

# **DNI-PRIVATE SECTOR WORKSHOP ON FUTURE CHALLENGES FOR SUPPLY, DEMAND, AND SECURITY IN THE GLOBAL ENERGY<sup>1</sup>**

*Carnegie Endowment for International Peace  
1779 Massachusetts Avenue, N.W.  
Washington, D.C.*

*November 6, 2006*

## **SUMMARY**

*Demand for energy is expected to continue to rise over the next two decades, particularly in the developing world. While no clear peak in oil supplies is coming in the next 5-10 years, access to reserves, rising costs, and other factors will slow production growth, leading to higher prices. The trend toward national control of energy resources is expected to continue, due in part to high oil prices and the perception that previous agreements are restrictive. National Oil Companies (NOCs) dominate the reserves of the world, but most are unable to technologically exploit them without assistance, leading NOCs to partner with Independent Oil Companies (IOCs). Key consumers will be the United States, the EU, and Asia (China, India, and Japan). Key suppliers will include the traditional sources in the Middle East, Russia and the Caspian region, and Africa, along with Canada and Venezuela.*

*Energy demand and policies in China, India, and Russia will be key determinants of global energy developments in the next two decades. China is expected to impact the energy industry more than any other country, with coal remaining its backbone. India's rapid growth has shifted its strategy from one of self-reliance to a focus on energy security, with its foreign policy adapted accordingly. Russia has played politics with its energy resources, domestically, in its near abroad, and increasingly in Asia, and is likely to continue to do so to further its national interests.*

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<sup>1</sup> This paper provides a brief summary of some of the key points raised in this Workshop on Future Challenges for Supply, Demand, and Security in the Global Energy Marketplace, which was held at the Carnegie Endowment for International Peace on November 6, 2006. The Workshop was sponsored jointly by the Center for Strategic and International Studies, the US Chamber of Commerce, the Business Roundtable, the Intelligence and National Security Alliance, the Office of the Director of National Intelligence, and the US Department of State's Bureau of Intelligence and Research. This Workshop was organized to solicit the views of non-governmental specialists and to facilitate the exchange of views between the outside specialists and government officials. The workshop was conducted on an unclassified, off the record, and not for attribution basis. The views expressed in the discussions and in this summary are solely those of individual experts who attended the workshop and do not necessarily reflect the analysis, views, or opinions of any individual speaker, company, consortium, or US Government agency.

### *Future Trends in the Energy Sector*

It has been said that while other industries have globalized, the oil industry has headed the other way; the world is not flat in oil. Rules in the petroleum industry have changed dramatically over the past 150 years and are sure to change in the future, making it extremely difficult to predict what lies ahead for the energy sector. To a large degree, exporter states will help to define the new rules of the game. Several countries, including Algeria, Bolivia, Russia, and the U.K., have taken steps toward greater state control. Because of high oil prices and perceptions that previous agreements are restrictive, this trend is likely to continue. Overall, the effect will narrow investment opportunities for Independent Oil Companies (IOCs) as NOCs attempt to use competition to extract better conditions for themselves.

According to one speaker, “hydrocarbons will reign until 2030.” No clear peak in oil supplies is coming in the next 5-10 years, but access to reserves, rising costs, and other factors will slow production growth, leading to higher prices. The lowest surplus capacity in 30 years occurred in 2004. Countries with sanctions and hostilities do not have the ability to bring production back on line, and five to six choke points handle half the world’s oil. Typically, there is a dip in 2<sup>nd</sup> quarter demand because of the transition between heating and driving, but recently there was no dip. This means the market is becoming tighter.

Conference participants identified a number of threats that could lead to oil disruptions and higher prices in the next several decades. In addition to natural disasters like Hurricane Katrina, wars, civil strife, and terrorism were identified as major concerns. The recent failed attack on a Saudi Arabian facility showed that sophisticated knowledge exists about where to strike to hurt the West economically. Strategic stocks could be threatened by a major attack on a key facility. Boundary disputes will remain a challenge to the supply, production, and exploration of energy. According to one speaker, with climate change, the Arctic is a likely area for future boundary disputes, and Antarctica may be an area of concern in 50-75 years.

According to several participants, in the future the world will need to take meaningful steps to reduce carbon emissions in response to climate change. By 2020 CO<sub>2</sub> emissions are projected to rise by 40 percent, with 50-60 percent of those emissions contributed by the developing world. One speaker argued strongly that unless Kyoto is global, it is not going to work and that solutions to the carbon issue need the participation of the developing world. Concentrations of CO<sub>2</sub> could double by 2060, and this may be the level that triggers significant climate change outcomes. A combination of technology, energy efficiency, and policy action is key to addressing this issue. Breakthroughs in new technologies remain a wild card that could significantly affect the energy markets.

The increased demand for energy will drive the investment cycle for energy companies and will be the baseline for their investments. When considering exploration, energy companies look at four risks: geological (are hydrocarbons present?),

technological (can they be accessed with available technology), commercial (at what price and under what terms to assure a favorable return on investment), and political (what threat does the political climate, or possible political changes, pose to projects and investments and can those risks be managed?). Future challenges for investment are likely to include such factors as political tensions and new geopolitical alliances; the supply reliability and price predictability -- the issue is producibility and deliverability not resource size; increased environmental sensitivity and climate change; new nations with new instabilities (e.g., ethnic separatism) that have emerged after the end of the Cold War; power shifts to areas with strategic commodities; succession issues in many nations; human rights and distributive (wealth) issues; HIV/Aids, poverty, and cultural concerns; terrorism and threats to facilities and transit choke points; challenges to contract sanctity; and political hostility to the United States and its foreign policy.

The petroleum investment cycle is unique due to its scale (\$6 trillion globally), complexity (deep water, etc.), and the range of risks. Other constraints on investment spending include higher raw material prices for steel, copper, etc., which increase the cost of projects; limited availability of skilled workers; and lack of access to investment opportunities. Nevertheless, one speaker argued that IOCs will continue to invest a great deal in exploration and infrastructure, but they have access to a small percentage of the world's oil. Since the 1970s, 180 oil companies have nationalized, but in general they do not invest a great deal. As a result, at some point, their infrastructure will be affected negatively and this could cause a dip in supply.

One participant noted that there seems to be somewhat of a resurgence of interest in nuclear energy, despite such hurdles as the disposal of spent fuel. Today, 16 to 17 percent of the energy mix is nuclear, and with growing interest in Europe and Asia it may stay at that approximate level through 2020. Another participant argued that the idea of import dependence is overstated, especially as more gas comes on stream. In the long run increasing fuel efficiency will be more important than greater use of biofuels or other alternative fuels.

The participants identified seven key emerging global energy trends:

- Acceleration in growth of global energy demand for power generation and transportation uses;
- Drivers for fuels of choice will be economic, environmental, and security;
- Constraints on producibility, conversion, and deliverability – the “above ground” issues;
- Changing global energy map with increased concentration of supply and demand growth centers not co-located; new emphasis on delivery infrastructure and choke points;
- Resource nationalism, the evolving role of National Oil Companies and bilateral alliances;
- Political instability and terrorism, and;
- Global climate change and emissions growth.

Five imperatives for an effective future energy policy were identified. These are addressing all forms of energy (including renewables) and demand (including improved efficiency and conservation); encouraging investment in strategic facilities and infrastructure, as well as research for new technologies; thinking globally and encompassing security, foreign policy, environmental, and economic considerations; and focusing on transportation and power generation/transmission as priorities. Strong political leadership must accompany all of these imperatives.

### ***National Oil Company Trends and Implications for US Energy Security***

NOCs dominate approximately 70-80 percent of the world's oil reserves. In general, NOCs do not pose a serious threat to U.S. energy security, but there is reason to be concerned. Some NOCs lack a commitment to transparency and good governance and many are reluctant to invest in future production to meet anticipated demand, even when prices are high. Tensions in government-to-government relationships increase the potential for political spillovers affecting production, and it is difficult to isolate resource-rich rogue states.

In general, NOCs benefit from resource nationalism, but they also often are encumbered with domestic obligations such as the expectations of low fuel costs and for support for social programs. On the other hand, NOCs don't face the constraint of shareholder pressure and they have the advantage of being able to operate in countries where western Independent Oil Companies (IOCs) can not for political reasons.

NOCs, in general, are less efficient than IOCs and they often have to deal with challenges related to technology, development and management of infrastructure, security (especially terrorism), and supply chain management. Although NOCs control access to much of the world's oil reserves, some of these reserves are in places of extreme technological challenges. In some cases, only IOCs have the capabilities to get at the resources. IOCs now replace less than 100% of their reserves, but they provide critical technology to less efficient NOCs and still control large shares of production.

The role of NOCs and their relationships with IOCs in the global energy market is evolving. Some IOCs are looking at NOCs that move outside of the home country as potential partners. China is an example of where NOCs are looking to move downstream, and Western countries that want to break into the downstream market in China as well see opportunities for cooperation. Looking to the future, new hybrid models of NOCs may emerge. Brazilian Petrobras, for example, is only 30 percent state owned and it is traded publicly.

### ***China***

Rapid economic development and increased demand for energy in China will have a major impact on the global energy industry. China will continue to seek external supplies for oil, gas, and coal to meet these growing needs. Coal production could rise from 2 billion tons to 3-5 billion tons by 2020, but there are concerns about whether

China's rail network could handle that kind of increase. The environmental impact of coal and increased vehicle use will be a focus of attention. Bottlenecks in transportation and rising energy demands also may exacerbate security concerns for China.

Coal is the backbone of the Chinese economy, and rail, which is interlinked with the coal industry, has not kept up. Frequent mine accidents reflect a stress on the industry. A move toward nuclear energy could help ameliorate the coal bottleneck issue, and the government hopes to build 40 nuclear plants by 2025. However, the contribution of nuclear to power production will remain small because China is boxed into coal for decades to come. All new power plants are coal-fired with few exceptions. With the high expectations of economic growth, China has no viable alternatives. Coal is China's biggest pollutant and getting worse. An important indicator of China's success in reducing pollution will be the amount of progress they make toward the goal of a "green Beijing" for the 2008 Olympics. If they don't make significant progress, the outlook for the future is bleak. This dependency presents an opportunity to work on clean coal technology with the U.S.

Oil imports are up 15% this year in China and most forecasts say demand will continue to rise sharply, primarily due to increased vehicle use. Use of oil for transportation is expected to rise to 50 percent, with 120-170 million vehicles forecast by 2020, although some estimates are as high as 300-400 million. Half of oil imports in the future are expected to come from Middle East, as they do now, but China will increasingly look to Africa, Russia, and other diversified sources.

China's bureaucracy is an impediment toward meeting its energy challenges. The authority of its institutions on energy-related matters is divided among multiple agencies, none of which is subordinate. Coordination problems exist, and there is no central body of power to create goals. There is a lack of human and financial resources for independent policy analysis. Also, some individual firms are stronger than the "bureaucracy." The coal and electric industries are strong locally, and oil is stronger nationally, with greater financial resources and political power.

The energy crisis of 2003-4 was a catalyst for change in China's energy bureaucracy. The government created the "Energy Leading Group (ECG)," which is an important first step toward improving energy governance. This indicates that the leadership is committed to improving energy governance and communication, and it provides a vehicle for crisis management. The influence of energy companies remains strong, however, and other reforms are necessary, such as in the sectors of energy reporting, prices, legal framework, and governmental agency funding. Corruption in politics is likely to remain a serious problem, especially at the local levels.

### *India*

India is shifting from a goal of self-reliance as an energy strategy in the 1990s to one of energy security. Three crises -- the 1960s famine, the green revolution, and a financial crisis in 1990s -- led to the shift. Economic growth is now at eight percent

annually, compared to the previous three percent that India believed it could sustain forever. This rather dramatic growth obviously will require more energy. India is seeking to diversify and manage its supply and demand with mixed success. Coal remains India's primary source of fuel, but the focus is on gas for electricity. Reforming the electricity boards will be difficult but crucial. Better distribution is needed, and public-private ventures seem the best way to succeed.

Energy policy is difficult to change in a democracy like India where state intervention is predominant in energy markets and voters are wooed by promises of free electricity. In India, poor people vote more often than other groups, and they have optimism in the political system. As a result, almost all energy consumption is subsidized. The government talks reform, but it seeks to avoid public debate on change. As a result, reforms move forward slowly, if at all. With a state-dominated economy, control over pricing policy keeps the hand of government on the energy sector and price policy will be resistant to change.

A key to going forward will be obtaining adequate supplies of natural gas. Essentially, two options exist: LNG via ocean or via pipelines from neighbors. Managing foreign policy adroitly will be crucial, and the role of the Indian navy in securing natural gas sea-lanes likely will emerge as an important issue. Another capacity-building area is refining, with India looking to export refined products. Also, coal-based methane may emerge as an important alternative in 5 to 10 years.

Indians are convinced that economics is the key driver of foreign policy, primarily focused on energy and secondarily on investment. Diversification of its foreign policy will be key. As Indian foreign policy has evolved, the U.S. has emerged as India's most important external relationship. Despite deep suspicions, India would like to improve relations with China as well.

### ***Russia***

Russia will be an important energy supplier and consumer in the future. Energy has been used frequently as a political tool by Russia, both domestically and internationally. Domestically, there are complex competing dynamics in the Kremlin for control of energy resources. Asset distribution following the fall of the USSR has influenced the political process since the early 1990s, leading to conflict between those key individuals who want to protect what they have and those who were left out and want in. According to one speaker, Russian national strategy is their personal strategy, and some intermediary companies are criminally connected, enriching those involved. Advisory bodies and tax audits have been used by Moscow to exert pressure on companies and projects at home and abroad.

Many countries play politics with energy, but Russia has been especially bold in this regard in recent years – but not always successfully. When Russia cut off gas to Ukraine in early 2006, it lost respect internationally and alienated Western Europe, and in the end Ukraine was not hurt. Russia continues to depend on the Ukraine as a transit

point. Russia's energy likely will continue to be used for geopolitical purposes, though its actions often are more about money than politics. Western energy companies that have invested in Russia have been pressured to give up majority stakes in oil and gas fields to Kremlin-controlled companies. Increasingly, Russia is looking eastward and would like to export more gas to China. Japan also would like more energy from Russia, but their strained historical relationship makes Russia a source of questionable reliability.

According to a one speaker, money and private interests will remain key drivers for energy decisions in Russia. The speaker also argued that unless the Russians move to diversify its distribution networks and customers, they themselves could be subject to political manipulation. Simply by controlling a pipeline, host countries can have major leverage over Russia. In the future, Russia might continue to play politics with some of the former Soviet states (currently Georgia, Azerbaijan, and Belarus are feeling these pressures), but probably not with the West, for whom it would like to be viewed as a safe and reliable supplier. Nevertheless, since Russia supplies anywhere between 30 and 100 percent of the gas consumed by EU countries as well as much of their oil, there is pressure to agree on a common EU energy strategy or policy for responding to possible future Russian energy challenges. Reducing Russia's hold over European energy supplies would require difficult and costly measures such as new terminals for importing liquefied natural gas or new pipelines to transmit oil and gas from Central Asia and the Caucasus to Europe. Russian resource wealth is enormous, but its infrastructure is being neglected and depletion rates average seven percent each year. Long-term prospects are better, but only with the development of production facilities in Siberia and offshore.

*December 28, 2006*