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Article

Resources and energy security

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RESOURCES AND ENERGY SECURITY

CHO KHONG*

Energy security is a topic that has attracted a flood of interest and responses, some alarmist in tone, others seemingly more measured. What are the factors that have come together to produce this heightened awareness of energy concerns? And standing at today's energy crossroads, which path will we take as we move into the 21st century? The issues around energy security, energy supply and geopolitics are complex. To understand them, we need to understand how oil and gas markets have moved, and the factors which have shaped this movement. And here the oil price provides a simple point of entry.

Supply, demand and price

The world oil market is a very different thing today from what it was just a decade ago. The strength of global demand for oil has surprised everyone, including all the market analysts. At the same time, it became clear for a variety of reasons, that there is insufficient investment in additional production capacity. The oil price, reflecting surging demand and low supply growth, has turned sharply upwards, though in real price terms, we are still somewhat below the oil price peak reached in 1980 (see Figure 1). The oil price is high, though not at its highest point in real terms. But while the oil crisis of 1979-80 was clearly supply-driven, resulting from the change of regime in Iran and the Iran-Iraq war that followed, as was the oil crisis of

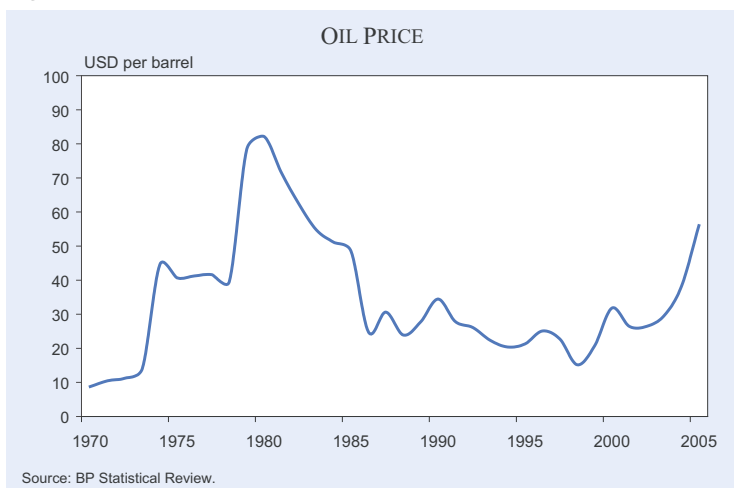
1973-74, resulting from a deliberate cut in OPEC production, there is no single explanation for today's rising oil price.

On the one hand, it has finally sunk in that it has become increasingly difficult to locate additional large deposits of oil, shattering the complacency of consumers and consumer country governments alike. The new non-OPEC areas developed since 1980 have reached the limits of their productive capacity, there are few new frontier areas left to explore (most of these, such as the deep offshore, are highly technology and capital-intensive, or else, like Alaska, are geologically complex and have environmental and local sustainability implications), and the major part of resources are in the hands of national oil companies, only prepared to develop their reserves on their own terms and according to their own timetable. As a result, the major international oil companies are finding the search for oil increasingly uneconomical.

The paradox is that there is still plenty of spare capacity. But only two countries share the bulk of that spare capacity, Saudi Arabia, largely, and also the United Arab Emirates. This concentration of conventional oil reserves is the fundamental factor underlying concern over international oil security, with the Middle East dominating oil exports today and set to increase its dominance over the next twenty years.

There is still plenty of spare capacity but concentrated in too few countries

Figure 1



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Middle Eastern oil exports have indeed risen substantially since 2002, and Saudi Arabia is committed to increasing investment to help meet rising oil demand. Yet there is uncertainty over how far Saudi Arabia will be able to increase output, given the lack of information on its reserves. And there is uncertainty over how much additional money it will be prepared to spend on the world's behalf to develop the spare capacity that they have. Pierre Wack, the founder of the Shell scenario team in the early 1970s and who predicted the oil price shocks of that decade, once warned not to project one's beliefs and expectations onto others. To expect others to do what is in your interests and expectations would be, as Wack put it, an extremely unlikely miracle.¹

The oil crises of 1973-74 and of 1979-80 led to worldwide recession and inflation. But today's crisis (with an appreciably lower real oil price compared to the 1980 peak) is associated with rising global GDP, modest inflation and a booming world economy. Perceptions have changed. Saudi Arabia still wants stable oil prices, but they now associate a much higher oil price level with stability and global economic growth, and they look to that higher oil price to deliver them the revenue that they need. From the vantage point of today, the rationale of low oil prices appears to have been undermined.

Then add in political risk. Thomas Friedman has argued that the price of oil is inversely related to domestic political stability in major oil producing countries.² Friedman points to a relationship which is strongly correlated, though (in my view) by no means inevitable. Nevertheless, what is of concern to the markets is the political unpredictability and potential instability of many of the major oil produc-

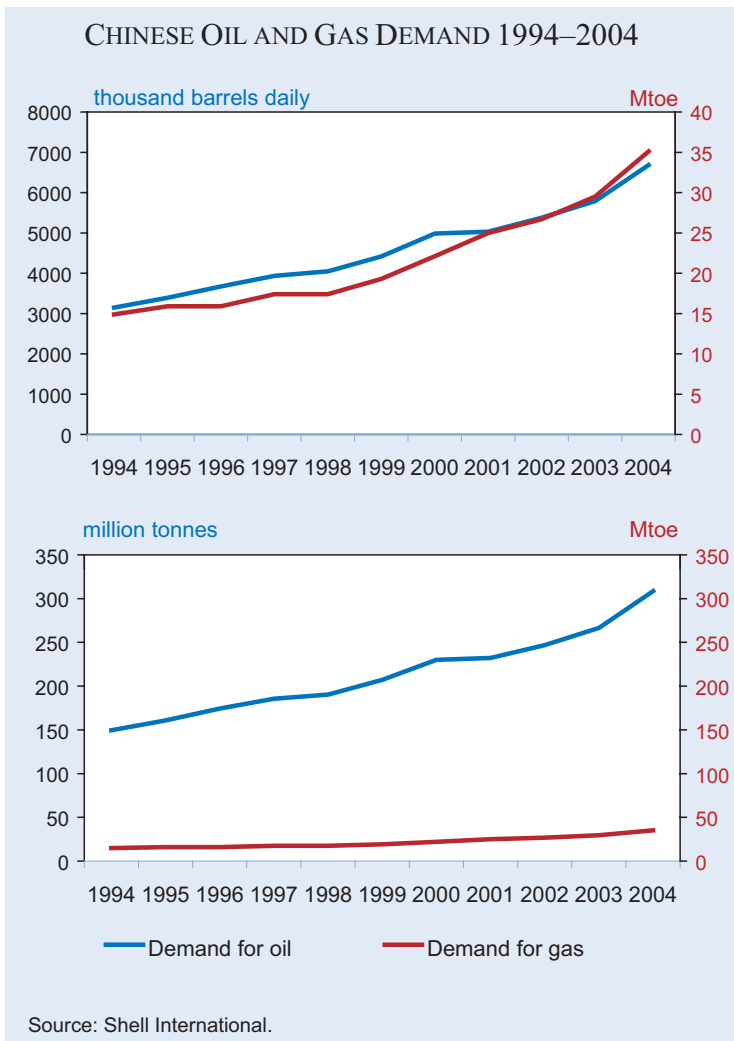
ers, marked by "predatory" regimes, problems of political legitimacy and of increased political risk.

But if the system is constrained and uncertain on the supply side, there are even larger pressures on the demand side. Oil consumption has been driven by robust economic growth in China, India, a recovering Japan, the US, Europe, and even Africa over 2000 to 2004, which was unprecedented.

The single most important headline factor, though, particularly in looking at incremental oil demand growth, was China. While people expected energy demand to rise in China's growing export-oriented and increasingly market-focused economy, it was the size of the leap in China's oil and gas demand, particularly since 2003, that surprised the oil markets, turning out to be much stronger than anticipated (see Figure 2). Meanwhile, US oil demand, fuelled by a potent mix of declining real petrol prices and rising standards of living (which meant Americans spend-

Demand growth has come mainly from China

Figure 2



¹ Pierre Wack (1986), "The Gentle Art of Re-perceiving", Shell International Petroleum Company Limited, Group Planning, March, reprinted from *Harvard Business Review*, September/October 1985 and November/December 1985.
² Thomas L. Friedman (2006), "The First Law of Petropolitics", *Foreign Policy*, May/June, 28-36.

ing an increasingly smaller percentage of their rising incomes on energy), was not standing still either (see Figure 3). Indeed, US demand has proved fairly inelastic as oil prices have risen over the last few years, and US demand probably accounted for a larger share of the rise in oil prices in 2005 than any other consuming country. The other point to note is that the squeeze in oil markets has been matched by large price increases for iron ore, steel, copper, soy beans and a host of other commodities, all attributable to the demands of a booming global economy and in particular to Chinese consumption.

Put supply and demand together, and increasingly analysts are coming to the view that the price rise that we see today is structural, not cyclical, even if (as some expect) there may be some price moderation over the near term future. The issue is reliability and predictability at reasonable cost, and if neither can be expected, then we are in what some have called a new age of energy insecurity.³

For China, the bulk of oil imports come from distant regions

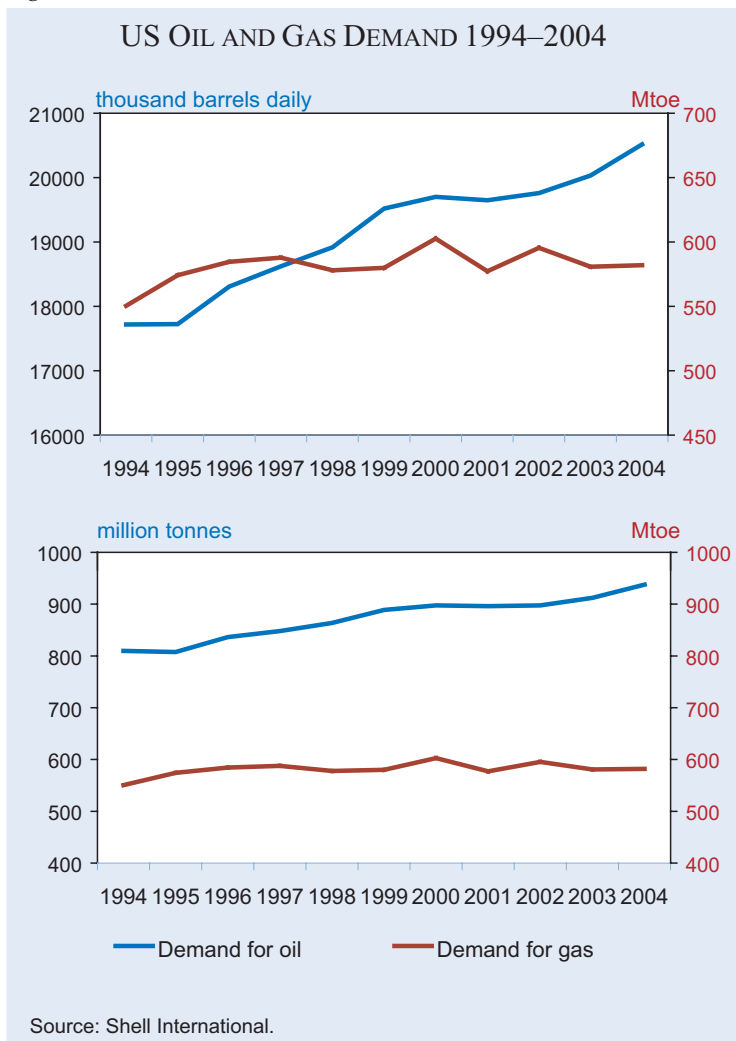
Distance and diversity

What are the principal parameters within which consuming governments have to analyse their energy security and to formulate a response in this new age? One key parameter is distance between their sources of energy supply and the main geographic consuming areas. Thus for China, which became a net oil importer in 1993 and whose oil import dependency now stands at around 50 percent of consumption and rapidly rising, more than half of its oil imports come from the Middle East, in particular the Persian Gulf, with Africa as its second largest supplier. And Chinese dependence on the Middle East is set to increase. This is a pattern of oil imports which is highly concentrated and in which the bulk of imports come from regions distant from China's main energy consuming regions on the Asia-Pacific seaboard, both reinforcing potential insecurity of supply. Indeed for China, there are only limited contiguous sources of supply. This maxim of distance between supply and

demand also holds with China's domestic energy supply, as its domestic energy resources are also generally located far from its main consuming regions. This configuration of resources located at a distance from consumption, which applies to East Asia in general, including Japan and South Korea, and is distinctive in comparison with North America or Europe, the two other major oil consuming regions.

The same consideration of distance holds for East Asian gas supply as well. North America and Europe have well-developed regional grids for piped natural gas. North-East Asia has no such grid, relying instead on LNG, largely from the Persian Gulf, though also from Indonesia and Australia's North-West Shelf, for the bulk of its gas supplies. How a regional gas grid for East Asia might develop, what lines will be built first and who will control

Figure 3



³ J. Robinson West (2005), *The Age of Energy Insecurity*, testimony to the Senate Committee on Commerce, Science and Transportation, September 21, Washington DC: PFC Energy, 2005.

access, are all key questions for regional governments which will shape their future relationships.

The other key parameter is concentration, or rather its opposite, diversity of energy supply. A fundamental principle of energy security is to spread your bets by diversifying your sources of supply. There is an increasing recognition by governments that diversification, through access to a range of supplies in order to reduce your vulnerability to any one of them, is key to their energy security.

Diversification has been a driver for the U.S. seeking to develop energy imports from West Africa and other regions outside of the Middle East. By 2015, the US National Intelligence Council expects Africa's share of US oil imports to climb from 16 to 25 percent, close to the proportion currently coming from the Middle East. Diversification has also been a driver of EU concerns to integrate energy security into a common foreign policy position, triggered by increasing European dependence on gas as part of its energy consumption and on reliance on Russia for gas supplies. This push to diversify gas imports was highlighted by Russia's miscalculation on gas supplies to Ukraine in December 2005 with its ramifications for onward gas supply to Western Europe, and is leading to renewed pressure to develop alternative pipeline routes from Central Asia and the Caspian, which bypass Russia.

The new great game

This brings us to the geopolitical power play of the new Great Game that has been developing. Growing concern by governments over energy security has revived traditional realist power dynamics in international relations. Oil and gas are critical imperatives, shaping the strategic concerns of states, with energy as central to national interests. Geopolitics, with its focus on spatial configurations of power, is key to this understanding. And the most influential proponent of this doctrine of geopolitics was Sir Halford Mackinder.⁴ A principal reason why his ideas are being resurrected today is because of the growing concern by governments to position themselves and their interests in the heart of Mackinder's heartland thesis, Central Asia and the Caspian.

⁴ Sir Halford Mackinder (1962), *Democratic Ideals and Reality*, New York: W. W. Norton [original publication 1919].

This region has the potential to become a major source of great power contention in this century. It has significant, if not over-large, hydrocarbon reserves of its own, and is surrounded by a number of major energy producers, Russia, Saudi Arabia, Iran and Iraq. Yet regional states are small and often insecure, creating an apparent power vacuum, sucking in the interests of powerful states from outside of the region. Russia seeks to maintain its hold over oil and gas exports from the region. Western Europe, as noted, is keen to develop alternative pipeline routes from the region through Turkey. And China has its own interests in seeking that some proportion of regional hydrocarbon exports go eastwards to China.

Behind the geopolitical concerns over Central Asia and the Caspian, there is a larger power play at work. China is very insecure over the Straits of Malacca, through which 80 percent of its oil imports passes, a figure which is set to rise as China becomes increasingly dependent on energy imports from the Middle East and West Africa. While the U.S. sees China as a potential emerging threat, China sees the U.S. as a potential existing threat to its energy security, because of its influence in oil producing regions like the Persian Gulf and because of its ability to block seaborne energy supplies through its naval forces and control of the high seas. Over the next few decades, this may lead China to develop a blue water naval capability and air reach that can secure sea lanes essential for its energy security. The value of doing so is debatable, however, given the cost; and such actions would also ratchet up the possibilities for confrontation with the U.S. and with Japan.

Meanwhile for today and in the foreseeable future, China will be looking for strategies that could effectively bypass the Straits of Malacca. Overland transport of energy supplies from Central Asia would therefore be worth a premium to China. And the agreement between Saudi Arabia to build, own and operate a strategic petroleum reserve in China helps ease both Saudi concerns that its oil exports might be cut off and Chinese concerns that its oil imports might be blocked. Storing oil forward in the market where it is to be consumed is therefore one strategy to be considered when seeking to overcome the parameter of distance in enhancing energy security.

There are also new areas, which cannot possibly have been imagined by Mackinder, where geopolitical

Central Asia and the Caspian may become the region for the great geopolitical power play

anxieties may in future come to weigh significantly on the strategic energy concerns of governments. The US current account deficit, for instance, had previously largely been funded by those countries exporting manufactured goods to the U.S.: Germany, Japan and China; with the last-named, rather than excessive domestic consumption, attracting most attention and blame by US popular opinion for the deficit. Rising energy prices meant, however, that the basis on which the US deficit is funded changed by summer 2005, when the major energy exporting countries to the U.S. started to fund a greater part of its current account imbalance than Germany, Japan and China. The question that arises is what will these energy exporters do with the petrodollars that they earn? Are the concerns, both political and economic, of energy exporting countries different from those of the manufactured goods exporters?

What we see, since the 9/11 terrorist attacks, is a concern by Middle Eastern governments to diversify their investments away from the U.S. This shift in attitude has been encouraged by US concerns in its “war on terror” to avoid over-dependence on Middle Eastern investments, hence the debacle over the failure of the investment attempt by Dubai Ports World to take over cargo management functions in certain US ports. It is unlikely that Middle Eastern governments see other regions for their investments as anything more than alternatives to balance over-dependence on the U.S., at least for the foreseeable future. What happens over the long term, however, is more uncertain.

Looking ahead

The long term holds a number of imponderables that may upset the calculations and expectations on energy security that key players in the energy game hold today. In its 2005 global scenarios, Shell identified three energy discontinuities that cut across all the scenarios that it set out for the long term future.⁵ Two of these relate directly to energy security; the third has an apparently indirect connection today, but becomes even more relevant to energy security over the long term.

The first discontinuity is an apparent relinking of global economic growth and growth in energy consumption, reversing the delinking between energy

growth and GDP growth from the mid-1960s to 2000 as economic growth became less energy-intensive. The energy intensity of growth has increased over the last five years, which may be a hump created by the large developing countries as they move through an energy-intensive phase of their development, with the growth of their manufacturing industry and of infrastructural investment. Which growth path will these large developing countries follow and will they eventually start to reduce the energy intensity of their growth?

The new Chinese leadership appears determined to limit China’s dependence on oil imports over the long term, through achieving a more balanced mix of energy sources and addressing the demand side of the equation, by improving energy efficiency and limiting oil consumption, as far as possible, to the transportation sector. If China’s new energy policy succeeds, and if other developing countries follow the Chinese path, this would moderate demand pressures rather than continue to see them increase exponentially. Indeed, it may well be argued that the Chinese model of development is simply not sustainable in energy terms and we cannot assume exponentially rising demand for and consumption of hydrocarbon energy. Also, the possibility of a sea-change in the way the U.S. and Western Europe use fuel, particularly in transporting goods over long distances, cannot be discounted, and could result in significant savings in oil consumption.

The second discontinuity is tied to the concept of “peak oil”, a controversial concept in itself, which does not mean oil running out. But it could mean hydrocarbon energy production starting to decline, rather than continuing to rise, if investments in both conventional and unconventional hydrocarbon resources are not made in time to offset the decline in existing known conventional oil and gas resources. The issue is not so much a reserves issue, as an issue of access to resources and investment in their development. The international oil companies are having to move to invest in more difficult production areas, such as the deep offshore, as easier areas are kept off-limits by major oil producing governments. This push into more difficult areas raises the cost of supply for conventional resources, putting an upward cost pressure on prices and driving up concerns over energy security. Developing unconventional resources could help ease that pressure, but this will require major investment in their development and the technology has still to be perfected. Should

Is the relinking of global economic growth and growth of energy demand temporary?

⁵ Shell Global Scenarios to 2025: the Future Business Environment: Trends, Trade-offs and Choices, London: Shell International Limited, 2005.

unconventional hydrocarbon reserves become significant, the energy map will change dramatically, focusing attention on where unconventional reserves are located and raising a whole new set of geopolitical uncertainties.

The third discontinuity is over climate change, which the scenarios assert will fundamentally change the policy mind-set of governments and peoples over the next 20 years. There will have to be a drastic change in our consumption of hydrocarbon resources if we are to keep atmospheric carbon dioxide below a level deemed potentially dangerous for climate change. If we accept this understanding on the dangers of environmental stress and global warming, the squeeze that we see today on energy supply, driving concerns over energy security and an emerging energy crunch, could come not because we cannot develop the oil and gas reserves, both conventional and unconventional, but for another reason, the fear of global warming. It is this fear that is driving development of renewable energy and of nuclear power, but both renewables and nuclear carry their own set of problems. For renewables, intermittency and conversion into liquid fuels pose major challenges, with transport as the hardest problem to solve. Large scale biofuels raise all sorts of issues around competition with food production and water use. And nuclear power has long planning lead times and unclear cost structures.

We should, of course, expect improvements in technology over the long term. But energy saving technology takes time to develop, there is a lot of inertia in energy systems, and the benefits of new technology will be slow to take effect.

Energy security – how to achieve it?

We have looked at the key parameters shaping concerns over energy security today, and we have seen how uncertain these parameters are when we look ahead into the future. How then may energy security be achieved?

One basic way to deliver energy security is through open markets and free trade, using an incentives-based approach to let competition and markets deliver energy supply. In theory, this approach would have the highest economic efficiency. And oil, and also gas at least in its liquefied form, is a fungible commodity with a standard global price. The prob-

lem with markets, though, is that they require everyone, including the major resource holders, to play by the same rules and they will lead to concentration, determined by cost, rather than diversity of supply.

Second, energy security can be achieved through diversifying supply sources and establishing interconnected delivery frameworks. Governments need to be pro-active in pushing energy security policies, taking a longer-term view than the markets and building up diversity of supply and a measure of spare capacity. Governments, however, will need to work wherever possible within a market framework and to keep their actions competitive, rather than conflicting with each other.

Third, energy security may be sought through establishing bilateral long-term contracts between producer and consumer, with point-to-point connections and government-to-government deals to secure supplies. This would be a very dirigiste approach, with strong government control directing the actions of national and international oil companies, requiring close political alignment.

In practice, countries will use a mix of either the first and second, or the second and third approaches. Governments will be a key driver to achieve energy security in either mix of approaches.

The conclusion inescapably emerges that energy security and responding to resource pressures is, at the end of the day, a global issue which needs to be tackled through a long-term approach. Markets will need to work together with government support and direction. Diversity is key to delivering security, but we need not just diversity of supply, but also diversity of technologies, including the technology required for the development of non-hydrocarbon energy sources, and diversity of delivery systems. Here, concerns over resource pressures come together with concerns over sustainable growth; they are two sides of the same coin. Large-scale investments will be required to break the current log-jam on energy security, and long-term stable investment frameworks are needed to deliver those investments in order to tackle today's growing concerns over energy security.

Energy security may be achieved by free markets and diversified supply sources as well as bilateral long-term contracts