Chinese NOCs include PetroChina, Sinopec, CNODC; and independents include Devon, Apache, and Talisman. Calculations are based on publicly listed stock share prices and earnings
Source: Booz & Company

Exhibit 8
Balance Sheet—A Strategic Differentiator in the Near Term



Note: Bubble size represents January 12th stock price / 52-week high
 Source: Bloomberg; Booz & Company

Exhibit 9
China Fiscal Stimulus Package Breakdown



Note: 1 US\$ = 6.8 RMB
 Source: World Bank; Booz & Company

- Companies in a relatively weaker position, many of them international oil companies, will have to remain more internally focused on operational improvement if they are to remain independent.

With continued uncertainty over how quickly and how strongly the global economy will recover, local and international firms' long-term strategies should align investor value propositions with China's competing energy priorities.

A consistent value proposition approach will position investors to take advantage of opportunities as de-regulation in China evolves, with successful companies likely drawing

on one or more of the following three trends:

- Establishing partnerships based on agreements about present and future objectives and the long-term potential these have for value creation.
- Scenario planning based on a shorter planning horizon and flexibility to adapt to rapidly emerging opportunities within China.
- Nurturing "soft power" techniques and adopting multi-dimensional problem-solving approaches that allow international companies to demonstrate how they can help Chinese companies achieve their

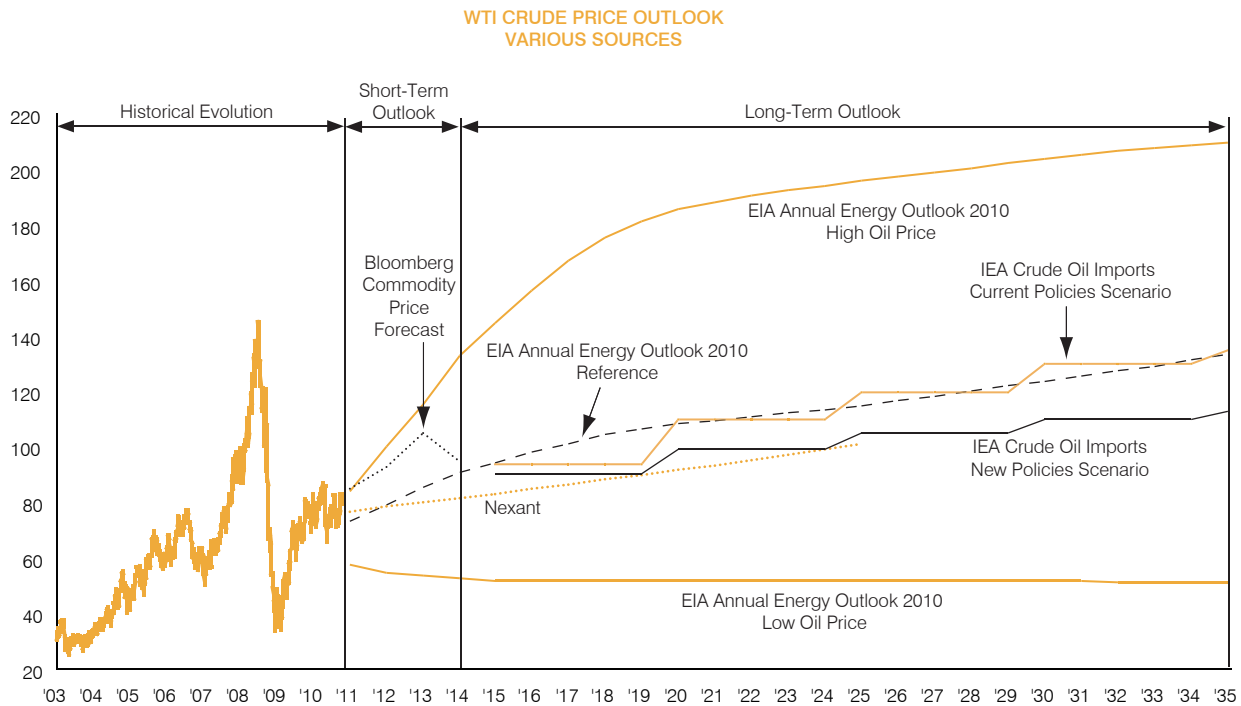
wider strategic objectives around the world.

Companies should also be on the watch for future government decisions, beyond the announced stimulus package, which might create further discontinuities and therefore potential opportunities for investors. Among the more specific opportunities likely to present themselves to international companies are:

Opportunities in upstream, power and gas

- In the upstream and power generation sector, where oil and coal dependency will unavoidably remain a major issue for the Chinese government, new or lesser developed technologies

*Exhibit 10
Higher Prices on the Way*



Source: Bloomberg; Bloomberg Commodity Price Forecast October 2010; Nexant Medium Oil Scenario July 2010; EIA July 27th 2010; IEA World Energy Outlook November 2010 (Real terms); Booz & Company

look certain to gain a rising position in the portfolio (for example, nuclear, CTL, solar and wind).

- Unconventional gas sources are being developed in China, and local companies (particularly PetroChina and Sinopec) are searching to develop technology and capability. This provides new opportunities for partnership.
- As Chinese companies become bolder in their overseas forays, we expect to see a sharp rise in international mergers and acquisitions outside China's borders, and potentially a restructuring of the industry landscape worldwide as China seeks resources and capabilities.

Opportunities in downstream

- While China's fuel market will continue to grow, uncertainties

will remain as to whether it has yet reached the steep part of the automobile penetration S-curve, and so decisions on capacity build will be critical in managing demand/supply balance.

- Regulation remains tight in refining, with retail price control and limitations on foreign ownership. Opportunities may come through market opening in both production and trading.
- Competition between new entrants (and minor refiners such as CNOOC and ChemChina) and the major incumbents may also create opportunities, for example, in retail network development.

Opportunities in chemicals

- With world markets continuing to become increasingly commoditized, and potentially more oversupplied, opportunities

will open up for potential consolidation involving Chinese companies, which could in turn threaten regional exporters.

- Chinese companies will continue with their expansion plans, increasingly looking for opportunities abroad, building on experience gained in upstream and refining. This will create opportunities for new joint ventures and other partnerships, as well as divestment.
- Chinese companies will also continue their push into more specialised chemicals, creating additional competitive pressure – but also opening up partnership, R&D and divestment/technology licensing opportunities for international players.

CONCLUSION

Despite the price of oil returning to within a whisker of \$100 a barrel in early 2011, the prospect of continuing weakness in the global economy leaves China's energy sector as one of the focal points of the world's energy industry.

But the return of high oil prices further underlines just how much China must balance its energy security and energy sustainability priorities. In the medium term—over the next five years—overseas resource agreements and acquisitions will likely figure prominently. For Chinese companies, acquiring the capabilities to handle such acquisitions—especially their

political aspects—will be crucial. Strategic partners could play an important role here.

Over the longer term, improving efficiency and broadening the sources of supply will be major emphases. Coal will continue to dominate China's energy production for decades to come, but it is likely almost every other conceivable power source will be at the very least explored in depth. Those which do not threaten growth or sustainability are likely to be taken up as fast as is feasible. Foreign technology and expertise, if it can aid or accelerate such schemes, will be welcomed.

Endnote

¹ See Booz & Company Viewpoints, “The Roaring Dragon” (2006) and “Where will the Dragon Roar Next?” (2008)

About the Authors

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.

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