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Hearing on China's role in the world:
China and the Global Petroleum Supply

Introduction

Most Americans are at least somewhat aware that China is consuming large amounts of energy. But having watched China and reports about China over the past twenty-five years, I think most Americans have little appreciation for how much China's requirements for energy are likely to grow. If China continues to develop as many economists expect, it is going to need all the energy saving technologies, conservation steps, oil, gas, coal and alternatives that it can find and develop. Even then imports of oil and gas are likely to grow by large amounts. Meeting China's requirements for energy is a huge challenge with potentially huge implications. I have told companies for years that whether they plan to invest in China or not, they need to understand what is happening - including both demand and supply. What happens will make a difference for all of us and not just for companies that are thinking about investing.

Before moving to the specific questions, it may be helpful to look quickly at where China stands with respect to demand and supply for energy and oil. Both demand and supply are important and making a few points about each may be helpful in placing the answers that follow in context.

Energy Demand by Fuel
The first chart at the end of this text shows where China stands on oil and energy demand by end use as estimated for 2005. As is generally recognized coal is the dominant fuel in China overall and in the two largest sectors - power generation and industrial use. Coal and biomass are the dominant fuels in residential use, which is the third largest sector. Oil is the dominant fuel in transportation but its role in other uses remains relatively modest.

Transportation
Looking in more detail at some of these uses and fuels, oil in transportation gets most of the attention in US press reports, but without much appreciation for what is actually happening. PFC Energy's statistics show China with about 20 cars per thousand people today. The comparable number in the United States – including cars, SUVs and pickup trucks – is between 750 and 800 per 1000 people. Comparable numbers in big four Europe are more like 500 to 550 per 1000, while the numbers in Korea and Malaysia are more like 200 to 230 (per 1000) – more than 10 times the levels in China today. In this context the number of cars in China is going to increase dramatically in the next few decades and the amount of oil required to fuel these vehicles is going to grow substantially even if these cars turn out to be highly efficient. But to put this in context, does anyone really expect that China will stay at 20 cars per 1000 people?

Residential
Looking at residential use, the volume of energy consumed in China is large, growing and still largely fueled by coal and biomass. What is important in residential energy in China is urbanization – people moving to urban areas or more likely finding themselves in urban areas as cities expand or new cities are formed. Urbanization in China has been growing steadily at about 3% per year – about three times as fast as the total population. This is important because in China urbanization is generally associated with stronger growth in demand for relatively clean commercial fuels such as LPG, kerosene, natural gas and electricity. Basically that part of the population that is moving to urban areas, working in factories and living in apartments is not going to be burning a lot of coal and crop waste for heating and cooking. Again it might be fair to ask whether anyone would expect China to do something different.

Industrial
On industrial energy the key point is that while China still has a long way to go in improving the efficiency of industrial use, it has made considerable progress over the last twenty-five years. As a result it is at least possible that future increases in industrial output will require larger increases in industrial energy than has been the case in the recent past.

China's use of industrial energy was extraordinarily inefficient when reform began. During a trip to China in 1980, the group I was with spent much of our time arguing over the likely vintage of much of the equipment that we saw in various factories. In many cases the technology had to have been from before World War II. Over the past twenty-five years, the average efficiency of China's industrial equipment has improved dramatically. But this was not because China was somehow forcing the introduction of high tech, super efficient machinery. Rather it was the normal process of investment and growth – adding reasonably up to date equipment as the economy grew - that has gradually raised the average efficiency of China's factories. This process will continue but now that the average efficiency is so much higher than it was in the past, China is not likely to see the same improvement in average efficiency as the economy continues to grow. As a result, absent any dramatic shift in the mix of things being produced, the volume of industrial energy could actually end up growing faster than the government is assuming – regardless of what is laid down in the latest five year plan.

Looking ahead most of the increase in China's requirements for industrial energy will be met with fuels other than oil. Coal, gas and electricity will all play important roles. But some of the increase will be met with oil – and possibly much more than most people currently assume.

Supply
Turning to supply, fifteen years ago many were still expressing optimism that there were huge, even Middle East level quantities oil and gas to be found in the Tarim basin and elsewhere. Nobody knows but there are not a lot of companies that feel that way today – at least with respect to oil. Within China I think it was the Energy Research Institute (the energy think tank that is part of the Development and Reform Commission) that first seemed to recognize that China's reserves were limited. This was in the early to mid 1990s and it led to some dramatic changes in the government's management of the sector. One change was the decision to let the NOCs go after foreign resources starting in 1993. Another was the decision to restructure CNPC and Sinopec starting in 1998.

Implications
The point here is that China is going to need a lot of energy – including a lot of oil and gas - even if economic growth slows from the rates we have been seeing. With what appears to be limited upside in the outlook for production, China is going to need all the technology, conservation steps, oil, gas and alternative energies it can come up with. And even then it is still going to need to import larger and larger volumes of oil and gas.

1. Is China developing an alternative energy superstructure?
As shown in the second chart at the end of this text, China has a very substantial energy superstructure – starting with the State Council and continuing though the NOCs. It also has a lot of activity in conservation and alternative energy. To assess how these are interrelated I would like to focus on three things: the government's approach to economic reform and energy, pricing and two ongoing initiatives in alternative energy.

Government's approach to economic reform and energy
From the beginning economic reform in China has been marked by pragmatism and experimentation. At the risk of oversimplification the government has focused on finding policies that work in particular sectors and applying them in other sectors. In many cases these policies have involved the introduction of competition and market prices that together with ongoing improvements in China's economic institutions and infrastructure have been the catalysts for spectacular growth. But reform and especially the introduction of competition and market forces have not proceeded at the same rate in all sectors. And these different degrees of reform in different sectors have always posed problems that have often led to new government initiatives to address bottlenecks and imbalances. In many cases this has involved introducing additional reforms including market prices and new economic institutions that more often than not have worked to keep things moving forward.

From the outset energy has been one of a small number of so-called pillar industries that the government has viewed as too important to be turned over to competition and market forces. Over the past ten or 15 years many pillar industries have been liberalized at least with respect to foreign participation. Changes have also been made with respect to energy including the structure of the NOCs and the pricing of energy. But at this point the government's involvement in energy is still as great or greater than it's involvement in other industries.

To be sure China is not the first country to have greater government involvement in energy than other industries. Many of the European countries tried government - intensive approaches to energy - with state owned oil companies and the like – and I have often thought that Japan would have gone this route, if General McArthur had not required the Japanese government to allow foreign partners in oil refining when the rebuilding of that industry began in the early 1950s.

Given the importance of energy, the resource endowment China assumed it had when reform began and the precedents mentioned, it is not entirely surprising that China has approached energy the way it has – why it has been so deliberate and fundamentally cautious in its liberalization of this particular pillar industry. From time to time it has looked like reform in energy might begin to move ahead faster. Flashes of possible change included the plans to introduce market pricing starting in the late 1990s and the decision to allow the NOCs to undertake IPOs back in 2000 and 2001. But as we stand

today, things have not progressed very far. This may be changing especially as China begins to face to up to how much needs to be done on both demand and supply – including alternative energies. But at the moment, many of the things that need to be done are not being done, at least to the degree that they should be.

Pricing

Perhaps the most critical area is pricing, since market pricing means that consumers see the incentives that they need to implement the steps that are the key to energy conservation and to some extent, the introduction of alternatives. China recognized the importance of market prices for crude oil and products in the late 1990s when it introduced a system whereby domestic prices products were to move to international parity. That has now happened in the case of crude but it has not yet happened in the case of products. Prices for gasoline and diesel fuel are adjusted with reference to international prices but the adjustments are subject to long and variable lags such that international parity is never quite achieved. Over the past year or so China has again signaled its intent to move to international pricing on more of a real time basis. But it has been somewhat vague as to exactly when this might happen. The government's management of energy including pricing has always involved something of a committee approach and last year's decision to set up an Energy Leading Group – as shown on the attached chart - would seem to have done little more than increase the number of ministries that have a voice on the committee.

Under the current arrangement China has a problem with crude prices moving with international prices but domestic prices moving toward but never quite reaching international prices. This is a problem for the now integrated national oil companies when crude prices are rising and it is especially a problem for Sinopec that is the shortest of the NOCs in terms of coverage, i.e., own crude production behind each barrel of crude that it refines. Allowing product prices to move with international prices would help solve this problem and perhaps more importantly, would provide a clearer incentive to consumers to conserve or to consider alternatives.

Two Initiatives

Focusing specifically on alternatives, two initiatives that may be worth mentioning are the Toyota – FAW joint venture to produce hybrid vehicles and the Japanese and European projects that seem to be getting underway as part of the clean development mechanism (CDM) under the Kyoto Protocol.

With respect to the first, the specifics are that Toyota of Japan and FAW (First Automobile Works), China's largest automobile manufacturer, are now in a joint venture that is producing hybrid vehicles, more or less along the lines of the vehicles that Toyota has been selling in this country. As I understand it, production volumes are still rather small – something on the order of 3000 units a year – and the cars are not inexpensive – something on the order of $37,000 or so. But the potential is enormous. If this venture is successful and hybrid vehicles catch on, China may end up with more cars, sooner, than otherwise. But if each of these cars uses less fuel, the net effect on energy demand in China should be a good deal lower than it would be otherwise.

With respect to the second, the specifics are that with the Kyoto Protocol coming into effect, European and Japanese utilities and specialized investment firms are beginning to invest in China and other emerging markets within the framework of the agreement's clean development mechanism (CDM). This is the arrangement that enables these

companies to earn emissions credits that they can use or trade with other companies in countries that are subject to the Kyoto Protocol's restrictions on emissions of greenhouse gases. When this approach was first proposed in the early 1990s many expressed the view that China would not want to participate in such an arrangement. But as long as the CDM does not carry any commitments to reduce emissions by the county where the investments are made, it was never clear why China would not welcome an infusion of investment and technology that would reduce energy consumption and especially, the use of fossil fuels. I have not been involved in any of these CDM projects but from what I have read, the number of projects being approved is growing quite rapidly. Clearly we need to remain skeptical until we see how these projects work out – including how the proceeds are shared and how large the volumes might eventually become. However these projects work out, the amount of activity would seem to be an indication of what might be possible if China were to allow its energy prices to be determined by market forces.

Caveat
I should probably add that market forces are not necessarily all that China requires to move more effectively in addressing its energy challenges. One of the reasons that penetration by LNG is not proceeding faster is that industries in the urban areas along the coast are reluctant to pay international prices for gas – especially when coal is available at much lower prices. Given the problems with local air quality, China faces a classic public good / private good problem in which the answer is probably higher taxes and higher prices for coal. Getting this done is not going to be easy but my feeling is that it will have to happen.

2. How will China's strategy affect the global market supply?
If the question is how the continued development of China's economy will affect the global demand and supply for oil, the answer is pretty clear. If the question is how the specific strategy that China uses to secure more oil will affect the global market, the argument may be a bit more complicated but the answer is largely the same.

Basically, China will be a large net importer of oil for years – probably decades. How large? No one knows but about ten years ago I did a survey of forecasts that showed that among institutions and companies that do these things, the consensus was China would be importing about 4.5 to 5 million barrels a day (MBD) by 2010. Looking at where we are today, the number is probably a bit higher by 2010 and maybe 9 or 10 MBD by 2020. Looking at the old forecasts I think most forecasters were too high in their projections for growth in GDP in the late 1990s. Most were then too low in their projections for growth in GDP since 2002. Depending on what happens with the world economy and China's, the current forecasts will change but the numbers cited are probably reasonable bases for planning.

What China does to secure this oil may be important but not for the question of what its net requirements will mean for global demand and supply. The demand / supply balance will almost certainly be tighter than it would have been if China had grown more slowly. The fact is that the same could be said for the US or anywhere else that is a major net importer.

To expand on this a bit - a couple of years ago we were asked whether it would make any real difference for Japan whether the long discussed oil pipeline from Siberia went to Daqing in north east China or to a port on the Pacific Ocean (Nahodka), where the oil

could be shipped to Japan or anywhere else. Our answer was that from a consuming country perspective, the important thing was that the pipeline be built and the oil produced. Both China and Japan are going to need oil from somewhere and if the oil is not produced in Siberia, the call on the world market will be greater than if it is not produced. If the oil is produced, the call on the world market will be lower regardless of whether this particular oil moves to China or to Japan.

3. How does China leverage the use of "private sector actors" to secure oil resources in other countries?

Presumably the "private sector actors" referred to are China's three national oil companies – and the other government controlled entities – Sinochem, CITIC and the two or three others - that seem to be competing for the designation of China's fourth NOC. At this point these companies compete with each other – and many of them have corporate components that have public shareholders. On the other hand most of the senior managers are government officials and many of these companies provide substantial levels of social welfare services for their employees and former employees. All in therefore I would not want to go very far in calling these "private sector actors".

Let me comment briefly on what is happening with the major NOCs, their experience and strengths and finally what I see as their leverage.

NOCs

The three national oil companies have different backgrounds and functional strengths. Historically CNPC / Petrochina was focused on the upstream – exploration and production in the onshore areas in China; Sinopec was focused on the downstream, refining, distribution and marketing and petrochemicals and CNOOC was focused on the upstream offshore and more recently, LNG. Since 1998 each of these companies has broadened its functional portfolios with the result that all three now have at least some participation in most if not all of the functions that are normally associated with an integrated petroleum company. The degree of integration varies from one NOC to the next but each has been heading in the direction of greater integration rather than specialization. In addition, while CNPC / Petrochina was first, all are now engaged to some degree in foreign exploration and production.

Experience and strengths

In terms of experience and strengths each of the major oil companies is in a somewhat different position. CNPC / Petrochina brings long experience in the upstream – especially onshore; Sinopec brings a strong position in the Chinese downstream and petrochemicals and CNOOC brings experience in the offshore plus some recent experience in LNG – both upstream and downstream. None of them brings the same technological capabilities as the best of the IOCs. But all three are working to improve their technological capabilities and these will get better over time.

Leverage – Access to Market

Where the leverage comes in may be the access that these companies can provide with respect to the Chinese market. To be clear, in a world in which petroleum markets are reasonably tight, none of the oil exporters will have any trouble selling their oil to China or anyone else. In this context what the Chinese NOCs can provide is not simply outlet for crude but rather the opportunity to participate in the downstream value added that results from refining and marketing or from the production of feedstock for petrochemicals. I don't know that anyone knows for certain whether any foreign

company – IOC or NOC - can make a satisfactory return participating in these activities in China. But the way things are structured today, that is what the NOCs can offer and what many foreign producers are likely to find attractive. Finding opportunities to invest in the downstream business is not a big deal in much of the world but finding opportunities to invest in a downstream or a petrochemical industry that is growing as rapidly as China's, may be different.

Leverage – Government Backing
Another important leverage comes from having a government standing behind these companies that has the financial resources and the willingness to use those resources to back their bids for other companies or for access to acreage in areas that are believed to have potential. This was an important issue in the contest between CNOOC and Chevron for Unocal. And it is likely to be a continuing issue now that China's international reserves are about to reach one trillion dollars. Paying too much for resources, if that is what they are going to do, rarely makes sense but if you have the financial capability and resources are limited and available for all to bid, it is hard to criticize the Chinese for doing what many consuming countries would like to do to increase what they see as security of supply. And, as indicated above, as long as China is going to be developing resources to satisfy its own requirements, it is not clear how their paying too much is going to damage the rest of us over an extended period of time. Basically, if the world's oil resources are going to remain concentrated in a small number of countries, the fact that China has huge financial reserves that it is willing to use to help secure oil for its own use, would not seem to make things a lot more serious than they already are.

4. To what extent does China use diplomacy, aid and other political means to secure energy resources?

China's approach to securing energy resources is a combination of participating in the international market for resources that I have commented upon above plus diplomacy, aid and other political means that are the subject of this question.

My political scientist colleagues have constructed a view of how China approaches the world that makes a distinction between the areas that are immediately adjacent to China and where China can exercise a fair amount of power and areas that are beyond that where China must use diplomacy, aid and other political means to secure its objectives. Given the limited reach of China's military today, this second area accounts for most of the world and certainly most of the reserves of oil and gas that China would like to secure. The answer to question #6 – and the last paragraph in this answer - will focus on the nearer areas; the next several paragraphs will focus on those areas that are farther away.

Diplomacy, aid and other political means
With respect to the farther areas, the interesting question may be exactly what China does when it uses diplomacy, aid and other political means to secure energy resources. In the case of Sudan of course China is simply willing to invest in a country that most countries and their IOCs will not have anything to do with. But what about other countries that face the possibility of finding themselves cross ways with the UN or American sanctions? Can China with a permanent seat on the UN Security Council or substantial holdings of American government debt provide a defense against sanctions that will buy itself something in terms of security of supply? For years I think most analysts believed that there was something to this view. But the longer we go without

China actually using its veto; I sense that this view may not be as strong as it was. Maybe China still gets some mileage from the likelihood that it can discourage the use sanctions – but the point is that this may not be as strong an argument for involving China as a partner say in E&P than it may have been thought to be in the past.

Business Ethics
Another area that warrants mentioning is business ethics and the fact that Chinese NOCs do not operate under something comparable to our Foreign Corrupt Practices Act: Years ago I would have said that this was an advantage for China. Short term I think it can still be an advantage when the issue is access to acreage. On the other hand when the objective is to operate over an extended period of time, as it is when you get into production, I think the American approach probably works better. If a country needs your technology and knows that you are playing by our business rules, I think that probably leads to a better long-term outcome.

South East Asia
One area in particular where I think China's diplomacy, aid and other political means have been effective is in its relations with South East Asia. The clearest example of what China has done in this regard was its decision not to devalue the yuan during the heat of the regional financial crisis in 1997/98. Most experts were predicting that China would devalue which would have led to further rounds of devaluation – and made the situation that much worse. Growth in China's exports in recent years has certainly caused problems for many of these countries but most are now adjusting and are depending on the Chinese economy as one of the primary destinations for their exports.

Several countries in the region have oil and gas. But the most important thing that China has accomplished involves the physical security of the sea-lanes that it will need for its imports from the Middle East. With so many countries in the region now benefiting from their role as suppliers to the Chinese economy, I think the odds on China running into problems in say moving oil through the Malacca Strait and up through the South China Sea are much lower now than they might have been say ten years ago.

5. In light of China's growing demand and acquisition, what would be the most appropriate strategy for the US to use to secure oil?

Basically I think Americans and our government leaders in Washington need to do more to understand the world energy situation including all of the things that are impacting world demand and supply. The fact is that almost anything we do to reduce demand or increase supply in this country – and anywhere else in the world including China - will mean easier balances and probably lower prices.

The balance of this will be a few brief points on US energy policy, energy relations and reciprocity with China.

US Energy Policy
Whatever we think about energy developments in China, as the world's largest consumer, the US should do much more to encourage conservation. Conservation is absolutely critical and I cannot emphasize strongly enough how poorly we have done in communicating this point to the public. It was not the oil companies that came up with the idea that we should take all of the improvements in engine efficiency over the past who-knows how many years and apply them to powering bigger and bigger vehicles. And having Congressional hearings every time the oil companies report their profits

does not really help in so far as it blocks out the message that it is all of us with our energy intensive lifestyles that are responsible for our high levels of consumption. On the supply side there are a lot of things that should be done including allowing the construction of terminals to allow the importation of LNG and looking very hard at politically attractive but economically questionable alternatives such as ethanol.

Beyond this, I think there is clearly merit in having a world-class navy – as long as we are going to be importing large volumes of oil and gas from long distances by sea and in having a reasonable number of world-class international oil companies and independents that are financially strong and have the world's best technologies. This is the case today, if we include the European companies in my best technologies category. And the way that Washington can be most helpful is by not making it more any difficult to maintain our leading edge in financial strength and technology. No one is looking for expressions of affection but our energy situation will not be helped by an excess profits tax.

Energy Relations with China and the rest of the world
As far as our energy relations with China and the rest of the world, I think we would all like to see an international market in which energy traded on the basis of supply and demand and without huge premiums for political risk. Beyond this in terms of our energy relations with China I think both sides need to recognize that there are tensions between each of us and other countries including countries that are major energy producers such as Iran and Venezuela and that each of us would be better off if our actions to secure energy could be managed in a way that did not make these tensions any worse.

Reciprocity with China
*F*inally, in terms of the way that the US interacts with China I think there is a case for greater reciprocity and fairness in terms of access to markets and resources. This is not the place to discuss the specifics of the US government's response to CNOOC's effort to acquire Unocal. But I do not think we can dismiss the possibility that whole matter might have gone more smoothly, if US IOCs had more opportunities to participate in the Chinese energy industry. As Japan and other countries learned long ago, US companies do have something to contribute – even in functions as basic as distribution and marketing. China will eventually learn this but it would be nice if it did not take another twenty years.

6. How are China's territorial claims linked to its domestic energy security?
The areas of interest here are the waters between China and Japan and China's claims in the South China Sea. This last would include not only the Paracels and the Spratlys but also everything else between the Paracels and the Spratlys in the north and say Natuna Island in the south. Some of these areas are currently producing oil and gas but many have not been explored in part I assume because of competing claims. So what will China do? My guess is they will continue to do what they have been doing – watching what is happening, looking for opportunities for joint development and not doing much else unless other claimants show signs of acting unilaterally. Doing anything else is not likely to be cost effective, especially if the implication is military action. Costs of military engagement aside, China has made a huge investment in building its reputation as a constructive regional leader and anything it does in the way of unilateral action in this area is going to upset a lot of its neighbors – not to mention the United States.

Japan is somewhat different in that the basis for the conflict is deeper and more sensitive politically in both countries. While I have never seen anything to indicate that there is enough oil in this area to warrant a conflict, I am not sure anyone knows this and thus I do not think we can be confident that the two sides will not yet stumble into something serious.

Chart 1: China Energy and Oil

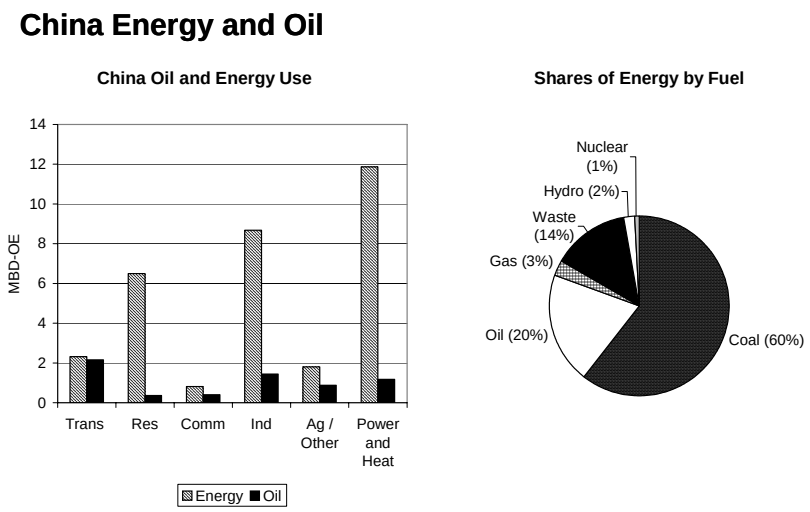

Chart 2: China Energy Infrastructure