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Securing Asian Energy Investments: Geopolitics and Implications for Business Strategy

Conference Report, September 11-12, 1997

MIT JP 97-11

Energy and Security Working Group of the Center for International Studies and the MIT Japan Program

Report compiled by Jennifer M. Lind, Energy and Security Working Group and Department of Political Science

Center for International Studies
Massachusetts Institute of Technology

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I. Introduction

The strategic significance and rapidly growing economies of Asia make the region one in which the vital relationship between energy and security is magnified. In the early 1970's, Japan led the first East Asian economic “miracle,” followed by a generation of Asian “tigers” the Republic of Korea, Singapore, Hong Kong, and Taiwan. A third generation of countries transformed by economic growth in the late 1980's, Thailand, Malaysia, and Indonesia, was close behind. Throughout this period of profound regional development, after the reforms of Deng Xiaoping in 1979, China grew at double-digit rates. The future of China's domestic and international politics as a result of its stunning economic growth now looms as the key question in international affairs of Asia.

Economies are engines, and engines require fuel. Asia's spectacular economic growth has led to the explosion of energy demand in the region. MIT Professor Richard Samuels observed in the introduction to the conference that Asia accounts for a quarter of global oil demand but holds only a tenth of its supply. With the continued growth of the Chinese and other economies, Asian

demand is expected to rise to 40 per cent of global energy demand by 2005. The good news for investors and energy suppliers is that the Asian economies will spend an estimated \$1 trillion on energy infrastructure during the next decade.

In speculating where Asia's energy will come from, and how they might secure it for their citizens, some analysts have considered some disturbing political and economic implications.¹ They suggest that China's burgeoning demand could lead to higher world market oil prices. Some analysts also wonder if the search for energy will lead Asian countries towards expansionism: they single out China, until recently an exporter, now imports most of its oil. How would states in the region react to acts of aggression? Will Asian populations, increasingly reliant upon and accustomed to the energy that fuels their economies and their lifestyles, may accept the bullying of weaker neighbors? Would the United States be asked (or feel compelled) to intervene? U.S. policy makers worry about bedfellows brought together by mutual needs: they observe that China, in need of oil, has moved closer to Iran, with its desire for nuclear technology, and to Russia as well. Is there a negative side to Asia's explosive economic development? What are the potential security concerns resulting from the region's search for energy?

In the conference "Securing Asian Energy Investments: Geopolitics and Implications for Business Strategy," there emerged a discussion of Asian energy and security issues in the realm of the known versus those unknown: what we

know versus what we do not. Conference participants challenged folk theories and conventional wisdom about energy and security in the region, and several clear themes emerged.

II. Energy Knowns and Unknowns

A. *What We Know*

The facts on Asian energy start with the disparity between supply and the extent to which demand is increasing. Professor Angang Hu of Tsinghua University noted that although China is rich in coal and hydroelectric power, it is poor in oil and natural gas reserves. Sustained economic growth (Hu forecasted over seven percent growth rates being maintained even until 2020) will create even greater demand for the resources that China lacks. Thus a major known factor is the extent to which China and Asia as a whole will be looking for more and more energy supplies. Professor Hu also noted that Chinese energy use is less diversified (being singularly dependent on coal) than virtually every other major state.

¹ Kent E. Calder, "Asia's Empty Tank," *Foreign Affairs* v. 75, no. 2 (March/April 1996), pp. 55-69.

The CIA That Cried Wolf, and Other Stories

Despite the concerns expressed by some analysts and the press, however, global oil supplies are rather secure. The oil crises of the 1970s created fear in Western minds that their nations' economies and lifestyles were hostage to their dependence on Middle Eastern oil supplies. Various forecasts in that decade, including one by the U.S. Central Intelligence Agency in 1977, predicted that the world's oil reserves were reaching their peak, and that the world would be drawing from wells that would soon run dry. Michael Lynch, Executive Director of the MIT Energy and Security Working Group, pointed out that the world has hundreds of years of oil resources: new fields in Latin America, the former Soviet Union, the North Sea, Canada, and even increased production in the United States. It seems that oil supply is not a long-term problem for the world nor even for a "thirsty" Asia.

Lynch discussed the concept of a oil *crisis* by pointing out that it is not a lack of oil, but a short-term disruption: an economic, not an energy problem. Oil crises lead to higher prices and corporate losses that may weaken, but not stop, economies. Other speakers, such as Guy Caruso of the International Energy Agency, joined Lynch in noting the importance of crisis management by Asian governments. As energy consumption rises, so does dependence and thus so does vulnerability. Plans by governments to manage vulnerability not only reassure economic actors within their countries, but reassure other countries that

an energy-desperate nation will not look avariciously to its neighbors for fuel. Crisis management of energy supplies, then, has implications for both economics and security. Caruso noted China's interest in an oil stockpiling program, pointing out that it is a positive sign precisely because of these reasons.

One energy "known," then, is that world oil resources are plentiful enough to meet Asian demand. Unlike the studies that emerged following the 1970's crises, and contrary to conventional wisdom, the problem is not an "empty tank" but of developing international policy approaches to access a tank that is sufficiently full.

A Capital Idea

Another known quantity in Asian energy issues is the importance of access to capital for building new power sources and for improving energy efficiency in the region. Many of the speakers discussed the role of capital in procuring new technology and how this would affect energy supplies and efficiency.

MIT Professor Kenneth Oye noted how far most Chinese industries have to go in terms of modernizing their outdated equipment; access to capital will give companies the ability to finance the acquisition of new technologies. Much of the needed technology currently exists, says Oye; acquiring it is a matter of liberalizing capital markets and changing structural economic incentives. For

example, technology for washing coal and then recycling the water currently exists, but China does not have it yet. Moreover, although more of China's industries are being managed according to commercial principles, Oye noted that advances in management will go only so far. The contextual economic incentives facing entrepreneurs will create an environment that either encourages or discourages investment; the Chinese government is responsible for economic reforms that encourage investment, and for capital market liberalization that provides firms with the necessary funding. Changing incentives to entrepreneurs and liberalizing capital markets to attract investors will go far in promoting the transfer of technologies that China needs.

Oye observed that in addition to increasing efficiency, such liberalization will benefit the environment, and China's relations with nearby countries as well. A cleaner, more efficient use of coal will reduce the acid rain that China is currently sending to its neighbors. MIT Professor Karen Polenske pointed out that China is currently the second-largest contributor to greenhouse gas emissions, or one-seventh of the global amount. She agreed with Oye: opening up the Chinese economy to new capital will have a major environmental effect: new equipment tends to be less polluting than the 30-40 year old technology on which China currently relies.

Although the \$1 trillion figure needed by Asia for investments in energy sources seems formidable, conference participants agreed that the capital is available, and that market liberalization and legal transparency rather than

capital supply, are the key issues. Former Caltex Chief Economist Dennis O'Brien noted that capital was plentiful and any good project would receive funding. Agreeing, Caruso suggested that creating the proper environment to attract foreign capital is more important than any capital shortage. He invoked the example of Thailand's electricity industry, where the problem is finding good projects and qualified people to run them.

Caruso observed that sale and privatization of public utility assets to private investors was key for developing the Thai electricity industry, and that independent power projects (IPP)s played a major role in increasing Thailand's energy supplies. IPPs generate electricity for sale to utilities or to retail customers. Also examining the role of IPPs, MIT doctoral candidate Peter Evans looked at their role in supplying China. He noted that China increased its electricity supply by 16,000 megawatts last year, and that overall, Asia invested \$9 billion in IPPs. At present, he said, most IPP projects are country specific. But he added that once there is greater capital liberalization and regulatory convergence among Asian countries, IPP projects will become more fully multinational.

What emerged from the conference, then, was the consensus that capital plays an essential role for the development of Asia's energy supplies. This capital is plentiful and available, as is the technology needed by many Asian countries. What disrupts the proper allocation of capital and the transfer of needed technologies, then, are restraints on investment and political structures

that create disincentives for technology acquisition. The promotion of capital market liberalizations and economic reforms to encourage investment has many benefits: in addition to economic efficiency, improved environmental conditions that benefit not only single countries, but their neighbors as well. O'Brien suggested that these sorts of smoothly functioning markets are the best guarantee of security in the region.

B. Energy Unknowns

Although conference participants discussed many known quantities in the issue-area of Asian energy, the influence of other factors remains very much unknown to us at this time. These include future potential energy sources, relative prices, and whether Asian nations will reconcile political and economic issues between them so to take advantage of the benefits of cooperation.

Supplying the Future

The question of future energy sources was raised by several conference participants. Tadahiko Ohashi of Tokyo Gas Company drew our attention to candidates for future exporters of liquid natural gas (LNG): Australia, Papua New Guinea, Alaska, Indonesia, and Russia, as well as non-Asian nations Oman and Qatar. Tim Forsyth of the United Kingdom's Royal Institute of International

Affairs discussed four key sources of gas and oil in Northeast Asia: East Siberia's Irkutsk and Krasnoyarsk regions, the Sakha Republic, the Sakhalin Islands, and the far west of China such as the Tarim Basin, and neighboring countries like Turkmenistan.

Forsyth and others noted that development of these regions was anticipated to have great potential for meeting Asian energy demands, but that the international cooperation required for development would require surmounting political tensions between nations. Tadahiko Ohashi agreed that development of a Russian pipeline to Northeast Asia was economically feasible, but politically difficult. For example, Japanese dependence on imported energy, and Japan's goal of finding stable sources of supply, fit in with Russia's need for development capital and export markets for its oil and natural gas. Although a lingering territorial dispute between the two nations, has made such cooperation difficult, Katsuhiko Suetsugu of the Asia-Pacific Energy Forum noted that the Japanese government has decided to decouple politics from economics, facilitating Japanese participation in Russian energy projects. Guy Caruso cited the example of electricity trade between Thailand and Malaysia to illustrate how countries have much to gain by participating in new forms of international energy trade. Peter Evans also suggested that convergence of regulatory policies and practices among Asian nations will encourage the formation of multinational enterprises that can result in economies of scale advantages for Asian nations, which will enjoy cheaper access to energy.

Tatsujiro Suzuki of CEPRI and Tokyo University addressed the very difficult problems of nuclear power. Suzuki pointed out that Asia is the only region in the world where nuclear power is expanding. Asian nuclear power generation will double by 2010, and every state with a nuclear power program is a declared or "threshold" nuclear weapons state. Suzuki added that both China and the Republic of Korea have announced plans for reprocessing and breeder reactor programs to close the nuclear fuel cycle. He added, moreover, that nuclear waste management in Asia is insufficient. Japan, for example, is four years away from exhausting its storage capacity. At present, only Japan has complete fuel cycle capabilities including a 15-ton stockpile of plutonium that has led many countries to be concerned about Japanese intentions to build nuclear weapons. As it expands its civilian nuclear power program, Tokyo will need to deal with the reactions of countries victimized by Japan in World War II, which are not yet confident of Japanese pacifism.

Not Just a Bunch of Rocks

The Spratly Islands are another unknown quantity in Asia's source of energy supply. New York University Professor David Denoon noted that while these are trivial in size, the sea bed surrounding these atolls is believed to contain significant natural gas (and possibly oil) reserves. Seven countries have claimed

the territory: China, Taiwan, and ASEAN nations Indonesia, Malaysia, Brunei, the Philippines, and Vietnam.

Denoon noted that we are unlikely to discover just what supply prospects the Spratlys have until the sovereignty issue is settled. Development will be expensive, and no one will choose to carry it out until confident they may lay claim to its benefits someday. Denoon proposed a model of "fair division," in which the islands are divided into five zones and distributed among the claimants, as one potential solution for the problem. Whether or not this (or any other diplomatic initiative will solve the Spratly dispute is unknown at this time. Similarly, the extent to which the energy reserves of the Spratlys can provide energy for Asian nations is another unknown quantity.

The major unknown factors related to Asian energy, then, are twofold. First, will countries be able to resolve pending *international* issues between them, such that they can take advantage of energy trading with their neighbors and develop new sources of supply? Expanded reliance on nuclear energy by some countries and access to new energy sources are contingent upon the ability of Asian nations to resolve the political tensions that have been problematic in the past. A second point concerns the need for liberalizing capital markets, changing economic incentives, and allowing privatization. Will countries make these necessary reforms, such that their domestic energy supply will be encouraged to grow? The certain answer eludes us at this time, but conference speakers

pointed to signs of progress in both the domestic and international realms that should give us some grounds for optimism.

III. Security Knowns and Unknowns

Asian international security has become an issue of great interest since the collapse of the bipolar Cold War system. The region is home to many powerful countries and historical tensions, trade rivalries and territorial disputes. Japan is the second-largest economy and military in the world, China is heading towards great-power status and has an army of two million men, Russia may yet emerge as a world power, and developing countries--particularly Indonesia with its huge population--may also play a large role in the future of the region.

Energy is closely linked with security in not just Asia, but the entire world. Economies run on energy, and countries with stronger economies are able to field more formidable armed forces, and to supply them for longer periods of time. Therefore armies are dependent on energy to fuel a strong economic base, and more directly, to fuel the vehicles and ships that bring them to battle. Moreover, energy security implies issues such as the need to secure sources of supply, which may lead to shifts in international political alliances. With large populations demanding oil to fuel their lifestyle, will Asian populations allow governments to pursue coercion of weaker neighbors in the

quest for energy? If so, Asia's growing demand for fuel could create regional instability.

The conference addressed questions about energy-related security issues in Asia. Some had clear answers, and others were difficult to answer at this point. The next section examines such issues.

A. What We Know

The issues on which most conference participants agreed were the U.S. role in Asia as a stabilizing force, the importance of domestic politics in shaping Asian international security, China's still-nascent military capabilities, and the undesirability of war in the region for all countries.

The Honest Broker

Many describe the role of the U.S. in Asia as an "honest broker," the power most widely trusted in the region. First, the U.S. presence serves to prevent Japan from dealing with the issue of acquiring a totally independent military. Although Japanese armed forces are the best in the region next to those of the U.S. , they still lack air-to-air refueling, significant amphibious capabilities, and other power projection capabilities that, if acquired, would alarm Japan's neighbors. The continuation of the U.S.-Japan Security Treaty allows Japan to

continue as it has, with about one per cent of its GDP devoted to defense spending. This number would surely rise should the U.S. depart, and tensions with Japan's neighbors (particularly Korea and China) would increase as well. Therefore Chinese concern about U.S. containment and calls for the U.S. to leave Asia have been muted by Beijing's recognition of the implications for Japanese policy should the U.S. leave the region. Former Director of Central Intelligence John Deutch pointed out that the U.S. is a trusted security provider in Asia and should remain engaged in the region; a U.S. departure may unleash competition between the other Asian powers. Such competition, in the form of arms races or even armed conflicts, would disrupt the vital economies of the region and of the world.

Domestic Politics Matter

Conference participants mentioned the significance of domestic politics in a few key energy and security areas. Beijing's priorities, and their implications for energy and security issues, were one area about which conference members seemed confident. The government is recognized to prize political control above all else; Professor Deutch pointed out that Beijing will always choose political control over economics, and will always choose security over economics. Although many noted the degree to which Beijing has abandoned communist

policies for market reforms, most agreed that Beijing values maintained political authority above all else.

This has both domestic and international implications for energy and security. First, while uncertain how far along the road of economic liberalization Beijing is willing to proceed, some optimism seems warranted. Thusfar, Beijing has allowed privatization to the extent that it has been able to meet its energy needs, for example, last year's acquisition of 16,000 megawatts of IPP-supplied electricity as discussed by Peter Evans.

Second, the implications for international security look less promising. China stands out in this regard because of its government's treatment of the Spratly Island and other territorial issues. Calling these claims the "lost territories," Beijing evokes China's "century of shame" when many of its territories were seized by Western imperial powers. Professor Denoon pointed out that by linking claims like the Spratlys to national pride, Beijing is establishing a position that will make compromise with the other claimants difficult. Chinese politicians may well reason that given their people's perception that the islands are rightfully China's (a perception created by the government's publicity about the issue), any compromise on their part will result in public disapproval. Therefore domestic political considerations may cause Beijing to take a hard line on the Spratly Island issue (similar arguments could be made in particular about Taiwan, and also in the Senkaku/Diaoyutai dispute with Japan.)

Turn Down the Noise about the “China Threat”

Though the preceding conclusions seem to have dire implications for international stability in Asia, conferees came to a different conclusion about the extent to which other countries should be alarmed by growing Chinese power. Although there are many uncertainties about Chinese power (to be discussed in the next section), some optimistic assertions were made with confidence. MIT doctoral candidates Christopher Twomey and Jacob Zimmerman showed that dire warnings about China’s huge military capability and Beijing’s intentions often overlook key facts. For example, of the 4,500 planes in China’s air forces, only 37 are the modern Sukhoi-27 Flanker; the vast majority are early-generation planes that date back even to the 1950’s. The Chinese air force is not able to make trouble in Asia. Twomey and Zimmerman also indicated problems with the Chinese navy related to inferior technology and that fact that China has a long distance to go in training its personnel before some of their new naval assets can be deployed. Since the technological advantage currently enjoyed by the United States and its allies will continue for some time, assumptions about relative Chinese military power should be examined more closely.

Speakers at the conference provided other grounds for optimism about China. They reminded us that China benefits from cooperation with the West and with its neighbors, and will suffer in the event of conflict. In order to meet

its energy needs, China needs capital, and therefore allows market liberalization to attract it, leading to greater energy efficiency and improved economic efficiency. The improved environmental conditions and the increase of international economic ties in turn are likely to improve China's relations with its neighbors and with other countries involved in its development. Whether or not such reforms will lead to a demand for democracy in China some day remains unknown, but incremental economic reforms should improve Chinese relations with other countries as well. Professor Samuels reminded us that these assumptions about the peaceful consequences of economic interdependence stand in contrast to the pessimism generated by a *realpolitik* approach to economic development.

War, what is it good for?

After their discussion of the military capabilities of the powers of the Asian region, speakers Twomey and Zimmerman noted that the countries of the region have a strong interest in maintaining peace. Wars in the area would be fought over water at long distances, and would be expensive. The costs of disrupted commerce would be magnified by the extent to which the wealth of these countries depends on exports. These countries have a strong interest in solving their problems diplomatically. This of course is no guarantee that they

will do so, but the fact that they have incentives to maintain peace is a positive sign.

In summary, then, what we know about Asian security is clear. The U.S. can play a mediating role in the region; its history there has established it as a trusted diplomatic player. With Japan and Korea working closely with the U.S. as a common ally, and with China spared the emergence of an independent Japanese military, the continued involvement of the U.S. can contribute to regional peace. Secondly, Chinese nationalism is related to energy and security issues, as in the case of claims on the Spratly Islands. Chinese domestic politics and the Spratly dispute, for example, are linked. Thirdly, as we think about the potential for conflict in Asia, we should keep in mind there is less a “China Threat” than the media presents. Chinese military capabilities are still nascent, and the U.S. and its allies maintain an exceptional technological advantage. Lastly we understand that underlying any discussion of Asian security issues should be the recognition that all of the nations of the region enjoy great advantages from sustained peace, and that a regional war would be exceptionally costly.

Although we recognize the importance of these known factors, conference participants raised questions about Asian security that are difficult to answer at this time. That is the subject of the next section.

B. Security Unknowns

The several unknown factors about Asian security include what foreign policies countries may apply in their search for energy, the future of the U.S. role in the region, and whether or not institutions will emerge to facilitate cooperation in both energy and security.

In Search of Energy

Conference participants agreed that domestic reforms promoting capital availability would increase energy supplies for China and for other countries of the region. One issue of concern is the question of states becoming expansionary in their search for energy security. During the introduction Professor Samuels posed the question: will dependence on foreign energy encourage Asian publics to tolerate their (or other) governments' coercive behavior towards other countries in the search for energy? One problem could be Chinese policy towards the Spratlys, as evidenced in cases of Mischief Reef and various island claims ranging from Natuna to the Diaoyutai. Other (far less likely) energy flashpoints could include Japan and Russia, with their territorial dispute in the Northern Islands, historical animosity, and military assets.

Competition for supply is unlikely to encourage significant military expansion in Asia, but it may cause the shifting of alliances. In this regard

Russia, China, and Japan are key players. Each can make choices that the United States regards as inimical to international security of the region. One possibility would be China seeking to secure oil access with closer ties with Middle Eastern "rogue" states such as Iran. China, with its nuclear technology, may make the decision that nuclear proliferation is acceptable given the energy access China stands to gain. A choice in this direction will worsen the Sino-American relationship. So would a warming of Russia and China or of Japan and Russia, if it leads to a reluctance of Japan to cooperate with U.S. foreign policy in other spheres. It seems that changes in alignments may create greater tensions between the powers of the region than outright violation of sovereignty.

Stay or Go?

Although it is clear the United States has played a valuable security role in the Asian region, it is not as clear how long this will continue. Professor Deutch raised the issue of Korean unification; with North Korea increasingly weak, unification could happen at any time over the next few years. When this happens, and the North Korean threat no longer is an issue, the prime justification for U.S. troops stationed in both Korea and Japan will disappear. At that moment, there will be strong pressure in the United States and perhaps even in Asia for a U.S. troop pullout.

Institution Building

In the discussion of energy-related security issues in Asia, conference participants noted the importance of multilateral cooperation for conflict avoidance. Dr. Suzuki raised the example of the 60,000 drums of low level waste that North Korea agreed to store for Taiwan. This agreement was conducted bilaterally and led to protests by many Asian nations; given the lack of transparency in the deal, no one can be sure what the waste includes and what North Korea may receive from it. Suzuki advocated the formation of a multilateral Asian nuclear energy institution to oversee such arrangements; the greater transparency it would create would help allay many countries' fears about the implications of greater reliance upon nuclear power.

MIT's Lynch, in pointing out the importance of crisis management plans for stable oil supplies, reminded the audience that greater multilateralism can help allay fears about oil supplies as well. National guidelines for oil stockpiling, and monitoring by an international institution, may reassure Asian countries that their neighbors have responsible plans for oil crisis management, and may stem fears that an oil-desperate country will to coerce its neighbor in its search for fuel. Japan, with 98% of its fuel supply dependent upon oil imports, already has a large stockpile, and China has expressed interest in developing such a program. Multilateral institutions that address such concerns may reassure

Asian nations that energy security need not be a potential cause of expansionism or other instability in the region.

Thus conference participants observed that there are many unknown quantities in Asian security. In their search for energy, countries may choose expansionism or alignments that are detrimental to U.S. interests in the region, or to relations with their neighbors. Although the U.S. seems to have been a stabilizing force in Asia, we are uncertain how this may continue given the end of the justification provided by the North Korean threat. A U.S. role can be maintained through influence in international institutions, which may emerge to help alleviate tensions caused by the search for increased energy supplies.

It should be noted at this point that many more security "flashpoints" exist in the region, but that these are less related to the quest for energy. The standoff between the two Koreas has persisted since the end of the Korean war, and a second war on the peninsula is regarded as the most worrisome potential flashpoint. Taiwan is another potentially explosive flashpoint, but is related more to domestic Chinese politics than to energy issues. The U.S. decision to participate in a Taiwan crisis will be more about its global role than about energy issues. Other issues of concern in Asia, such as island disputes between Japan and Korea (Tokdo/Takeshima) and Japan and China (Senkaku/Diaoyutai) are similarly related more closely to national sovereignty than to energy. These issues are other question marks that characterize the uncertain future of Asian international security.

IV. Conclusion

In the conference "Security Asian Energy Investments: Geopolitics and Implications for Business Strategy," many common themes emerged about what we know and do not know about Asian energy and security issues. The rapidly growing Asian economies, China in particular, will continue increasing its demand for energy, and this demand will need to be met. The search for energy supplies is acknowledged to have domestic and international implications. Domestically it requires the ability of states to attract capital, which is acknowledged to be plentiful and available. Attracting capital will require market liberalization, which has implications for central political control. The case of China has been, and will continue to be, the most interesting to observe in this regard. Domestic politics in China are recognized as crucial in understanding all aspects of Chinese government policy, be its Spratly Island claims or its regulation of domestic capital markets.

The search for energy has international implications as well. Showing that world oil supply is plentiful, conference participants debunked the conventional wisdom that states will necessarily compete for oil in a world of scarce resources. Speculation continues, however, about how states will compete for access to the oil and other energy that does exist. We are uncertain if some Asian nations may choose expansionism or alliance behavior that could create instability in the

region. We are uncertain that the U.S. role in the region will continue. We are uncertain that international institutions, which could make states more secure in the search for energy supplies, will be created.

We know, however, that countries about whose intentions there has been a great deal of speculation--notably China--do not yet present a military threat to the United States or its allies in Asia. Moreover, China and others have strong incentives to avoid conflict. An Asian war would be expensive and economically devastating for the countries involved, and would disrupt the international economy as well because of the region's significance.

China has a great deal to benefit from continued economic ties with the U.S., Europe, and its own neighbors. Conference speakers highlighted how outdated technology in China requires modernization, which would increase economic efficiency as well as improve environmental conditions. China's inefficient coal shipping network can be transformed with western expertise and capital, increasing China's energy supply. Therefore not only is its military unable to challenge the west, China will find many economic reasons why conflict would damage itself as much as any other party. The case of China is one in which a close examination of what we know is essential for dealing with the uncertainties that confront us. Continued exploration of energy and security issues facing China and Asia as a whole will help lessen uncertainty surrounding these important topics in this key region.

V. List of Speakers

Guy Caruso	International Energy Agency Paris, France
David Denoon	Department of Politics, New York University
John M. Deutch	Department of Chemistry, MIT
Peter Evans	MIT Working Group on Asian Energy and Security
Tim Forsyth	Energy & Environment Programme, The Royal Institute of International Affairs, UK
Angang Hu	Development Research Academy for the 21st Century, Tsinghua University of China
Michael C. Lynch	Working Group on Asian Energy and Security
Dennis O'Brien	Pacific Economic Cooperation Council Energy Forum
Tadahiko Ohashi	Tokyo Gas Co., Ltd.
Kenneth Oye	Center for International Studies, MIT
Karen Polenske	Department of Urban Studies and Planning, MIT
Katsuhiko Suetsugu	Asia-Pacific Energy Forum
Tatsujiro Suzuki	Central Research Institute of Electric Power Industry, Japan
Christopher P. Twomey	Working Group on Asian Energy and Security
Jacob ben-David Zimmerman	Working Group on Asian Energy and Security