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OVERVIEW OF GLOBAL ENERGY SECURITY ISSUES

HEARING

BEFORE THE

SUBCOMMITTEE ON INTERNATIONAL ECONOMIC POLICY, EXPORT AND TRADE PROMOTION

OF THE

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UNITED STATES SENATE

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OVERVIEW OF GLOBAL ENERGY SECURITY ISSUES

Tuesday, April 8, 2003

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
SUBCOMMITTEE ON INTERNATIONAL ECONOMIC POLICY,
EXPORT AND TRADE PROMOTION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2:33 p.m., in Room SD–419, Dirksen Senate Office Building, the Hon. Chuck Hagel, chairman of the subcommittee, presiding.

Present: Senators Hagel and Sarbanes.

OPENING STATEMENT OF HON. CHUCK HAGEL, U.S. SENATOR FROM NEBRASKA

Senator HAGEL. Good afternoon. Today we have brought together two distinguished panels of senior Administration officials and leading private sector experts to examine global energy security.

Energy security is a critical component of America's national security. Reliable energy supplies, particularly oil and natural gas, are crucial to our economic development and growth. Our national energy and national security interests cannot be separated from world developments and global stability. Our dependence on imported crude oil creates potential vulnerabilities to our economy and national security.

During this hearing, we will examine where global energy resources are concentrated and how much potential remains untapped globally. We will explore the impact of war and political instability on global energy supply and possibilities for mitigating that impact.

America's economy is almost 60 percent dependent on imported oil. This situation will not change for the foreseeable future. America is the world's leading consumer of crude oil. We use 19 million barrels per day, or almost 26 percent of the world total. We are the world's leading importer of crude oil, bringing in more than 9.6 million barrels per day.

And as Deputy Secretary of Energy, McSlarrow points out in his prepared testimony for today's hearing, and I quote, unless the Secretary has changed his testimony,

> The United States is increasingly dependent on foreign oil and may not be far from the point at which we no longer can assume a domestic or even a North American supply of natural gas that fully meets demand.

America needs a comprehensive energy policy that recognizes the realities of our inter-connected world. We cannot develop our energy policies under the false assumption that energy independence is achievable in the short-term. Our dependence on OPEC oil, including and especially Middle Eastern Gulf crude oil, is more likely to increase than decrease in the foreseeable future.

America's demand for natural gas will continue to exceed its supply. This imbalance will continue to grow.

The interdependence of global energy markets requires that America and her allies must work with Persian Gulf and Middle Eastern energy suppliers regardless of the political risks associated with the region. The United States presently depends on Middle East Gulf oil for 25 percent of its crude oil imports. Middle Eastern Gulf oil provides 26 percent of Europe's crude oil imports and 67 percent of Asia's imports.

Russia and oil-producing countries in the Caspian, Latin America and West Africa will all continue to play important roles as global supplies of crude oil. But the Persian Gulf will remain the choke point of the global economy. For example, Middle Eastern Gulf oil is responsible for over 20 million barrels per day, or almost 30 percent of the world's total oil production, 57 percent of global oil exports, and 65 percent of oil reserves.

The two primary oil producers in the Caspian, Kazakhstan and Azerbaijan, at times touted as a possible alternative strategy supply source in the Caspian region, today produce 1 million and 300,000 barrels of oil per day respectively. And even under the best-case scenarios, production would only double to 3 million barrels per day by 2010.

America's energy security depends in part on the reliability and the volatility of oil producing regions. Our energy security interests must, therefore, promote stability and economic grown in these energy-producing regions of the world.

Long-term energy security will depend on the success of our efforts to support political and economic reform and regional security in oil producing countries and regions such as the Middle East, West Africa, the Caspian and Latin America.

Political instability in Venezuela and Nigeria show that the correlation between political instability and oil supply is not limited only to the Middle East. The absence of responsible governance and democratic institutions over time will undermine security and stability, with dangerous implications for the global economy.

Energy security is not limited to just assuring an adequate supply of crude oil. The American economy is also captive to dependable and reliable supplies of natural gas, as well as other resources like nuclear energy. Conservation and renewable fuels need to play more and more of a role in America's energy future.

I welcome our distinguished witnesses today and look forward to their testimonies. We will begin with Kyle McSlarrow, the Deputy Secretary of Energy and Alan Larson, Under Secretary of State for Economic, Business and Agricultural Affairs.

The second panel will include expert private sector witnesses, including Dr. Daniel Yergin, Chairman of Cambridge Energy Research Associates and author of "The Prize," which received a Pulitzer prize and "Commanding Heights, The Battle for the World

Economy," which will be broadcast on PBS as a six-part television series starting next month; Mr. Vahan Zanoyan, CEO and President of PFC Energy, an internationally recognized leader and expert on the commercial, political and strategic aspects of the global oil and gas business; and Dr. Martha Brill Olcott, Senior Associate to Carnegie Endowment for International Peace and one of the leading American experts on the politics of Central Asia and the republics of the former Soviet Union.

Ladies and gentlemen, thank you for making yourselves available today. We are grateful for your time and your expertise and what you have to say. We all look forward to it. We will begin with the Deputy Secretary of Energy who, I understand, has been consumed today with negotiations with our Russian friends.

So thank you, Mr. Secretary, for taking time to work us into the schedule. And with that, please proceed.

STATEMENT OF HON. KYLE E. McSLARROW, DEPUTY SECRETARY OF ENERGY, DEPARTMENT OF ENERGY

Mr. MCSLARROW. Thank you, Mr. Chairman. I am pleased to appear before you today and I look forward to discussing the important role that energy plays in the global economy and the Administration's efforts to enhance our energy security. And I am pleased to be here with Secretary Larson with whom I work very closely on a daily basis on a lot of these issues, and it is really a reflection of the coordination, the close working relationship that the Department of State, Department of Energy and the Department of Commerce enjoy.

Over the past century, we have witnessed the power of energy to drive economic development and sustain progress. On the other hand, since the 1970s we have also learned firsthand how energy shortages and the high prices that result can compromise economic growth and the quality of life to which Americans have grown accustomed.

The U.S. is far and away the largest single energy market in the world. And as a result, U.S. energy policy plays a critical role in maintaining global energy security. From our first days of the Bush Administration, we knew that the United States faced an energy crisis long in the making. In addition to the California crisis, which you will recall, Mr. Chairman, consumers faced unparalleled increases in natural gas and gasoline prices.

And what was true in the beginning of 2001 is still true in 2003. We have a series of long-term energy challenges that require action now. And these are challenges that are present along the entire energy continuum, and affect the environment and economy, the transmission of electricity, and commodities ranging from crude oil and its associated products to natural gas.

As you noted, Mr. Chairman, we long ago ceased to fully provide for our petroleum needs domestically, and though most of our natural gas can be supplied currently by North American production, the trend here is also toward a greater share for gas imported from outside our hemisphere. We are often at the mercy of events and decisions over which we have limited, sometimes no, control. When winters and summers are mild; when all refineries or pipelines are online; when supply from abroad is abundant and reliable, we do

not feel this dependency. However, when almost any one of these factors breaks down, markets react instantly, and we face the higher prices and volatility that have become by now an almost certain cyclical phenomenon. President Bush recognized that to prevent these problems, we needed a national energy plan, and he presented this plan to the American people almost two years ago.

Under President Bush and Secretary Abraham's leadership, our approach to energy security—indeed, to global energy security—is contained in the following principles. First, we must balance increased production with a renewed focus on the clean and efficient use of energy. Second, we must expand international engagement with consumer and producer Nations. Third, we must expand and diversify our sources of supply. And, finally, in everything we do, we must champion free markets and free trade.

Thus our initiatives are not limited to domestic activities. In fact, we are aggressively pursuing a variety of international cooperative efforts to strengthen energy security, in most cases working very closely with the State Department. Those efforts basically fall into two types of initiatives. The first type is to leverage our leadership in high technology. The second type is to pursue a set of policies that strengthen our security.

I will just take a moment and summarize what I have submitted in the written testimony, but I would like to just highlight a couple of initiatives where we are partnering with key energy countries to help create new technologies and develop new energy sources that will enhance U.S. and global energy security. One example is the Generation Four International Forum, so called GEN–4, in which we work with about nine other countries on joint nuclear energy research and development. Through this process, we are cooperatively exploring six new reactor designs that are more advanced, safer, more efficient, and more proliferation-resistant.

Another example is the recently launched Carbon Sequestration Leadership Forum in which we will work with countries around the world to develop cutting edge pollution-control and carbon-sequestration technologies that can make tomorrow's coal or natural gas plant truly emissions free.

Earlier this year as you know, Mr. Chairman, President Bush also announced that the United States would join with the international community to develop the International Thermonuclear Experimental Reactor, the so-called ITER.

But the second prong of our international energy strategy is more than just technology cooperation, and it is based on a principle of diversification. Put simply, to meet our long-range energy needs, we must expand and diversify our sources and types of energy. We need to maintain a diversity of fuels from a multiplicity of sources. We are working to diversify energy supplies and promote the development of new resources around the globe. And I look forward to talking with you further about that today.

We are working to enhance our dialogue with key producing and consuming countries. And we are working to expand global capabilities to protect against energy supply disruptions.

I will stop there, Mr. Chairman. I appreciate the opportunity to answer any questions you may have.

Senator HAGEL. Mr. Secretary, thank you, and your full statement will be included in the record.

Mr. MCSLARROW. Thank you.

[The prepared statement of Mr. McSlarrow follows:]

PREPARED STATEMENT OF HON. KYLE MCSLARROW

Thank you, Mr. Chairman. I am pleased to appear before you today to discuss the important role that energy plays in the global economy and the Administration's efforts to enhance our energy security.

I. Introduction

Over the past century, we have witnessed the power of energy to drive economic development and sustain progress. On the other hand, since the 1970s we have learned firsthand how energy shortages and the high prices that result can compromise economic growth and the quality of life to which Americans have grown accustomed.

As energy markets become more integrated, U.S. energy security has become integrally linked to developments around the world. The U.S. is the largest single energy market in the world. As a result, U.S. energy policy plays an important role in maintaining global energy security.

From our first days of the Bush Administration, we knew that the United States faced an energy crisis long in the making. In addition to the California electricity crisis, you will recall that consumers faced unparalleled increases in natural gas and gasoline prices.

That is why President Bush so quickly directed the completion of a comprehensive and balanced national energy policy.

II. Energy Outlook

What was true in the beginning of 2001 is still true: we have a series of long-term energy challenges that require action now. These challenges are present along the entire energy continuum, and affect the environment and economy, the generation and transmission of electricity, and commodities ranging from crude oil and its associated products to natural gas.

These challenges can be summarized by one phrase: energy security. To be more specific, the United States is increasingly dependent on foreign oil and may not be far from the point at which we no longer can assume a domestic—or even a North American—supply of natural gas that fully meets demand.

Thus, before I address some of the policy issues before this committee and Congress, it is worth analyzing the premise of growing dependence on foreign energy. I will use the analysis presented by the Department of Energy's independent analytical arm, the Energy Information Administration, in its Annual Energy Outlook 2003 (AEO 2003), and will confine this brief review to petroleum specifically and total energy supply and demand.

A. Petroleum Trends

The historical record shows substantial variability in world oil prices, and there is similar uncertainty about future prices. Three AEO 2003 cases with different price paths allow an assessment of alternative views on the course of future oil prices. The three price cases are based on alternative assumptions about OPEC oil production levels, primarily from the Persian Gulf: lower output in the high price case and higher output in the low price case. However, with its vast store of readily accessible oil reserves, OPEC is expected to be the principal source of marginal supply to meet demand increases in all scenarios.

By 2025, OPEC production is projected to be 61 million barrels per day (more than twice its 2001 level) for the "Reference" case. Based on growth in world oil demand of about 2.0 percent annually, projected prices in real 2001 dollars reach about $27 per barrel in 2025. In nominal dollars, the reference case price is expected to exceed $48 per barrel in 2025.

In the high world oil price case, OPEC production is assumed to only increase to 46 million barrels per day by 2025 (about 25 percent less than the reference case) and prices rise by about 3 percent per year from 2001 to 2015. Prices remain at about $33 per barrel (in real 2001 dollars) after 2015 as market penetration of alternative energy supplies become economically viable at the higher price and cap oil prices.

In the "low world oil price" case, with assumed greater expansion of OPEC production to 71 million barrels per day by 2025 (about 15 percent greater than the

reference case), prices are projected to decline from their high in 2003, reaching $19 a barrel by 2010 (in real 2001 dollars), and remain at that level to 2025.

U.S. petroleum consumption varies, not only with oil prices, but the level of economic growth. While projected U.S. petroleum consumption varies with the projected price of crude oil, from 28.2 million barrels per day in the high world oil price case to 30.2 million barrels per day in the low world oil price case in 2025, the largest variation is with different assumptions about the rate of economic growth. Total petroleum consumption in 2025 ranges from 26.9 million to 31.8 million barrels per day in the low and high economic growth cases, respectively.

In the reference case, gross domestic product is expected to increase by 3.0 percent per year between 2001 and 2025. In the high economic growth case, GDP grows at a faster 3.5 percent per year and in the low economic growth case at a slower 2.5 percent per year. However, while petroleum consumption varies with each scenario, it increases in all cases from today's level.

In 2001, net imports of petroleum accounted for 55 percent of domestic petroleum consumption. Dependence on petroleum imports is projected to grow in the reference case, reaching 68 percent in 2025. The corresponding import shares of total consumption in 2025 are expected to be 65 percent in the high world oil price case and 70 percent in the low world oil price case.

The growth in the share of petroleum accounted for by imports has received little notice in recent years. Expenditures on petroleum as a share of GDP have fallen from a peak of 9 percent in 1980 to only 3 percent today. The OPEC share of U.S. petroleum imports has fallen from a peak of 70 percent in 1977 to 40 percent in 2002. More importantly, the share of U.S. petroleum imports originating from the Persian Gulf is about 20 percent today versus a peak of 28 percent in the late 1970s.

However, as the marginal source of supply, OPEC and, ultimately, the Persian Gulf producers are expected to become increasingly important for future supplies to the United States and the world. By 2025, 53 percent of U.S. petroleum supply is expected to come from OPEC, including 26 percent from the Persian Gulf.

Although crude oil is expected to continue as the major component of petroleum imports, refined products are projected to represent a growing share. Growth in domestic U.S. refinery capacity is expected to remain constrained by regulations and economics. While total capacity is projected to grow by 3 million barrels per day between 2001 and 2025, all of the growth is at existing refineries. No new facilities are expected to be built over the forecast period.

Growth in total U.S. petroleum demand in the reference case, from 20 million barrels per day in 2001 to over 29 million barrels per day by 2025, is projected to outstrip U.S. refinery capacity. As a result, refined petroleum products are projected to account for a growing portion of total net petroleum imports, reaching 34 percent of total net imports by 2025 (6.7 million barrels per day) in the reference case, up from a 15 percent share of total imports in 2001 (1.6 million barrels per day).

This means that the U.S. will increasingly rely on foreign refinery investors to provide not just the volume of petroleum product needed by U.S. markets but products that meet the required characteristics (e.g., sulfur content, octane levels, etc.) of the U.S. supply slate. This decreases the flexibility and direct control that U.S. policymakers have in dealing with petroleum supply issues.

B. Total Energy Trends

Another way to analyze our energy picture is to look at our total energy consumption and balance it against our total energy production.

Total U.S. primary energy consumption is projected to increase from 97 quadrillion Btu in 2001 to 139 quadrillion Btu by 2025 in the reference case, 1.5 percent per year. It is important to note that the reference case already assumes continued improvement in energy consuming and producing technologies, consistent with historic trends. Without these improvements, total primary energy consumption would otherwise grow to about 200 quadrillion Btu by 2025.

The difference between reference case consumption and domestic energy production is the level of net imports (all energy types) required to meet projected U.S. energy consumption levels. Because of slow growth in domestic energy production, total net imports are projected to grow from about 26 quadrillion Btu in 2001 to almost 50 quadrillion Btu in 2025.

As I mentioned earlier, this already assumes that future gains in energy efficiency take place at the same impressive rate as in recent years. Nonetheless, the EIA also analyzed what it termed a "high demand side technology" case, with an even more aggressive decline in energy intensity.

With more rapid decline in energy intensity, total energy consumption could be reduced to levels below that shown in the reference case. In the high demand side technology case, it is assumed that increased spending on research and development

will result in earlier introduction, lower costs, and higher efficiencies for end-use and electric generation technologies than assumed in the reference case. Due to a faster decline in energy intensity in the high demand side technology case, total primary energy consumption is projected to be 6 percent lower in the high demand side technology case by 2025, at 130 quadrillion Btu.

With lower levels of total consumption, net imports are also reduced. However, the reduction in imports is partially offset by lower levels of domestic energy production resulting from a decline in the energy prices that producers see with lower consumption levels. Net energy imports decline to 45 quadrillion Btu by 2025 in the high demand side technology case from nearly 50 quadrillion Btu by 2025 in the reference case. The result is that even in a case with an accelerated decline in energy intensity, the U.S. will still be highly dependent on energy imports to meet future consumption needs.

III. President Bush's National Energy Policy.

These trends are a concern. We long ago ceased to fully provide for our petroleum needs domestically, and though most of our natural gas can be supplied currently by North American production, the trend here is also toward a greater share for gas imported from outside our hemisphere.

Quite simply, we are at the mercy of events and decisions over which we have often limited—sometimes no—control. When winters and summers are mild; when all refineries or pipelines are online; when supply from abroad is abundant and reliable, we do not feel this dependency. However, when almost any one of these factors breaks down, markets react instantly, and we face the higher prices and volatility that have become by now an almost certain cyclical phenomenon.

President Bush recognized that to prevent these problems from becoming a permanent, recurring feature of American life, we needed a long-term plan for energy security that would promote reliable, affordable and environmentally sound energy for the future.

Almost two years ago, President Bush presented his solution, a national energy policy, to the American people.

Our approach to our energy security—indeed, to global energy security—is contained in the following principles.

First, we must balance increased production with a renewed focus on the clean and efficient use of energy. Second, we must expand international engagement with consumer and producer nations. Third, we must expand and diversify our sources of supply. And, finally, in everything we do, we must champion free markets and free trade.

IV. Energy Security: Closing the Gap Between Supply and Demand

The Administration believes that a balanced, comprehensive energy plan is imperative to the long-term strength of our economic and national security. This balance should include a recognition that we must also increase domestic production in order to reduce our rising dependence on imported oil and gas; and key to achieving this balance is the President's proposal to open a small portion of the Arctic National Wildlife Refuge (ANWR) to environmentally responsible oil and gas exploration and development.

But we also understand that we need to leapfrog the status quo and fundamentally change our reliance on imported energy. That is one important underpinning of the President's Hydrogen Initiative, which the President announced earlier this year during the State of the Union Address.

Hydrogen can be produced from diverse domestic sources and has the potential to free us from reliance on foreign imports for the energy we use at home. When hydrogen is used to power fuel cell vehicles, it will do so with more than twice the efficiency of today's engines.

And hydrogen-powered vehicles would have a tremendous positive impact on the environment, as they would produce none of the harmful emissions that we see with today's gasoline-powered fleet. In fact, the only byproduct of the fuel cell is pure water.

The Hydrogen Fuel Initiative complements the Freedom-CAR initiative, a partnership with the U.S. auto industry that Secretary Abraham announced at the Detroit Auto Show in January 2002. The Freedom-Car partnership is designed to greatly accelerate the pace of development of fuel cell vehicles powered by hydrogen.

The President's Hydrogen Fuel Initiative represents a commitment to the future hydrogen economy, and it has already generated tremendous enthusiasm among the energy and auto industries—partners that will be integral to transforming our nation's energy future from one dependent on foreign petroleum, to one that utilizes the most abundant element in the universe.

As the President has said, his goal is to see to it that the first car driven by a child born today could be powered by hydrogen and pollution free. To support the Hydrogen Fuel Initiative and the Freedom-CAR partnership, we propose to focus $1.7 billion over the next five years on overcoming several significant technical and economic barriers to the development and expanded use of hydrogen, fuel cell, and advanced automotive technologies.

If we are successful in this endeavor, we estimate that industry could make a commercialization decision on fuel cell vehicles, hydrogen production, and refueling infrastructure by 2015. A positive decision would lead to hydrogen fuel cell vehicles in the showroom by 2020, and by 2040, this could reduce oil use in light duty vehicles by over 11 million barrels per day—an amount of oil that approximates that which America imports today.

V. Energy Security: Strengthening International Cooperation

But our initiatives are not limited to domestic activities. We are partnering with key energy countries to help create new technologies and develop new energy sources that will enhance U.S. and global energy security. These international partnerships allow us to share costs, increase our knowledge base, and eventually expand markets for advanced energy technology.

One example is the Generation Four International Forum (GIF) in which we work with Argentina, Brazil, Canada, France, Japan, South Africa, South Korea, Switzerland and the United Kingdom on joint nuclear energy research and development. Through this process, we are cooperatively exploring six new reactor designs that are more advanced, safer, more efficient, and more proliferation-resistant.

Another example is the recently launched Carbon Sequestration Leadership Forum in which we will work with countries around the world to develop cutting edge pollution-control and carbon-sequestration technologies that can make tomorrow's coal or natural gas plant truly emission free. This June, the U.S. Government will host a ministerial level conference to discuss international collaboration on carbon sequestration, including the FutureGen Project. With international and private sector partners, the U.S. will sponsor this $1 billion initiative to design, build and operate the first coal-fired, nearly emissions-free power plant.

Earlier this year, President Bush announced that the United States would join with the international community to develop the International Thermonuclear Experimental Reactor (ITER). When built, ITER is expected to achieve the first sustained burning plasma, an essential next step on the long technical, regulatory, and economic road toward demonstrating the feasibility of commercial fusion energy systems. If ITER and significant future scientific and engineering efforts prove to be successful, fusion energy plants would produce no harmful emissions, no long-term radioactive waste, and—because no fissile materials are required in the fusion process—virtually no proliferation threat.

VI. Energy Security: Increasing Diversity of Supply

To meet our long-range energy needs, we must expand and diversify our sources and types of energy. To assure energy security, we need to maintain a diversity of fuels from a multiplicity of sources. Opportunities for increased investment, trade, exploration and development are increasing every year, far beyond the traditional markets of the last 50 years.

We are working to diversify energy supplies and promote the development of new resources in the Western Hemisphere, Russia, the Caspian Region and Africa. We are working to enhance our dialogue with key producing and consuming countries to better predict and monitor oil market developments and offset energy crises. And we are working to expand global capabilities to protect against energy supply disruptions.

A. North American Energy Working Group

Shortly after taking office, the Administration prioritized our energy relationship with Mexico and Canada, the top two energy suppliers to the United States. In April 2001, President Bush Canada's Prime Minister Chretien and Mexico's President Fox launched the North American Energy Working Group to further integrate the North American energy market and make it stronger and more efficient.

Our experts meet regularly to develop and implement strategies that enhance North American energy trade and interconnections, and most of all energy security. We work to identify and overcome the regulatory, technical and policy obstacles to increased production and delivery of energy within North America in an environmentally friendly manner.

B. Western Hemisphere

The North American effort is just part of the process. Half of all U.S. petroleum imports come from Western Hemisphere countries, and Trinidad and Tobago is the United States' largest supplier of liquefied natural gas. We have been working with our partners in the Hemisphere to promote increased development of oil and natural gas resources and advance energy integration on a regional scale. We have met with our counterparts from Mexico, Canada, Bolivia, Brazil, Ecuador, Colombia, Peru and Venezuela—all of whom are determined to develop and expand their vast energy resources. The Hemispheric Energy Initiative is a product of the Summit of the Americas and provides an arena for hemispheric cooperation on energy issues.

C. Russia

Outside of the Western Hemisphere, we continue to strengthen our energy relationship with Russia, now the second largest crude oil producer and exporter in the world. Last year, Presidents Bush and Putin launched a new era in our bilateral cooperation by creating a new strategic energy initiative between our two countries. As the American co-chair of the Energy Working Group, I am pleased to report the continued success of this initiative.

Under the Working Group, our experts meet regularly to exchange information and technical expertise. The objective is to help create the regulatory and investment conditions required for increased energy development in Russia as well the infrastructure necessary to deliver the energy to the outside world. Our cooperation takes into account the environmental risks associated with oil production and transportation. Earlier this month, Secretary Abraham and his Russian counterpart established a bilateral dialogue on oil spill prevention and response.

The private sector plays an important role in this effort. Last year, the U.S. and Russia co-hosted a Commercial Energy Summit in Houston to incorporate companies into the dialogue and leverage our technical cooperation with investment opportunities. In our view, rising Russian production significantly increases the supply diversity in the world oil market.

D. Caspian Region

In addition, the United States has a strong interest in resource and infrastructure development in the Caspian Sea region. The United States has been a strong supporter of oil and gas development in the region, urging governments to establish the necessary legal, fiscal, and regulatory environments to safeguard the large investments required to develop these new resources. The Caspian Basin has proven reserves in the 17–33 billion barrel range (to put this in perspective, Persian Gulf proven reserves amount to approximately 679 billion barrels), with possible oil reserves of about 233 billion barrels. With sufficient investment, the Caspian region could produce 3.5 to 4.0 million bpd by 2010.

The Administration has been a strong advocate of new pipeline capacity to transport oil—and gas—in an east-west corridor to reach world markets. Secretary Abraham attended the inauguration ceremony for the Caspian Pipeline Consortium (CPC) that opened its pipeline from Kazakhstan to the Black Sea, providing direct access from Kazakhstan to export markets. Secretary Abraham also participated in the ground-breaking ceremony in Baku for the Baku-Tbilisi-Ceyhan pipeline that will be able to carry 1 million bpd from the landlocked Caspian to world markets.

E. Africa

Energy from Africa plays an increasingly important role in our energy security, accounting for more than 10 percent of America's oil imports, and is a key engine for economic development in Africa. We are pleased with the resolve of African nations to facilitate private sector investment in the development of energy resources.

At a meeting of U.S. and African Energy Ministers last year in Morocco, the U.S and African countries reaffirmed a commitment to good governance and stable regulatory structures and discussed additional steps to encourage private investment in the energy sector. At that meeting, we met with government and industry to discuss ways to improve energy trade and facilitate energy sector development to better serve U.S. and African economic growth and development.

F. Producer–Consumer Dialogue

In addition to these efforts, we have been strengthening our dialogue with key producing and consuming countries to better monitor energy market developments and respond to supply disruptions.

We continue to participate in the International Energy Forum (IEF), a multilateral effort to enhance relationships between oil producing and consuming nations. A key focus of the IEF is a joint effort to improve the transparency, timeliness, and

accuracy of the data that guides global oil markets. This initiative, begun by the United States, has garnered broad support from both producers and consumers.

G. G–8 Energy Cooperation

We are also working closely with our other friends in major consuming countries to address our common energy challenges. Last year, as recommended by the National Energy Policy, Secretary Abraham co-chaired with his Canadian counterpart a meeting of energy ministers from the G–8 countries in Detroit. We reaffirmed the importance of emergency oil reserves and our commitment to coordinate their use. We agreed to work together to meet growing energy demand by encouraging the investment that will be needed in energy development, production and infrastructure, as well as in improved energy efficiency.

H. Asia Pacific Economic Cooperation (APEC)

We also participate in the Energy Working Group of the Asia Pacific Economic Cooperation (APEC), most notably in the APEC Energy Security Initiative, which the United States originally proposed in 2000 and which was endorsed by APEC Leaders in at the 2001 Shanghai Leaders Meeting. Shorter-term actions under the initiative include enhancing the transparency of the global oil market and sharing ideas on energy emergency preparedness. Longer-term actions include cooperation on energy efficiency, renewable energy, and alternative fuels.

I. U.S.–U.K. Energy Dialogue

Last year, President Bush and Prime Minister Blair agreed to establish the US–UK Energy Dialogue. The dialogue involves discussion on both domestic and international energy policies. The collaboration focuses on deepening cooperation on environmental, economic, and developmental issues, and incorporates the private sector in implementing these objectives. We are in the process of developing a comprehensive report for our leaders, which will highlight our common position on various energy issues and outline joint activities to be undertaken.

J. Cooperation on Natural Gas

Although most of these initiatives encompass a wide variety of topics, with a particular emphasis on petroleum, we also have stepped up our cooperation on natural gas issues.

We have, for example, undertaken a joint study on natural gas with Canada and Mexico to assess future supply and demand projections. And, last November, the Department of Energy hosted a liquefied natural gas (LNG) Summit with Algeria to discuss the investment and infrastructure required to expand LNG trade between our two countries. And we look forward to continuing our work with other key natural gas producers such as Trinidad & Tobago, Angola, and Nigeria.

In addition, the Department of Energy participates in the World Bank's Gas Flaring Reduction Initiative and is a member of its steering committee. We undertake research and development activities and partner with other organizations to assist in gas flaring reduction. Bilaterally and multilaterally, we are working with various countries and organizations to promote the development and utilization of natural gas resources, which, in turn, will directly contribute to the reduction of gas flaring and venting.

VII. Emergency Strategies: Response to Supply Disruptions

All of these activities are directed at ensuring a reliable and affordable supply of energy to the American people today and in the future. But we also recognize the importance of protecting against the possibility of a severe supply disruption. The Administration early on reaffirmed the importance of maintaining a strong Strategic Petroleum Reserve (SPR). In November 1991, the President directed that we begin to fill the SPR to its 700 million barrel capacity. Today the SPR contains a record 599 million barrels of oil—the highest amount in its history. This oil can be released at a maximum rate of 4.2 million bpd, and we can begin delivering oil to the market within 13 days of the President's order.

We continue to play a leadership role in the International Energy Agency (IEA). Created following the 1973 oil crisis, the IEA includes 26 member countries that are committed to holding emergency oil reserves and to taking common effective measures to meet oil supply emergencies. Together, IEA members' oil stocks total nearly 4 billion barrels, 1.2 billion barrels of which are under direct control of member governments, with the remaining 2.6 billion barrels from commercial stocks. IEA members have the ability to draw down these stocks at a rate of over 8 million bpd (including the SPR).

At the G–8 Energy Ministerial last May, we agreed on the importance for net oil importing countries to maintain emergency stocks and to use them when necessary

to respond to major physical supply disruptions. We also recognized the value to global energy security when other countries, including those in Asia (whose import dependence is projected to increase sharply), build similar stocks.

Mr. Chairman, at this point, I thank you for the opportunity to testify before you today, and I welcome any questions the Committee might have.

Senator HAGEL. Secretary Larson, welcome.

Mr. LARSON. Thank you. Senator Hagel: Please proceed.

STATEMENT OF HON. ALAN P. LARSON, UNDER SECRETARY FOR ECONOMIC, BUSINESS AND AGRICULTURAL AFFAIRS, DEPARTMENT OF STATE

Mr. LARSON. Thank you very much, Mr. Chairman. I too have a longer statement for the record, but I would like to summarize that at this point.

I really welcome the opportunity to testify on this important and timely subject and to do so with Deputy Secretary McSlarrow because, as he said, we really do have a strong working relationship. And many of the issues that we have to deal with span traditional energy policy and foreign policy considerations.

We need to begin by recognizing some hard facts. For example, the United States and our key allies and trading partners must import half or more of our oil needs. This reliance on imports is likely to grow since oil demand is rising and domestic production capabilities are limited. Moreover, some two-thirds of the world's proven oil reserves are found in the Middle East.

Energy security does not and cannot mean self-sufficiency. Energy security does mean ensuring that there are sufficient and diversified supplies of oil and other forms of energy, and that these supplies are available on terms that support the growth of the American economy. Energy security also means being sure that actual or threatened interruptions in energy supplies can never seriously disrupt our own economy, nor impair the ability of the President to conduct foreign policy.

My testimony highlights three important dimensions of our international energy security policy. First, we work to make imported energy more reliable, by increasing its supply, by improving the climate for private energy investment, and by diversifying our sources of energy.

Second, we maintain an active dialogue and strong partnership with established oil producers in order to ensure that they maintain responsible production policies that support the needs of a growing world economy.

And third, through our cooperation both with responsible producers and with our partners in the International Energy Agency, we make sure that we have flexible and effective responses to any actual or threatened physical disruption in the supply of oil.

The starting point for our diversification strategy is North America. Canada is our leading supplier of oil, natural gas and electricity. And Mexico is one of our top four suppliers of oil.

We are making progress in developing a North American energy market that would bring substantial benefits for all three countries. We also have made significant headway in the Caspian, a region with the potential of increasing oil production from 1.6 million barrels a day to 5 million barrels a day in 2010, a somewhat higher

number than your estimate, and we will find out, but in any event there is substantial capacity there.

Senator HAGEL. I used just two countries.

Mr. LARSON. Right. The United States has offered strong support for the Baku-Tbilisi-Ceyhan oil pipeline. Construction is just beginning now, and the pipeline will begin transporting oil in 2005. The Shah Deniz pipeline will provide a similar outlet for Caspian gas.

Russia is an energy superpower. There is significant potential for expanded production and exports of Russian oil and gas. To achieve this potential, it will be necessary for Russia to attract private investment, including foreign direct investment into exploration, production and transportation projects.

In West Africa, the development of oil and gas reserves could contribute to global energy security and be a source of revenue to finance badly needed economic development. Achieving this potential will require a much stronger institution supporting the rule of law, transparent systems for receiving and expending budget resources, and a stronger commitment on the part of leaders to using energy revenues for the benefit of their own people.

Historically, Venezuela has been one of our most reliable suppliers. Under President Chavez, however, Venezuela has pursued a foreign policy that sometimes is hostile to some of our key objectives. At home, he has contributed to a polarization that resulted in untimely interruptions of Venezuela's oil supplies to the United States. We are working very hard to encourage Venezuelans across the spectrum to work with the OAS Secretary General, Gaviria, to find a peaceful, constitutional, democratic and electoral solution to their domestic crisis.

The traditional Gulf producers, and especially Saudi Arabia, play an important role in energy security. Their interest in maintaining a long-run demand for oil has moderated OPEC production policies. Their willingness to maintain and to use excess production capacity has helped offset supply interruptions, such as the recent interruptions from Venezuela and Iraq.

Cooperation in the International Energy Agency is the centerpiece of our energy security policy. In the IEA, we work with key partners on policies to diversify energy supplies and to respond to energy supply disruptions. IEA countries hold more than 1.2 billion barrels of emergency oil reserves of which 600 million barrels are represented by the U.S. strategic petroleum reserve. IEA countries stand ready to use these stocks if necessary to help offset oil supply disruptions.

Let me end with a word on Iraq. The Administration has stressed many times that the oil reserves of Iraq are for the Iraqi people. Our post-war strategy will fully reflect this principle.

Mr. Chairman, there is no quick fix or panacea that will produce energy independence. Rather, we must preserve our energy security by sustained, patient and determined efforts to diversify supplies, to increase the scope for market forces, and to maintain our ability to respond to oil supply interruptions.

Thank you.

Senator HAGEL. Mr. Secretary, thank you. Thank you, Mr. Secretary. And your full statement will also be included in the record.

[The prepared statement of Mr. Larson follows:]

PREPARED STATEMENT OF HON. ALAN LARSON

Mr. Chairman, distinguished Committee members, I am pleased to be here today with Deputy Secretary of Energy McSlarrow to discuss the international aspects of U.S. energy security.

Hard Facts About Energy

We approach international energy policy aware of a number of hard facts that must be factored into the formulation of the nexus of an effective energy security and foreign policy. These hard facts include:

- Imports supply roughly half of our oil needs, and an even greater share of the needs of some of our most important allies and economic partners.
- We are no longer self-sufficient in natural gas. We now import 15 percent of our natural gas, almost entirely from Canada, but in growing volumes from Trinidad and other LNG suppliers.
- Two-thirds of proven world oil reserves are in the Middle East. In contrast, the United States has 2 percent of proven world oil reserves.
- OPEC nations provide roughly one third of the total oil exports, but also control two-thirds of world reserves.
- Oil supply shocks in any region of the world have an impact on our economy through the instantaneous operation of international oil markets, as we saw recently in Venezuela. Taken together, these facts mean that an effective international energy security policy must, as outlined in the President's National Energy Policy:
- Promote increased and diversified production of energy from a range of foreign suppliers in many regions.
- Coordinate effective international measures to respond to physical oil supply disruptions, through investment in strategic oil stocks, and through cooperative mechanisms to draw on them in case of a severe physical oil supply disruption.
- Encourage major oil producing countries to maintain responsible production policies to support a growing world economy and reduce oil market price volatility.

American energy security policy must complement and support America's economic and foreign policy goals. We must ensure that our economy has access to energy on terms and conditions that support economic growth and prosperity. And we must ensure that the United States can pursue its foreign policy and national security interests without being constrained by energy concerns.

The international oil market can be both volatile and unpredictable, as its recent reactions to recent events in Venezuela and Iraq have demonstrated. We have intensified our already close contacts with major oil producing and consuming countries, making clear that we look first to producers to follow through on their offers to offset market disruptions. If needed to reinforce their efforts, consuming countries stand ready to use strategic stocks. We are pleased that major producers, especially Saudi Arabia, have stepped up production, which has helped to stabilize and reassure global oil markets. This approach—looking to cooperation with the major producers and consumers—to handle challenges of the global energy market underscores the role of foreign policy in promoting energy security.

Domestic Energy Supplies

Energy policies that rely on market forces have made our economy more flexible and responsive. We use energy more efficiently; since 1970, America's energy intensity (the amount of energy it takes to produce one dollar of GDP) has declined by 40 percent. New technologies, such as deep-water drilling and enhanced oil recovery, are reducing the environmental effects and the economic costs of accessing technically challenging oil and gas reserves in the United States. In fact, the U.S. Gulf of Mexico remains one of the world's most promising regions. Alaska also holds vast reserves that can bolster our energy security.

The U.S. is a leading energy producer. The United States produced 72 of the 98 quadrillion BTUs of energy that we consumed in 1999. The United States is the world's second largest natural gas producer and its third largest oil producer.

We are virtually self-sufficient in all energy resources except oil, of which we import just over half of our needs. EIA forecasts suggest that over the next 20 years, U.S. oil consumption could increase by 33 percent or more than 6 million barrels a day. Depending on many factors, including the domestic and international energy policies we adopt, the Energy Information Administration estimates that imported oil could grow to as much as 62 percent of our total oil consumption by 2020.

Other developed regions are also dependent on foreign oil. Europe currently imports 52 percent of its oil needs. Japan imports 98 percent of its oil needs.

These high levels of imports by friends and allies, as well as by the United States, means that energy security cannot be defined as self-sufficiency, as much as we would like that to be the case. With 2 percent of the world's proven oil reserves, the United States is unlikely to ever again be self-sufficient in oil.

Reliability Through Diversification

Energy investments are costly, risky and require long-term commitments. For that reason, neither companies nor countries can have all of their eggs in one basket. Recognizing this reality, American energy security policy has sought to encourage like-minded free market policies toward energy, emphasizing the expansion and diversification of energy supplies. In the immediate future, however, oil and natural gas will likely continueto play a central role in the world economy and international energy markets. So we must find more oil and gas supplies, and these supplies must be reliable and made available on terms that permit sustained economic growth.

Let me provide you with just a few concrete examples that demonstrate what we are doing to achieve these energy goals.

North America: Energy Integration

We have made strengthening our energy cooperation with Canada and Mexico a top priority of energy security policy. We established a North American Energy Working Group in 2001 to serve as a forum for exchanging information and pursuing joint strategies. Senior energy experts from the three North American governments recently released a North American "Energy Picture" report that, for the first time, jointly measures the energy stocks, trading balances, and energy flows in the continent. This marks the first time we have truly looked at the North American market as a unified one. It is an important first step towards greater integration, and mutual economic benefit, and greater energy security. And our work on the Working Group continues.

Canada is our leading supplier of imported natural gas, electricity and oil. All three flow across the border in both directions. The Canadian energy sector is developing its heavy oil reserves, with production expected to reach one million barrels per day by year-end. These heavy oil reserves are anchoring Canada as a pillar of North American energy security. World-scale oil and natural gas projects are also underway in Atlantic Canada, which is now the fastest growing source of natural gas for New England.

New England is the region of our country that is most dependent on home heating oil. New England homes tend to be a the end of our nation's natural gas grid—or are not even connected to the grid at all. Canadian gas is helping reduce significantly that dependence.

Several Canadian provinces are also enthusiastic about major new hydroelectric projects, with potential for large-scale new supply the United States.

Last but not least, Canada is a leader and a key partner in a range of renewable and alternative energy sources, from fuel cells to bio-mass.

Canada's vast resources, market based energy policies, and our interconnected energy infrastructures, contribute significantly to U.S. energy security and to the shared economic health of our two nations. These are all reasons why the State Department hosts an inter-agency bilateral "Energy Consultative Mechanism" between the two governments, allowing each side to work towards common ends and to address issues of concern.

Mexico is one of our leading energy and trading partners, and has, with other major producers, surged production in recent months to reduce market volatility. The U.S. is also the leading market for Mexican manufactured exports, which are now about 10 times the value of Mexico's oil exports. Energy trade with Mexico is not a one-way street. We import crude oil and electricity from Mexico, and are a net exporter of refined petroleum products and natural gas to Mexico.

Mexico will make its own decisions on whether or how it wants to liberalize its energy sector to attract investment, and whether that investment will be domestic or foreign. Mexico has already liberalized transportation, distribution, and storage of natural gas, and has successfully attracted domestic and foreign investment to that sector. In the last few years, Mexico has also begun to allow independent power producers (IPPs) to sell power to the public grid.

The reliability of North American energy trade is also enhanced, of course, by geographic proximity. But more important than geography alone is the rule of law and predictable investment conditions created by NAFTA, integrated pipeline networks, closer cooperation between our governments and energy companies and long-term reliable supply relationships. Our policy is to deepen further this framework of rule

of law and predictable investment conditions in North America and to use it as an example as we seek to build similar frameworks in other regions. For example, the North American Energy Working Group has five expert sub-groups that have harmonized certain appliance standards to facilitate trade and established a mechanism for scientific and technical cooperation.

Venezuela: Traditional, But Strained, Supplier

Venezuela and the United States have also enjoyed strong historical energy ties. Traditionally, Venezuela has been one of our most reliable oil partners. Venezuelan oil policy, until recently, has been built upon a reputation of reliability to international markets, which was of great mutual benefit. Through World Wars, politically inspired embargoes, and global dislocations, Venezuela found that its national interest was best advanced through maintaining a reputation of reliability.

Venezuela's turmoil came at a difficult period for the world economy, but production, and to a lesser extent refinery operations, are now recovering. Venezuela led the way in opening aspects of its energy sector to U.S. firms. These firms remain hard at work there, just as Venezuelan owned CITGO continues to operate in the U.S. as a commercial entity. These reciprocal energy investments bring benefits to both parties. We maintain a robust, if more difficult, energy dialogue with Venezuela, and will continue to do so.

And the United States will continue to work to help Venezuelans resolve their political differences. The key to reverse the severe economic and political decline in Venezuela is a renewed dedication to find a constitutional, democratic, peaceful and electoral solution to the crisis as called for in Organization of American States (OAS) Permanent Council Resolution 833. Democracy and the rule of law are essential elements of a sound investment climate. The dialogue facilitated by the OAS Secretary General remains the best forum in which the Government and the opposition can secure such an agreement, and we urge both sides to avail themselves of this opportunity. The Friends of the OAS Secretary General's Mission for Venezuela, of which the U.S. is a member, was formed in January to support this dialogue.

Caspian Coming On-Line

The Caspian basin has tremendous potential, offering the possibility of production increases from 1.6 million b/d in 2001 to 5.0 million b/d in 2010. This will represent the largest non-OPEC production growth in the world. Transporting this oil from this land-locked region to world markets through the development of multiple pipelines has been a major U.S. foreign policy priority since the mid-1990s. In addition to enhanced energy security, this policy will strengthen the sovereignty and economic viability of new nation states in the region.

The Department of State maintains a Senior Advisor on Caspian Basin Energy Diplomacy. The incumbent, Ambassador Steve Mann, serves as a catalyst between governments, industry and in some cases NGOs, to achieve specific milestones to forward the goal of creating an East-West energy corridor from the Caspian to the Mediterranean.

Construction of the Baku-Tbilisi-Ceyhan (BTC) pipeline begins this month, April 2003. BTC will start shipping oil in 2005. The pipeline will transport up to 1 million barrels/day when it reaches full capacity (in 2010) . The U.S. is also working with the governments of Kazakhstan and Azerbaijan to bring Kazakhstani oil into the BTC pipeline system.

The South Caucasus gas line, running from the off-shore Shah Deniz gas field in Azerbaijan to central Turkey, is also moving ahead and will begin operations in 2006. We are also working to improve the investment climate throughout the region by stressing the need for governments to respect contract sanctity and fight against corruption.

Russia: Energy Super Power

Russia already is an energy super-power. Expanded oil and gas production in Russia can make a major contribution to its own economy and to a well-balanced global supply mix. Russia is developing new oil and gas fields, including multi-billion dollar projects, with U.S. and other foreign investors. They are also successfully expanding production from existing fields as they work more closely with, and learn from, Western service companies. We welcome strengthened energy ties with Russia, and their new energy production in the coming years will enhance U.S. and global energy security. Through the programs of Eximbank and OPIC, we are providing financing and insurance to reduce the political risk of energy investments. We look forward to working with Russia as it strengthens its ties with the International Energy Agency.

We join the Department of Energy and the Department of Commerce in the U.S.-Russia Energy Working Group. The working group has met several times in the last

year, and has formed five sub-groups to focus on cooperation in the areas of: (1) Stability of oil supply, prices and forecasts;(2) Investments into the Russian Energy Sector; (3) Energy Efficient Technologies; (4) Information Exchange; and (5) Small and Medium Energy Enterprises. The third meeting of the high-level group will be in Washington April 7–9, but the working level sub-groups have launched several concrete initiatives.

We also joined with the Department of Commerce and the Department of Energy to establish the U.S.-Russia Commercial Energy Dialogue. Our Commercial Energy Dialogue with Russia focuses on facilitating commercial cooperation both within and outside Russia and addressing bottlenecks that limit the amount of Russian energy that can reach world markets. The U.S. hosted the first U.S. Russia Commercial Energy Summit in Houston in October, 2002, with participation by a large number of American and Russian energy firms and senior officials. The next official dialogue meeting was held in Moscow in December, and successfully organized follow-up to be driven by the private sector. Five sub-committees are preparing recommendations for both governments on possible steps to enhance the potential for commercial cooperation. These groups meet regularly in Moscow, and focus on the investment framework, the regulatory framework, markets and transportation, services and equipment, and small-medium sized enterprises.

West Africa: Great Potential

The Administration recognizes Africa's emerging role as a major energy supplier. For example, Nigeria is normally the fifth largest supplier of crude oil to the U.S., with exports to the U.S. averaging nearly 600,000 bpd in 2002. We are in close contact with the Nigerian government and the firms operating in the Niger Delta region in these days of unrest.

Oil reserves generate a large share of government revenue in countries such as Nigeria, Angola, Gabon, Equatorial Guinea, Republic of Congo and Cameroon. Emerging potential producers, such as Sao Tome, Chad and Mauritania also will begin producing significant new oil supplies in coming years. U.S. energy firms are key in Africa's on-going emergence as an energy-supplying region. From the large firms, such as Exxon-Mobil and Chevron-Texaco, to the smaller oil firms such as Amerada Hess, Marathon, Ocean Energy, Kerr-McGee and others, U.S. companies bring the most advanced technologies and resources to assist African countries in developing their energy resources.

We have a strong policy interest in assisting oil-producing countries to channel their energy resources into solid and sustainable economic development that will benefit their populations. Democratization and the development of responsible governing institutions are particularly important in reducing oil related conflicts and promoting African supply stability. Substantial foreign direct investment is needed to develop African energy resources both onshore and offshore deepwater. We support this process by encouraging the reforms needed to improve the investment climate. Accountability and transparency are necessary to ensure that oil revenues benefit the population and support development. We have an interest in helping West African nations solve these problems, not just out of altruism, but also self-interest.

We are prepared to explore new partnerships to help West African countries make good on their commitment to good governance, transparent business practices, sound economic policies and market-based regulation. We have negotiated a bilateral energy cooperation framework agreement with Nigeria. We favor the World Bank's involvement in independent monitoring arrangements in the Chad-Cameroon pipeline project. Another sign of our commitment is the opening of our new embassy in Equatorial Guinea. This new mission will support our ongoing work in the areas of energy security, human rights, and good governance in Equatorial Guinea.

Persian Gulf: Key Global Suppliers

The Middle East holds two-thirds of proven world oil reserves and has the lowest production costs in the world. Saudi Arabia, the world's largest oil producer, has pursued a policy of investing in spare oil production capacity and storage, and diversifying its export routes to both the Persian Gulf and the Red Sea. These enormous investments allow Saudi Arabia to credibly assure markets that it has the spare production capacity, and the export outlets, to mitigate supply disruptions in the Gulf or elsewhere. Saudi Arabia and other major Gulf producers, such as the UAE, Kuwait, and Qatar, repeatedly emphasize their commitment to be reliable suppliers of oil and natural gas to world markets. And they have demonstrated their leadership by offsetting the recent fluctuations in Venezuelan and Iraqi exports.

Despite frequently expressed concerns about "dependence" on the Middle East, the world and U.S. economies clearly benefit from access to these low-cost supplies. In

fact, this region is a core supplier not to the U.S., but to our key economic partners, primarily in Asia. Without abundant, low-cost Gulf supplies, we would expend scarce economic resources to secure the energy we need at higher cost to the world economy, and our citizens.

Gulf producers will continue to have an indispensable role in the world market. In fact, we will encourage them to increase foreign investment to steadily expand supplies, and increase their own economic potential. But, just as the disruption in Venezuela has shown, the world needs a highly flexible, resilient oil market that will allow for some regions to compensate for ebbs and flows in others. And the greater diversity and growth in world oil production we seek should also allow the market to work better.

Emergency Preparedness and the International Energy Agency

Continued close cooperation with energy producers and consumers enhances our collective emergency preparedness. In the event of disruptions, we have looked to producers to make a maximum effort to use spare capacity to replace lost supply. Producers are acting, but we are also ready if needed. We sustain intense consultations with our partners in the International Energy Agency (IEA) and, if necessary, we are ready, willing and able to make an appropriate emergency response, primarily based on coordinated drawdown of strategic stocks. The 26 IEA members collectively hold over 1.3 billion barrels of government-controlled stocks, representing 114 days import coverage.

The critical role of the International Energy Agency (IEA) is worth underscoring here. Founded in 1974 in response to the oil shocks, the Agency Secretariat and 26 member countries have developed a coordinated approach to emergency preparedness and potential use of strategic petroleum reserves. In addition, the IEA's small, expert staff provides information and analysis on the quick-changing energy scene. The IEA tracks all five energy sources—oil, gas, renewables, coal, and nuclear—and provides a global framework to support short-term readiness to respond to energy disruptions and long-term diversification and technology development. The agency also provides expert guidance to important non-member countries, such as Russia and China, on investment policies, strategic stocks, and how to work better within energy markets. This dovetails with work the U.S. and others are doing in the Asia Pacific Economic Cooperation (APEC) forum and contributes to enhanced energy security.

Energy Infrastructure Security

Given potential terrorist threats to energy infrastructure, the State Department's Counter-Terrorism Coordinator and Political-Military Bureau's Office of Critical Infrastructure Protection work closely with the Departments of Homeland Security and Energy and U.S. Ambassadors overseas to increase awareness of these threats and facilitate cooperation to handle them.

Problem Countries Needing Special Treatment

While our general energy security approach is to actively support the global opening of trade and investment opportunities, there is a set of problem countries whose policies and actions are of such concern that we bar or restrict American firms from most commercial activities with these states, including exploring for or developing energy resources, and, in most cases, buying or importing their oil. These countries include major oil producers such as Libya and Iran, and more limited producers such as Sudan, Cuba and Burma. Libya, Iran, Sudan and Cuba are designated State Sponsors of Terrorism.

In dealing with these nations, we balance our desire to diversify our energy sources with our very real concerns about the security threats that these nations pose to the international community. With the Iran and Libya Sanctions Act (ILSA), Congress set out a policy to discourage investment in the development of petroleum resources in Iran and Libya because of concern about those countries' support for international terrorism and pursuit of Weapons of Mass Destruction (WMD).

Iraq: Country in Transition

The Administration has been clear that our actions in Iraq are not "about oil." As the President has assured the world, Iraqi oil belongs to the Iraqi people. Coalition forces are working to ensure that Iraq's oil sector is protected from acts of sabotage. When Iraqi oil flows again, we will do everything we can to ensure that the proceeds are applied for the benefit of the Iraqi people. Iraq's oil and other natural resources belong to all the Iraqi people—and the United States is and will respect this fact.

Conclusion

Energy security is a leading Administration priority, and our National Energy Policy spells out the road map to achieve it. In the long run we need new technologies such as hydrogen that can fuel our economy without posing threats to the environment or our national security. In the interim, our international energy policy must address the familiar challenges posed by a hydrocarbon-based economy where oil reserves are concentrated in various challenging regions of the world.

Energy security is advanced by sustained improvements in the investment climates in Russia, the Caspian, Africa, and in our own hemisphere, as well as by improved investment opportunities in traditional venues such as the Gulf and Venezuela. We are placing special emphasis on making the integrated North American market work better. To counter short-term, physical disruptions, we stand ready, with our IEA allies, to deploy a collective response if needed.

We intend to engage intensively with energy partners all over the world to diversify supplies, improve investment opportunities and assure that market forces work as transparently and efficiently as possible. Like the war on terrorism, achieving energy security will not be achieved by one dramatic breakthrough but rather by sustained, patient and determined efforts. The State Department here and overseas is actively engaged on this entire effort to enhance our energy security.

Senator HAGEL. Let me begin with Secretary McSlarrow. You both referenced Russia. And of course, Secretary McSlarrow has been engaged with the Russians today. But you both made some significant comments about that relationship which, for purposes of our hearing today, is somewhat isolated on energy capacity and relationships, but I am going to get to you on that point as well, Secretary Larson, to maybe embroider a bit beyond just the energy dynamic.

But to you, Secretary McSlarrow, what are the challenges that we face, most significant challenges in developing our relationship with Russia and their emerging energy industry, so that we not only are working out and structuring a short-term relationship but, probably more importantly, a long-term relationship with them?

Mr. MCSLARROW. Well, Mr. Chairman, I think it is important to think about this relationship, at least in terms of energy, in two ways. As you know, Presidents Bush and Putin last year established the U.S.-Russian energy dialogue. I am the U.S. co-chair and, as you noted, we have had two days of meetings, the third such meetings since it was established.

But one aspect of the relationship is the Administration's belief that our partnership and relationship with Russia will be strengthened by increased U.S. investment and participation in the energy sector within Russia itself. And the second aspect to it is, given the resources, predominantly oil and gas and very much so on the gas side, that Russia has, how Russia might play a role in the future global energy markets, and it already is a significant exporter, but it is clear that it could export oil even more than it does now. And so when you look at the challenges for both of those aspects, one challenge is to ensure the kind of transparency, certainty of the rule of law, tax treatment of U.S. corporations that are investing in pipelines or in exploration and production projects. And there are a number of challenges there, although it is also clear that the situation has improved very much over the last few years.

And then on the other side, it really comes down to transportation. And so, for example, the U.S. and Russia both at the Governmental levels, but even more importantly in some ways, within the private sector, are exploring additional routes to allow the additional export of oil, for example, the proposed Murmansk pipeline

and Murmansk terminal that would allow potentially up to 1 million barrels a day of Russian oil to hit the global energy markets and actually, in some ways, is closer to the coast of the United States than the Persian Gulf would be. In both of those, you are dealing not just with logistical and transportation challenges, but you are also dealing with the fact that you right now have a pipeline monopoly, Transneft and Russia—the Russia Federation is going to have to sort through some of those issues—as well as, once again, the kinds of issues that relate to U.S. or, more broadly speaking, Western investment.

Senator HAGEL. Thank you.

Secretary Larson, would you like to take any piece of what Secretary McSlarrow has said especially in the areas of transparency and rule of law, the things that the State Department obviously has been focused on as well, but even a wider portfolio that you work on?

Mr. LARSON. Very much so, sir. I would comment on two domestic energy policy issues. One is the overall investment climate and rule of law issues. And this has been a very big problem that, over time, has prevented some foreign investment that otherwise might have occurred.

There has been this interesting development recently where BP-Amoco has proceeded with a major investment that is in a way the first of its kind.

As we look forward, I think there are two issues that are very much on our minds right now. One is whether the Russian Government will move forward with some type of arrangement on production-sharing agreements that would at least address very expensive and risky offshore developments, because it is important for there to be the sort of investment that would make sure that Russia is adding to its reserve base even as it is increasing its output.

The second issue, Secretary McSlarrow mentioned, and I think it is worth underscoring again. And that is the tension between a policy of having state-controlled pipeline systems, Transneft and Gazprom, versus allowing enough private investment and competition to create more outlets for the production and export, and more competitive outlets for production and export of energy.

The other point that I think is worth introducing here is the broader—a broader range of economic initiatives that can promote the rule of law. Here I think the WTO accession of Russia is a very important issue. We are supporting that very strongly. We think it is important to move forward, but to do so on commercial terms.

We also think that it is important to move forward with the graduation of Russia from the Jackson-Vanick rule, which I think is something that could significantly improve the tone of the economic relationship.

Senator HAGEL. Thank you. Develop that a little bit if you would, Secretary Larson, for the Caspian, the same issues, transparency, the investment challenge, rule of law. Obviously, we have a pipeline, the Baku-Ceyhan pipeline that soon will be underway, the construction of it, if not already. So the private sector dynamic seems to, in some cases, be at least in the transportation area developing a strong foothold. Production is another matter. But that area, the Caspian, if you would reflect on that, as well as West Af-

rica, using the same parameters that you and Secretary McSlarrow have just spoken of.

Mr. LARSON. I think a good starting point is that in the long run, our energy security is enhanced if the countries in which we are investing and from which we are buying energy are countries where the benefits of that oil and gas production are flowing into the society and helping develop the society and helping to improve the lives of ordinary people because I think that is part of making sure that there is a stable political base over a period of ten to twenty years, during which an energy investment project reaches its fruition.

In West Africa, just to start there, we have been working harder to support countries like Nigeria that have a significant amount of oil and gas, but where there have been both security problems recently that forced temporary closure of some of the production facilities in the Niger Delta, and more generally over a period of time where there has not been sufficient success in turning oil and gas wealth in the ground into human capacity and education and health and things of that sort. We want to be working with countries to help them in that regard.

In Kazakhstan or in the Caspian more generally, first of all, there is tremendous potential. And there has been tremendous progress from where we were just a very few years ago when the idea of a Baku-Tbilisi-Ceyhan pipeline seemed to many like a fairly farfetched possibility. And now ground is being broken and construction is underway.

There have been some significant investments made in countries like Kazakhstan. When I was visiting there recently, there was unfortunately a fairly serious disagreement between the major Western countries and the Government. Now, this seems to be working itself out, but it is part of a set of factors that color the investment climate and make it a climate that is a little bit difficult even though the size of the energy resources there is so great that companies really want to be involved there.

Here to, I think both for the production but also for the pipeline project, it is important to work with these countries to help them make sure that some of the benefits of these resources are flowing to the people. That pipeline flows, crosses some very, very poor areas. And you can look after the security of that through military forces to some extent, but I think you also have to attend to the security of the pipeline by making sure that the people who live in its path see economic benefits coming from it.

Senator HAGEL. Thank you.

Secretary McSlarrow, would you develop a little bit what you referenced in your testimony—and as I looked through your prepared testimony, you develop it in some detail—some of the projects that the Energy Department is looking at now and particularly the President's hydrogen fuel initiative? Could you talk a little bit about that, how that fits into the overall energy independence picture here for our country and the future?

Mr. MCSLARROW. I would be glad to, Mr. Chairman. As we just discussed, the basic premise of our approach has been diversification. That is diversification of sources, diversification of fuels. And we are a country that is endowed with enormous natural resources

in some ways, but it is also very clear that to pursue this strategy, we need to do so bilaterally, multilaterally through different means, and I guess our philosophy could best be summarized as "Let a thousand flowers bloom." Almost anything, if it is economical, is the right policy when it comes to energy policy, whether it is here or abroad. The situation you do not want to be in is one where all of the eggs are in one basket.

And so, for example, I mentioned a couple already in the oral statement earlier, but we have pursued the North American Working Group because, as Secretary Larson pointed out and you did as well, the significance of North America to our energy needs is great. I mean, North America or this hemisphere supplies 50 percent of our oil. That is not inconsequential. And there are a lot of trading opportunities with Canada and with Mexico, in addition to a lot of opportunity with our neighbors in South America.

We also hosted the first Africa, U.S.-Africa energy ministerial. Secretary Abraham hosted that, co-hosted that. And there are a lot of opportunities in working, again, on a bilateral and sometimes multilateral basis for opportunities, whether or not it is for investment or for ensuring that supplies, needed supplies get onto the world market.

I think the interesting thing about what we are doing at the Department is, in addition to all of the sort of traditional investment opportunities which we are aggressively seeking, to go back to my oral testimony, is the technology opportunities that we have. You mentioned the President's initiative on hydrogen. Right now in this country, the vast majority of coal is used for electricity generation. The vast majority of nuclear energy is used for electricity generation. About 23 percent of natural gas is used for electricity generation, but that is forecasted over the next 25 years to increase as a percentage.

And then when you look on the transportation side of the ledger, three-quarters of petroleum in this country goes for transportation. And so what we are trying to accomplish with the hydrogen initiative, in addition to all of the environmental benefits that come with it, is to essentially take advantage of the domestic resources that we have in abundance, principally coal, and others, and shift the balance so that we are in one category and transportation not completely dependent on one type of supply of energy, let alone one type of supply from one region of the globe that has the ability to affect prices and, thus, our economy.

And as Secretary Larson said, it is very clear: We are not going to achieve energy independence in the sense that we are going to produce all of the energy at home. But on the margin, what we are trying to do with diversification is to lower the ability of others to control our destiny. And so the more we diversify, the more we control our own destiny.

Senator HAGEL. Secretary Larson, would you like to add anything to that? I am going to ask a question of each of you which follows along with what Secretary McSlarrow was just referencing, and that question is: How do the two departments that you represent coordinate in working through these objectives, the national energy policy group that was set up to, in fact, coordinate these efforts and harness the resources that your departments and others

bring to the focus that we are putting on this overall effort of national energy independence with all of the other pieces that factor into it? Maybe you could begin, Secretary Larson, explaining how that works. Thank you.

Mr. LARSON. Much of the process works in the way that I think the most efficient processes in business and Government work, and that is in a very informal, personal and intensive way. As Secretary McSlarrow said, I think at the beginning of his remarks, we have made it a point to coordinate very, very closely and directly on all of the key issues that arise. And I will give you just one very recent example in the area.

In preparing for the eventualities that might arise out of military operations in Iraq, we have a strong policy of working with key partners in the International Energy Agency, and that is something that the Department of Energy and the Department of State do jointly, to represent our interests in this international organization that we created after the first oil embargo.

We sat down and developed a strategy months in advance for preparing the way in the International Energy Agency to make sure that the consultative machine ran and the other machinery was very well prepared. And then when it became clear that there was a real prospect of action, we began together to consult some of our key partners around the world on what the appropriate responses should be.

At the same time, the two Departments really over the last two years have been very closely orchestrating our contacts with the key energy producing countries so that we had a very constructive relationship with them, one based on trust. Obviously, the Secretary of Energy is the point person in this because most of the people with whom we do business are the Secretary's counterparts.

But when I have been traveling or others in the State Department have been traveling to parts of the world where there is energy business to do, we have always discussed in advance what the points to make were and shared. The briefing materials, and made sure that we were presenting to these Governments a very consistent and coordinated approach on what the United States' position was. As a result of that type of preparation over the course of the Administration, we think that there has been a very constructive response. We think, for example, that the major oil suppliers that had unused capacity did respond effectively, first to the Venezuelan disruption and later to the commencement of military operations, that the comments that they made to the press and that the International Energy Agency made to the press and that we and our partners made to the press, were very consistent, factual, credible and, therefore, reassuring to the marketplace.

And the way that happened was primarily because of the working relationships that have been established between the two Departments and in cooperation, of course, with The White House and the National Economic Council and the National Security Council.

Senator HAGEL. Thank you.

Secretary McSlarrow.

Mr. MCSLARROW. Well, I do not have a whole lot to add to that. I think Al covered most of it. But I would just add only that, at least internationally one thing we discovered is that there a variety

of international fora that crop up frequently. In fact, the problem is too many.

So the ability of the Energy minister and his counterparts to talk on a frequent basis is there, and one that we take full advantage of. And as Al said, we coordinate very closely.

Domestically, again as he referenced, we work very closely with the National Economic Council, first under the leadership of Dr. Lindsey and now under the leadership of Steve Friedman. Energy is obviously a vital part of our economic future, and The White House takes it as such. And so at least domestically in terms of how we interact, in addition just to our informal cooperation, I would say that that is the most formal process that we work through.

Senator HAGEL. What additional thoughts would you have, Mr. Secretary, as to what we here on Capitol Hill could be doing in the way of giving more support or focus or attention or emphasis to your efforts over at Energy? We have a number of, as you know, energy initiatives up here in various committees in the House and the Senate for a number of fuels, a number. But beyond that, there, I am sure, are other areas where we could be doing things.

I am not surprised, but I note that nuclear has not been touched upon here, not much, in the first 45 minutes of this hearing. Coal has been referenced a couple of times. But those would be two areas that you might want to include in whatever thoughts you have, because I would be interested in getting both of your sense of nuclear and coal for our future energy portfolio.

Mr. MCSLARROW. Well, there is no doubt that our view is that nuclear and coal have an important part of the energy mix, and have to play an important role in our energy future.

As I said before, nuclear provides about 20 percent of our electricity generation today. Nuclear energy has a couple of challenges which we recognize in the national energy plan. One was: What do you do about nuclear waste? Well, the Administration recommended and Congress approved moving forward on Yucca Mountain. Now, we are still a ways yet. We are hoping to have—to take receipt of nuclear waste starting in 2010. But that was a big answer to a big question.

Another issue has to do with proliferation. I mentioned earlier, the GEN-4 international consortium. One of the goals is to work on advanced fuel cycles and advanced reactor designs that address, up front, proliferation and safety issues.

I think in today's market, the biggest problem that nuclear energy faces, frankly, is not the mechanics of nuclear energy. The industry has come a long way from 20 or 30 years ago. It is regularly operating at 90 percent capacity. It is one of the most efficient, lowest cost providers of electricity in the country. It is really the political dimension, and there—that is a dimension that affects investment decisions. And I think until there is a greater comfort level, it is going to be hard to convince people to make that kind of upfront investment decision.

And so there would be a place I would say it would be very important for the Senate and Congress in general to make clear that nuclear energy has that kind of vital role in the future and in the energy bill that is presently before the Energy Committee.

On coal, again, coal provides 50 percent of our electricity generation. We have a 250-year supply. It is abundant. It is cheap. But it also has challenges, particularly in the environmental arena.

So what we are working on and what the Administration has proposed and President Bush has announced, is a number of initiatives that take on those challenges and that try to figure out how you use coal, whether or not you use it in a gasified form so you can sequester carbon and reduce emissions, or some other technological advances. But it is clear we cannot walk away form coal. But it is also clear that just based on the R&D that has been done in the last few years, we have real opportunities to turn that into a low emissions source of energy. But it is not without challenges, and it is not without cost.

And finally, Mr. Chairman, at the risk of beating a dead horse, I should mention ANWR because—I realize we had a vote here in the Senate recently on this, but I do think it is important to think about ANWR in this way. And that is, and particularly in this environment where I think people are—where this will resonate a little more. If you look over the last five years at the spare capacity on the world market, it averages about 4 million barrels a day, with production today of about 77 million barrels. And if you look at the forecast from the Energy Information Administration, which is an independent arm of our Department, over the next 25 years, it is not much different. It is about between 4 million and 5 million projected of spare capacity.

If ANWR had been—when it was first eligible to be voted on, had come online, we could be producing 1 million barrels a day now. The way to look at this is that is 25 percent, potentially, of spare capacity. And at a time when only a few million barrels off the market has put us, in terms of markets and everybody watching what OPEC is doing and what we are doing with the petroleum reserve, it ought to be a reminder that when people say "1 million barrels a day," that is still on the margin a very significant increase in our energy security potentially. And as I said, I know I am risking beating a dead horse, but I think that is an important thing to continue to consider.

Senator HAGEL. Well, I did ask what you thought we should be doing up here. And so you are looking for two more votes.

Mr. MCSLARROW. That is about right.

Senator HAGEL. Secretary Larson.

Mr. LARSON. I agree that both nuclear and coal are indispensable parts of an energy balance. I would focus just quickly on the international dimension of that. We find in groups like the G–8, for example, that there is a vast range of views on this subject. Countries like the United States, France and Canada have maintained nuclear as an important option. Countries like Germany are moving—and Italy are moving strongly away from it. And some like the United Kingdom are a little bit on the fence. I actually should include Japan in the camp of countries that are maintaining nuclear as an option.

We would like to try to work with countries to improve the ability to use nuclear power in a safe and efficient way, and that gets to a point that I want to make more generally that, to the extent that we are able through the research and development initiatives

that you have referred to and that Kyle McSlarrow has been talking about, that we can have these open to participation by countries that are prepared to ante up and share in the costs and, therefore, also share in the benefits. I think it is a very important way to proceed. It lessens the budget costs for the United States to explore these options, and it adds to our energy security if other countries can also find ways of diversifying their energy mix.

On coal, I do not have too much specific to add to what Kyle said except to say that I think that some of these technologies that minimize the environmental impact of coal, clean coal technologies, carbon sequestration, can be very important in increasing the acceptability of coal outside of the United States.

The last point I would make comes back to the North American energy market. I think that we will have potential to further integrate the energy market is this hemisphere. That will require, among many other things, making sure that we treat energy production throughout North America in an even-handed way. Occasionally, there are proposals that move in a different direction. They do not all come in the United States. Sometimes they come from our neighbors as well.

But I think each country, as I have had the opportunity to have more intensive discussions with them on this subject, sees that there is a North American energy future that is a better future than the future we build if we build them separately. And that is going to require, I think, that we are very conscious to make sure that we are not erecting small barriers or small impediments to the free flow of energy across national borders in North America.

Senator HAGEL. Thank you. I appreciated also, in your written testimony, one of your last points about Iraq and making a very clear statement on Iraqi oil which the President and Secretary of State have recently made the same points, that Iraqi oil belongs to the Iraqi people. I think there is still some question, maybe significant question in the world, as to what all of America's motivations are in Iraq, and certainly oil is right at the top of that list of questions. So the more we can make that point very clear, as you know so well, I think the better off we are.

I would say to Secretary McSlarrow that you know that we are doing our part up here for renewable fuels, in particular bio-diesel and ethanol, not that we have any parochial interest in that, but in the overall interests of a wider, deeper energy portfolio for our country, that is, we think that is probably good.

Maybe I could ask one last wraparound question of the two of you. You have been up here for an hour and I appreciate very much your time. And you both have made this case well in your written testimony and some of the specific points you have made in answer to the questions.

The importance of integrating policy, I do not think can be understated at a time when so much is at risk in this world. This piece that we are focusing on today, energy, is but one of those. But I think it has been pretty clear in what each of you have said, representing the two important Departments here for the Government in this area, that without that integration of understanding our national security interests, our diplomatic interests, our economic interests, energy interests, that we will not accomplish any of our in-

terests unless we come at it from the wider-lens view that they are all inter-connected and all inter-related, and investment and relationships are critical.

And because we have had a good deal of emotion and passion as to how we got into a war in Iraq, I think we face some significant challenges within our own country, within our own pockets of people who talk, some up here on Capitol Hill, responsible members of Congress, "Well, let us sanction some of our allies. Let us hurt some of our allies," because they did not agree with us on Iraq, that in my view is a very dangerous and short-sighted reaction. And I think just viewing this from the narrow focus of energy, we come to clearly understand how dangerous that kind of reaction is.

The President said it again yesterday and he has been saying it, as well as Secretary of State and Secretary of Energy, that these great challenges that lay before us are world challenges and not just U.S. challenges.

I would give you each an opportunity to respond to that, or expand on that, or say anything you would like before I ask the second panel to come up.

Secretary McSlarrow.

Mr. MCSLARROW. Well, Mr. Chairman, first, thank you for the opportunity to be here today.

I guess I would just close by using the example we discussed before, which is Russia. I mean obviously, there were—these are difficult times. But nonetheless, I believe my charge from President Bush and Secretary Abraham is to continue driving forward on the energy dialogue. It is good for the partnership. It is good for U.S. energy security. It is good for U.S. investors. It is good for U.S. companies. And so I am just going to properly stay in my lane and just focus on that. But I think it is one of the—as in many other cases, we can differ and still work together at the same time.

Senator HAGEL. Yes. Thank you. Well, please convey to the Secretary and all of your colleagues our appreciation for what you are doing, and we are mindful of it. And we will help in every way we can. So thank you.

Secretary Larson.

Mr. LARSON. Thank you. I would like to make two comments, Mr. Chairman. The first I think arises out of my capacity as one of President Bush's Presidential appointees who, at the same time, is someone who served in different administrations. And that is that energy security cannot be a partisan issue. There are no panaceas. Most of the things that people talk about are things that we need to do, but we cannot just do one or two of them. We need to do all of them.

We have to pursue energy conservation and renewables. We have to pursue initiatives like ANWR. We have to pursue the development of a diversified energy mix by looking into all of these different parts of the world that we have discussed today, and others, to create a resilient energy market.

And it is very important to maintain the sense that we do not have the option of achieving energy self-sufficiency, but we can achieve energy security if we approach it in a bipartisan way and if we look at all of the things we have to do, not just a small subset.

The second point I wanted to make picked up on your very apt remarks about the importance of international cooperation and of not holding grudges, if you will, and I will just give you one example. After the 1973 oil embargo, the United States did make a policy of forming the International Energy Agency. At the time, one important country chose to stay out of the IEA, and that was France. They felt that they wanted to pursue an independent Middle East policy, that they wanted to go their own way, and that was a subject of considerable tension at the time.

Today France is a member of the International Energy Agency. And when Mr. McSlarrow and I and others held our consultations earlier this year on how we should respond effectively and in a coordinated and concerted way to any developments in Iraq, it was with the new French leader of the International Energy Agency. They now hold the executive director position in the agency that they once made a political choice to stay out of. And I think that is an illustration of the point that you made, which is that over time, you know, countries come back to the fold. And on this issue of energy security, France is a country that has worked very closely with us in recent years through the IEA.

Senator HAGEL. Thank you, gentlemen. We are grateful. And again, I would say to you, Secretary Larson, as I did to Secretary McSlarrow, please pass on to your colleagues how much we appreciate what they are doing at a very difficult time. Thank you very much.

Mr. LARSON. Yes, sir. Thank you.

Senator HAGEL. As our first panel packs up, the second panel is welcome to step forward. [Pause.]

Senator HAGEL. Welcome again. We appreciate the three of you being here today because you represent so much expertise and experience in the area that we are talking about today. So thank you.

We will begin with one of our first private sector witnesses. And as you know, I have introduced the three of you. So, Dr. Daniel Yergin, welcome. Proceed.

STATEMENT OF DR. DANIEL YERGIN, CHAIRMAN, CAMBRIDGE ENERGY RESEARCH ASSOCIATES

Dr. YERGIN. Thank you, Senator Hagel. It is an honor to be addressing your subcommittee this afternoon.

Events over the last several months have, of course, made energy security front and center, and have demonstrated anew the importance. We have seen disruptions not only in the Persian Gulf but also non-Gulf countries, Venezuela and now Nigeria.

But this issue of energy security is very much of continuing importance. And it has been for over a century. It probably began when Winston Churchill converted the British Navy from coal to oil on the eve of the First World War, meaning that the Royal Navy was now dependent on oil from Persia, Iran. And at that time, he laid out one of the most important principles of energy security. He said, "Safety and certainty in oil lie in variety and variety alone." And that is still the case today.

What I would like to do in my testimony is to provide the subcommittee with a framework for understanding the national energy position, to identify some key axioms for thinking about energy se-

curity, and then to relate them to some of the areas that you have already raised as being of particular importance.

Why are these issues so salient now? Some are obvious: what is happening in the Middle East; the rise in U.S. oil imports. To that add the market pressures, energy price spikes in 2000 and 2001, and then in 2002–2003, have reminded us in this post-new-economy world of the importance of energy and its importance to our economy.

Finally, of course, there is a new sense of post-9/11 vulnerability. To the traditional concerns about energy security, add those about the security of energy infrastructure.

Now, as Senator Hagel pointed out, our $10.5 trillion economy rests, first, on oil. And then altogether oil, natural gas, coal and nuclear provide 93 percent of our energy. Oil is almost 40 percent. Wind, though growing, and solar provide a little over one-tenth of 1 percent, about 75,000 barrels a day, compared to almost 20 million barrels a day of oil.

As you pointed out, Senator Hagel, most of these issues are debated in the context of what is unfolding in the Middle East, and I think people lose sight of the fact that the United States gets 90 percent of its oil either from within the U.S., from the Western Hemisphere, or from West Africa and the North Sea.

But still our imports continue to rise. As Secretary Larson said, there is no single formula of what to do. To the list he had, I would certainly add technology. One of our focuses at Cambridge Energy Research Associates is on what we call the digital oil field of the future, which we think over five to ten years could add the equivalent of 125 billion barrels of economically recoverable reserves—which are more than those from Iraq.

I have in my testimony, eight principles of energy security. I will not mention all of them, but one of them, Senator Hagel, is a point that you have made about the importance of cooperative relationships with allies, and that these are not issues that we can go alone with.

What about tomorrow? When we look at the shares of world oil production and world oil reserves, we see that something very dramatic has happened that people have not much focused on. There has been the first major increase in world oil reserves since the mid-1980s, when all of the Persian Gulf countries together increased almost overnight their proven reserves by what amounted to 50 percent. That is, we have now seen 175 billion barrels increase in proven reserves. They are not, however, in the Middle East. They are in our neighbor Canada. And those new reserves that have been added, oil sands, are 50 percent more than Iraq's proven reserves.

Obviously, the reserves of the Persian Gulf—now not 66 percent, but 56 percent—are still not only among the cheapest to produce but are of absolute central importance to the health of the world economy. And their security and stability is of critical importance. Yet, at the same time, these resources exist in a larger and more diverse network of global oil production and supply.

Again, as you suggested, things need to be seen in perspective. Iraq's recent production is less than 3 percent of total supply.

What about the future of Iraqi oil? Our estimate is that it would take two to three years and several billion dollars simply for Iraq to get back to where it was in 1990, and perhaps $30 billion in seven to ten years to add another 2 million to 2-and-a-half million barrels a day.

Altogether when we look out over this entire decade, we see an increase of about 20 to 25 percent increase in world production capacity. The leaders in new sources will be the Middle East on one hand and Russia and the Caspian on the other, pretty much even, and then West Africa.

So let me say a word about Russia and the Caspian. The numbers are quite striking, from—together—from 7.8 million barrels a day to 14.2 million barrels a day over this decade. The U.S. Government has played a very important role in encouraging the development of Caspian reserves and production.

The striking growth has been in Russia, what some have started to call the miracle in the Russian oil fields, a 25 percent increase over the last three years, and more than anything else, it is technology, and the application of economic principles to the operation of those fields.

As Secretary McSlarrow discussed, transportation is the key bottleneck, and certainly there's an area for the U.S. and Russia to cooperate as we look to the development of these new pipelines that would make Russia a significant exporter potentially to this United States. I think we all welcome the words that have been said in the last few days by President Putin and our President's National Security Assistant, trying to look beyond the major disagreement on Iraq to cooperative relations, including energy.

Let me say a word about West Africa, which is the other area of significant growth. By 2006–2007 West Africa could overtake the North Sea as a source of oil. But we also see the risks there as exemplified in this almost 40 percent shutdown of Nigerian capacity over the last few weeks because of political instability.

There are major obstacles that need to be focused on in order to encourage this development of production in West Africa which would be so important to the economic health of those countries and to their economic growth. One need is to market the natural gas that comes with oil. Another is to address the instability in the political environment.

How can the U.S. help? We can help in terms of strengthening state institutions, improving political relations with West African countries and developing domestic and regional gas markets.

That is an overall picture. I would like to say something further about the principles of energy security. I began by quoting Winston Churchill, one British Prime Minister, on energy security. I would like to conclude by quoting another, a discussion I had with Margaret Thatcher in the course of working on Commanding Heights.

At the end of our talk, she said, "Remember Thatcher's Law." Not being familiar with what it is, I asked her, "What is Thatcher's Law?" "The unexpected happens," she replied. "You had better prepare for it."

At times like this, we are very mindful of the surprises, whether in the Middle East, Venezuela or Nigeria. But Thatcher's Law seems to me a very good principle, indeed an essential principle,

to keep in mind, both now and in the future when it comes to energy security.

Thank you.

Senator HAGEL. Dr. Yergin, thank you.

[The prepared statement of Dr. Yergin follows:]

PREPARED STATEMENT OF DR. DANIEL YERGIN

I. Introduction

I am very pleased and honored to be invited by the Subcommittee to discuss Global Energy Security. Energy security is a subject that has much engaged me for over 25 years. It constitutes one of the major themes of *The Prize: The Epic Quest for Oil, Money, and Power*.[1]

A year ago this hearing might have been more theoretical, about "what-ifs." Events over the last several months have, of course, made it front and center, and demonstrated anew the importance of oil to our security and our economy. The issue of oil in the Persian Gulf is foremost now. But we have also seen the significant disruptions in non-Gulf countries, Venezuela and Nigeria. The disruptions in Venezuela removed more oil from the world market than the cessation of Iraqi exports and did much to push up oil prices and deplete U.S. inventories. Barring further disruptions, we should see oil prices continue to ease as demand decreases with the end of the winter in the northern hemisphere and as large volumes of stepped-up production from other countries reaches our shores.

But the issue of energy security will remain one of continuing importance. Energy security is not a new concern. It has recurrently been an issue since the rise of industrial society more than a century ago. The beginnings may well have been when Winston Churchill, as First Lord of the Admiralty, converted the Royal Navy from coal to oil on the eve of the First World War. As a result, the Royal Navy moved from Welsh coal as the source of its propulsion to Persian (Iranian) oil. Confronted by this new risk, Churchill articulated a principle of energy security that is no less apt in the first decade of the twenty-first century: "Safety and certainty in oil lie in variety and variety alone."

Over the century since Churchill's decision, energy security has persistently come to the fore. It was a very critical dimension in World War II. In the decades after World War II, there were five Middle East crises that either disrupted or threatened to disrupt the world oil supply system. We are now in the sixth.

The previous crisis was a little more than a decade ago, with the Gulf Crisis of 1990–91. At that time, the imminent threat was that the breadbasket of world oil production—the Persian Gulf—would fall under the sway of Saddam Hussein, enabling his regime to translate oil into political, economic, and military power—and into weapons of mass destruction.

A decade later, Iraqi oil is no longer entering the world market. In looking back, it is clear that, with the end of the Cold War and the resolution of the Gulf Crisis, we passed into a decade of exaggerated confidence about security. That includes energy security.

My objectives in today's hearing, in response to the subcommittee's specific questions, are threefold:

- First, to provide the subcommittee with a clear framework for understanding the national energy position.
- Second, to identify key axioms for thinking about energy security.
- Third, to relate international relations in various regions—including Russia and West Africa—to the future of oil supply and to try to answer the question, "How important is Persian Gulf oil in a global context?"

The reasons energy security is so salient—and why these hearings are taking place—is clear:

- *War in Iraq—turmoil and crisis in the Middle East.* This extends beyond Iraq to terrorism, al Qaeda, demographic pressures, the Israeli-Palestinian conflict, and generational change.
- *Rise in U.S. oil imports.* A quarter century ago, at the time of the 1973 oil crisis, the United States imported 36 percent of its oil. Today it is over 50 percent.

[1] Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power* (Touchstone, 1993).

- *Market pressures.* Energy price spikes in 2000–01 and 2002–03 have in this post-"new economy" world reminded people of the importance of energy, which slipped away during the now-defunct era of the "new economy."
- *Vulnerability.* To all this, add a new concern in addition to the traditional concerns about the flow of oil: the security of energy infrastructure, part of the overall focus in the United States on "homeland security."

II. The U.S. Energy Position

America's $10.5 trillion economy rests on an energy foundation. Some 93 percent of that foundation is provided by oil, natural gas, coal and nuclear power. (Oil, at about 20 million barrels per day (mbd), alone provides 40 percent of the total. Natural gas is 22 percent). Another 2.6 percent is hydropower; and biomass also provides 3.5 percent. Wind, though growing, and solar provide a little over one tenth of 1 percent—the equivalent of about 75,000 barrels per day (bd). It is noteworthy that the United States consumes about a quarter of the world's oil, while its GDP is about a third of total world GDP.

Imported oil meets over 50 percent of U.S. total oil consumption (see Table 1). Seventy percent of America's oil either is produced in the United States or comes from our neighbors in the Western Hemisphere. Another 20 percent comes from West Africa and the North Sea.

Table I.—The Top Five: U.S. Oil Imports, November 2002

(million barrels per day)

Country	Amount
Canada	2.07
Venezuela	1.60
Nigeria	1.59
Mexico	1.53
Saudi Arabia	1.50

Source: USDOE, Monthly Energy Review.

The simple reason that U.S. oil imports are going up is that U.S. demand has for many years been increasing more rapidly than production, which is increasing only modestly.

The prospect of rising oil imports has caused concern in the United States ever since the United States became a net importer in the late 1940s. After all, the United States provided six out of seven of all barrels of oil used by the Allies in the Second World War. For 30 years, "energy independence" has been a recurrent cry. Yet, during these years, the United States has become more integrated into the world economy in many ways that have contributed to higher standards of living and higher employment. This integration emerged as one of the major themes of our new PBS series, *Commanding Heights: The Battle for the World Economy.*[2] Some of the indicators are: U.S. foreign trade doubled during the 1990s and is now equivalent to 25 percent of GDP, compared to 10 percent a couple of decades ago. Americans made 200 million overseas phone calls in 1980. By the end of the 1990s, that number was over 5 billion. One out of seven U.S. manufacturing workers is employed by a non-U.S. owned firm.

Oil, however, is a strategic economy. The issue is not whether the United States should import oil, but, rather, how to avoid being in a position that makes it vulnerable to disruption. Unless one is able to imagine some draconian regulations or a series of technological breakthroughs that are not now apparent, the practical question does not revolve around substantial reductions in imports, but rather about stabilizing them.

But how to do that? There is no single answer or formula.

Conservation has a significant role. The United States already has made a good deal of progress. Today, the amount of oil used per unit of GDP is only half of what it was in the 1970s.

[2] *Commanding Heights: The Battle for the World Economy,* PBS, beginning May 15, 2003 at 10pm.

Stabilizing or increasing oil production is also important. Technology has meant extraordinary strides in the capabilities and efficiency of oil production within a strong environmental framework. The deepwater Gulf of Mexico is the major reason that the U.S. production is increasing—slightly offsetting the strong declines elsewhere. But the ability to continue to increase production will depend, more than anything else, on policy decisions made on access to resources.

A major technological revolution is unfolding today—what we at Cambridge Energy call "DOFF"—the "digital oil field of the future." This brings together a panoply of information and control technologies, remote sensing mechanisms; "intelligent drilling," and highly-accurate measurement tools to make exploration and production far more exact and targeted. The consequence will be to substantially lower costs. As a result, physical supplies that were previously too expensive or too difficult to reach will now become economically feasible. The impact of DOFF will be enormous. For example, in our recent major multiclient study on the subject, we show that in the next five to ten years the digital oil field could expand world oil reserves by 125 billion barrels—more than the entire currently-proved reserves of Iraq.[3]

New technologies, particularly in the transportation sector, will be important, although this will only unfold over time, as the U.S. vehicle fleet cannot quickly turn over. While there is much discussion about the fuel cell, it does not seem imminent as a competitive technology in transportation. It appears that the biggest medium-term impact will come from hybrid vehicles—part internal combustion, part battery-driven.[4]

III. Principles of Energy Security

Being that the United States will be a large oil importer—the world's largest—for some years to come, what are key principles for thinking about energy security? Based upon the experience of the United States over the last 30 years, I would offer the following common-sense observations:

1. Recognize that there is really only one oil market. The United States is part of a global oil market, an extraordinarily huge logistical system that moves 77 million barrels of oil around the world every day. U.S. security resides in the stability of the overall market.

2. Churchill's maxim of 90 years ago still holds true: diversification of supplies is one of the key guarantors of security and this has been an important element of United States policy since the 1970s. The recent sudden losses of production from Venezuela, Iraq, and, partially, from Nigeria underscore this point.

3. Emergency stocks, such as the U.S. Strategic Petroleum Reserve, are a front-line defense against disruption. But their value should not be devalued and undercut by turning them into market-management schemes that confuse temporary hikes—seasonally induced or the result of regulatory-induced balkanization of the gasoline market—with a serious disruption. At the same time, spare capacity maintained by key producing countries is a major defense against disruption, as was demonstrated in 1990.

4. The oil market is far more flexible than it was in earlier decades. Intervention and controls can be highly counterproductive, hindering the system from readjusting. As tough as it is, resisting the temptation to micromanage markets can be one of the most significant contributions of public policy. After all, the famous gas lines of the 1970s were largely homemade—the result of controls that prevented moving gasoline to where it was needed from places where it was not needed.

5. Pursue cooperative energy relations with other importing nations, whether they be the other industrial nations, the new "globalizers" like China and India that will be the most rapidly growing importers of oil, or the poor nations. These can be pursued on a multilateral basis, as with the International Energy Agency, or bilaterally.

6. Government can allay the panic that creates self-fulfilling prophecy through quality information and by facilitating the exchange of information within the industry that makes possible more rapid adjustment.

7. Most oil exporting nations recognize the mutuality of interest and are deeply interested in "security of demand"—stable commercial relations with their customers, whose purchases often provide a significant part of their

[3] *Digital Oil Field of the Future,* CERA Multiclient study, 2003.
[4] *The Hydrogen Economy, How Far and How Fast?*, CERA Private Report.

national revenues. Thus, the United States needs to maintain strong dialogues and a spirit of cooperation on a consistent basis with the exporting nations.

8. A healthy, technologically driven, domestic energy industry is part of energy security. So is a commitment to research and development and innovation across a broad spectrum that takes into account current and future environmental considerations.

IV. Today's Oil Supply—and Tomorrow's

Table 2 provides the basic outline of share of world oil production and world oil reserves. As is evident, the Middle East is the largest regional source of oil. But one of the most noteworthy features since the 1970s is the significant growth in non-OPEC production. As a result, the Persian Gulf's share of production has declined from 40 percent to under 30 percent. Most noteworthy is the 35 percent decline in output in Iran over the last 25 years and the 20 percent decline in capacity in Iraq between 1990 and 2002.

Reserves are a different story. A far larger share of world oil reserves is concentrated in the Persian Gulf region. The percentage share is typically given as 66 percent. But that is no longer up-to-date. It is now 56 percent.

Table 2.—World Oil: Regional Shares

(percent of total)

	Percent of World Liquids Production	Percent of Reserves
North America	18.5	17.7
United States	10.4	1.8
Canada	3.3	14.8
Mexico	4.9	1.0
Middle East	29.2	56.5
Saudi Arabia	11.6	21.5
Iran	4.8	7.4
Iraq	2.9	9.3
Kuwait	2.7	8.0
United Arab Emirates	3.2	8.0
Africa	11.1	7.6
Asia Pacific	10.6	3.2
Latin America	8.8	8.1
Europe	9.1	1.6
Eurasia	12.5	6.4
Russia	6.8	
Other	4.0	

Source: Cambridge Energy Research Associates, Accenture, and Sun Microsystems, ''Global Oil Trends 2003.''

Although almost completely overlooked, something very important has just happened to supply. This past year saw—after several years of discussion—the first major increase in world oil reserves since the mid-1980s, when all the major Persian Gulf countries announced that they were increasing their proven reserves by what proved, in aggregate, to be more than 50 percent.

The new increase is some 175 billion barrels. This is a great deal of oil—50 percent more than Iraq's proven reserves and two thirds those of Saudi Arabia's. These new reserves, however, are not in the Middle East, but in Canada. Advances in the technology for handling the oil sand deposits in the province of Alberta have, by cutting costs almost in half, moved this enormous volume of potential supply into the economically-recoverable "proven reserves" column. For the first time since the famous geologist Everette DeGolyer reported to President Roosevelt in 1943 that the

"center of gravity of world oil production" was shifting to the Persian Gulf, there has been a significant decline in the Persian Gulf's share of total world oil reserves, from 66 to 56 percent.

The point here is that world oil supplies are not some finite constant sum. Rather, the picture is dynamic and changing. The reserve picture will continue to shift. It is altogether possible that if and when a "new" Iraq sorts out its arrangements and reintegrates into the world economy, new exploration will substantially increase its reserves, pushing up once again the Persian Gulfs share of the total.

That the Gulf's reserves, among the cheapest to produce in the world, are of central importance to the health of the world economy can hardly be doubted. They are critical both to the developed and the developing world. Altogether, the region provides more than a quarter of the rest of the world's total oil.

Yet, at the same time, these resources also exist in a much larger and more diverse network of global oil production and supply. Losing sight of that is to lose sight of the context. Some of today's rhetoric would have one believe that Iraq is uniquely important to world oil supply. That simply is not true. It amounts to less than 3 percent of total world supply, and technology is making available new supplies in ways that most people do not realize.

One other observation: it is continually said that Iraq has the second largest proven reserves in the world (although there is some question about the word "proven" in the case of Iraq, given how relatively under-explored it is). But Iraq is no longer the second largest; it has the third, after Canada. Also, it is helpful to note that Iraq's reserves are more or less in the same range as neighboring countries—Kuwait, Iran, and the United Arab Emirates.

CERA sees significant growth in world oil supplies over this decade—measured in terms of additions to capacity, on the order of a 20–25 percent—plus increase. (*See* Graphic "World Liquid Productive Capacity"). Some of the most noteworthy growth will occur in Eurasia (Russia and the Caspian), West Africa, and Latin America—as well as Canada. The deepwater U.S. Gulf of Mexico is also very important.

The largest growth, at least at this point, looks to be in the Middle East. On present estimates, Middle East capacity is expected to increase by about 7 million barrels per day—more growth than in any other region. But Russia and the Caspian will be very close.

The overall growth in world productive capacity will be required to meet rising demand from developing countries, led by China and India. (China's oil consumption has doubled since 1990, and today China is the world's third largest oil consumer and is rapidly moving up on Japan.)

But the prospects for future oil supplies are not fixed. They will be determined by economics, politics, public policy, and technology. Whatever the part of the world one is talking about, one critical factor will be the stability and reasonableness of the investment framework and its openness to foreign investment. The second thing that needs to be taken into account is time frame. There is no fast-forward button to push. An ineluctable "law of long lead times" seems to govern when it comes to major oil and gas development. Projects unfold over five or ten or fifteen years. At every stage, the investors are managing risks. This reinforces the need to shape investment environments that meet the needs of both host governments and international companies over time.

These observations should be kept in mind when discussing the speed with which the Iraqi oil industry will be restored and expanded.

What might be expected from some of the major regions? To begin with, Canada will become a much more significant producer—moving from 3 mbd in 2003 to 4.5 mbd in 2010—led by the oil sands from Albert and, to a lesser extent, from eastern Canada's offshore.

V. Russia and the Caspian

Russia and the Caspian have taken on new significance for the world oil market over the last year. Waves of optimism and pessimism about the potential contribution of the Former Soviet Union have swept over the world oil market in the last decade. At one point, there was expectation that the Caspian region might be a new "el dorado," a new Persian Gulf. At other points, there was focus on the decline of output from the Russian Federation.

There has been a striking shift in the picture of Caspian oil and gas reserves in the last decade. Ten years ago, Caspian hydrocarbon reserves were visualized as consisting very largely of oil, concentrated mainly in the southern third of the basin. Now, after a decade of intense exploration, it has emerged that most of the oil is located in the northern third of the basin, while the hydrocarbons located in the southern third appear to consist mainly of gas.

That has put a very different face on the commercial challenges of developing the Caspian Basin, and on the geopolitical implications. The proximity of the oil of the northern Caspian to the Russia transportation system makes Russia a prime candidate as an export route. As for the gas of the southern Caspian, it is still unclear whether the primary market will turn out to be Russia or Turkey—or indeed to what degree a substantial share of the Caspian gas will remain stranded.

In our work, we have identified several factors that have come together to strengthen the confidence about potential sizable growth from this area.[5]

- The Russian oil industry is going through considerable modernization, as it shifts from an industry that was the remnant of old Soviet ministries toward that of independent oil companies seeking to operate at world standards. New technology, new organization, and new attitudes are turning around the production outlook. Observers are noting a shift in the outlook of the industry toward an emphasis on efficiency and cost reduction. Transportation bottlenecks are in the process of being reduced, although they are still significant. The results can be seen in the sharp increase in production last year and this year, as well as an increasing appreciation in the scale of reserves.
- However, it is worth noting that most of the increase in Russian oil production in the last four-and-a-half years is due to the Russian oil companies themselves. With the significant exception of the offshore development of Sakhalin, most of the Russian production increase comes from West Siberia, long the traditional core of the Soviet oil industry. So far the only significant Western players have been the leading service companies.
- The August 1998 financial crash in Russia was a great shock to Western investors. Russia has had several years of solid economic growth since, however, combined with continuing market reform. This strengthens the confidence of Western investors and creates a more solid basis for economic and political cooperation. After years of frustration and disappointment, Russia is now a higher priority for significant investment on the part of Western companies that want to diversify their resources. As time goes on, world capital markets may well attribute higher value to Russian oil reserves than they do today.
- A new strategic relationship has been emerging between the United States and Russia. This provides a context for a growing energy relationship. And, in turn, the energy relationship is a significant dimension of the overall relation. It is too soon to assess the significance and impact on the energy picture from the strains between the two countries produced by the Iraq war. But the Russian government has been careful to draw a clear line between its disapproval of U.S. policy in Iraq and its continued strong support for economic partnership with the United States.[6]

Key for future development will be the development of new pipelines that break the transportation bottleneck. There may be a decision as early as May on which route east for Russian oil—whether to a port in the Russian Far East or whether to a terminus in China. There is also the possibility that a northern pipeline will be built to the ice-free port of Murmansk—where Lend-Lease goods were shipped during the Second World War. Such a system would enable Russia to become a significant petroleum exporter to the United States. The distances to the East Coast would be shorter than that for a tanker from the Persian Gulf.

As it is, the transportation bottlenecks are in the process of being resolved with new pipelines out of the Caspian region, which is facilitating the build-up of production from those countries.

What does this add up to in terms of additional oil production? Based upon what is known today, we see strong oil growth coming out of Russia and the Caspian—from 7.8 million barrels per day in 2000 to 14.2 million barrels per day in 2010—almost a 60 percent increase. In addition, Russia has an enormous role as the "Saudi Arabia of natural gas," supplying large volumes to Western Europe and, in the years ahead, to growing economies of East Asia and even possibly to the United States, in the form of liquefied natural gas (LNG).

Of course, there could be further surprises that throw either Russia or the Caspian off the new track. But it certainly has much stronger foundations than in the past. The growth of oil supplies from Russia and the Caspian can be one of the most important new contributions to stability in world oil markets—especially in the face of non-OPEC declines elsewhere. The United States has many reasons to pursue

[5] *Miracle in the Oil Fields? The New Growth in Russian Oil Production: Drivers and Implications,* CERA Private Report.

[6] *Changing Course? Iraq and the New U.S.-Russian Relationship,* CERA Global Alert

continued strengthening and broadening of our political and economic relations with Russia. By developing further those relations in general, and working with the Russian government to facilitate energy development, the U.S. government can make a significant contribution to energy security.

VI. West Africa: At the Threshold

The upstream oil and gas industry in West Africa is at a threshold. After several years of steady but unspectacular gains in oil output, West Africa is on the cusp of becoming a leader in global oil production growth. West Africa's potential is manifested by large deepwater oil discoveries in recent years offshore Angola, Nigeria, and Equatorial Guinea. Most new oilfield developments are offshore, but not exclusively. Once the Chad-Cameroon pipeline is completed, a billion barrels of hitherto untapped oil reserves in southern Chad will begin to be exported to the global market. Many American oil companies hope to participate in West Africa's growth.

How significant is West Africa's potential? West African oil production capacity could increase from 4.6 mbd in 2002 to 7.8 mbd in 2010—an increase of 70 percent. Based on CERA's projections, almost one out of five barrels of global capacity growth could come from West Africa between 2002 and 2010. This growth could strengthen the diversification of United States oil imports and thus improve U.S. energy security. The U.S. is a natural market for West African oil.

Angola and Nigeria account for the lion's share of regional production capacity—roughly 80 percent in 2002—but some of the smaller producers are likely to record significant gains to 2010. Equatorial Guinea, which produced no oil until the mid-1990s, could see production more than double from 0.22 mbd in 2002 to 0.4 mbd in 2010. Chad could see its production grow from nothing to roughly 0.25 mbd in the next several years. Oil has been discovered in Niger, but lack of an export pipeline is one of the factors preventing its reserves from being developed. Oil has yet to be discovered in the waters offshore Sao Tome & Principe, but it is attracting strong interest from oil companies as it makes preparations to license acreage.

West Africa's potential is clear, but political and market factors could lead to reality falling short of potential. We've seen over the past few weeks what turmoil can mean in terms of output. Violence in the swamps of the Niger Delta—Nigeria's main oil producing region—led to the sudden shut-in of approximately 800,000 bd of oil production capacity as of late March 2003. The volume of currently shut-in production is approximately 30 percent of Nigeria's total liquid production capacity. Production disruptions occur frequently in the Delta, but the current volume of shut-in capacity is exceptional and is an unfortunate highlight of Nigeria's political situation.

One certainty is that West Africa has tremendous upstream growth prospects. If West Africa is to realize its potential for production growth, three risks need to be successfully managed. A new CERA study on West African oil and gas to 2020 identifies these risks.[7]

OPEC quota/government policy. In all West African producers, government policy—such as domestic content rules—could lead to slower-than-expected growth.

- *Marketing natural gas.* Could the lack of market outlets for associated gas production create indefinite delays for new oilfield developments? If the gas associated with an oil development can't be reinjected or marketed, it could threaten new oilfield development. Developing outlets for gas production—LNG, domestic/regional markets, gas-to-liquids—is essential for West Africa to realize its growth potential. Gas could even spur real regional economic integration. A much-discussed natural gas pipeline from Nigeria to Ghana would, if it is built, represent a true milestone in regional integration.
- *Political environment.* Political instability—unexpected changes of government or civil unrest or even war—could complicate exploration and development by injecting delays and increasing uncertainty about who in government makes the rules. Moreover, lack of political stability could result in simmering conflicts over control of oil revenue that would preclude the use of such revenue as an engine of economic growth and higher living standards.

The U.S. government and international financial institutions could work together with West African governments and oil companies to diminish some of the risks that could lead to West Africa falling short of its potential for production growth. Such policies could be focused on:

[7] *West African Oil & Gas to 2020: Opportunity, Potential and Risk,* CERA Multiclient Study

- Helping to strengthen state institutions. Weak government institutions in West Africa often prevent oil revenue from being used as a catalyst of sustainable economic growth and rising living standards.
- Improving political relations with West African countries. Strong ties between U.S. and West African governments can help expand oil company investments. Strong ties would benefit other endeavors as well, such as security cooperation.
- Developing domestic and regional gas markets. Given the large scale of natural gas reserves in West Africa—Nigeria's gas reserves match those for oil—gas could serve as the foundation for expansion of the region's modest industrial base. Abundant gas reserves also offer the possibility of rapid expansion of power generation capacity. Development of regional gas markets, such as the proposed Nigeria to Ghana gas pipeline, would lead to deeper economic integration between neighboring states. A growing industrial base and rising power supplies would create jobs and foster greater economic and social stability in West Africa's oil producing states.

VIII. Conclusion: One Final Axiom

I began by quoting one British prime minister on energy security. I would like to conclude by quoting another. I remember a discussion I had with Margaret Thatcher in the course of working on *Commanding Heights.*[8]

"Remember Thatcher's Law," she said at the end of our talk.

Not being familiar with it, I asked her what it was.

"The unexpected happens," she replied. "You had better prepare for it."

At times like this, we're very mindful of the surprises—whether in the Middle East, Venezuela, or Nigeria. But Thatcher's Law seems to me a very good principle—indeed, an essential one—to keep in mind both now and in the future when it comes to energy security.

Senator HAGEL. Now, let me ask our next witness, Mr. Vahan Zanoyan, to please proceed. Thank you. Nice to have you with us today. We appreciate it.

STATEMENT OF VAHAN ZANOYAN, PRESIDENT AND CEO OF PFC ENERGY, WASHINGTON, D.C.

Mr. ZANOYAN. Thank you very much, Mr. Chairman. It is a pleasure and an honor for me also to be here.

I would like to summarize some of the key points in my formal testimony also without repeating the whole story. First I would like to give a very simple definition of what I understand by "energy security." And what I understand is sustainable, reliable supplies at reasonable price.

And immediately, I would like to go and make a major distinction here between security of supplies or crude oil, which so far I think most of the discussion has been about, and security of supplies of natural gas which, in my view, is the bigger threat right now in the United States. And I will argue that between these two issues, oil which gets most of the discussion and most of the debate, actually to a large extent is not most of the problem.

Why is not oil most of the problem? I ask this even though I am not advocating here, by any means, complacency about security of oil supplies. I think at least in the last 30 years, if not before, we have spent a lot of time and effort in the world to kind of adapt to but also prepare for disruptions in oil supplies. We have built the Strategic Petroleum Reserve (SPR) in the last 30 years, which is a major safety net in my view, which has not even been fully used to its full potential.

[8] Daniel Yergin and Joseph Stanislaw, *The Commanding Heights: The Battle for the World Economy* (Touchstone 2002), p. 106.

Not only do we have SPR, but we also have agreement on a coordinated way of deploying it should a disruption occur. We have introduced major taxes on oil use, not so much in this country but in other consuming countries in general. There has been a very significant diversification of supply sources, and I agree here with what the previous speaker and Churchill have said, that diversity does enhance security, even though I will argue that it does not necessarily guarantee it.

We have had vast technological advances, not only in the production of energy, but also in the consumption of energy. We have made considerable enhancements also in market transparency and efficiency. And finally, we have done pretty good in terms of consumer/producer dialogue and coordination. Not just dialogue, but also I think there has been an alignment of interests in the last several years, maybe in the last couple of decades even, in what is in the interest of major producers when it comes to oil market stability and price moderation and, at the same, what is in the interest of the major consuming—or importing nations.

Now, the results of all of this has been very impressive. We have—if you look at the record of the last 15 years of how the global oil sector has managed to deal with major oil disruptions, it is quite impressive. We went through a very major oil disruption in 1990, 1991 when both Iraq and Kuwait went out of commission. The world lost almost overnight 4.5 million barrels a day. If you look back and look at what the implications were, we had a couple of months of price surges and tension in the market. We had a slight recession here in the U.S. But compared to what 4.5 million-barrel-a-day oil disruption would have meant on a 1973 scale, for example, we did not see much of an impact at all.

And let us remember that also during that same period, when the global oil sector was trying to adjust to this kind of disruption, there was substantial reductions in exports from the former Soviet Union. Production there was crashing, and net exports were falling less, but they were falling nonetheless.

To give you a much more interesting recent example: It is not definitive because it is only weekly statistics, but according to the Department of Energy, the latest weekly statistics show that the week of March 28th, we imported 10.4 million barrels a day of crude oil, the highest ever weekly import rate. At the time when we are at war with the major Persian Gulf producer, at the time when the world has not yet recovered from the big collapse in Venezuelan production, and at the time when Nigerian output collapsed by 750,000 barrels a day, we recorded our largest imports.

To me, this means something is working. These are not accidental events. And even though I would not base everything on just one weekly statistics, I would take the record of the last 15 years seriously in this, and say there have been some improvements.

And without necessarily going into a lot of complacency, I would recognize these achievements, not just to feel good about it; but because sometimes when we try to fix what is not broken, we can do more damage than good.

So when it comes to these oil issues, I would like to differentiate between three specific concepts. One is diversity of supplies. As I

said, it does definitely enhance security of supplies, and it also creates market stability. I think the more producers, the better.

But there is one thing that diversity of supplies alone cannot do. It cannot immediately fill a sudden disruption anywhere in the world. If we had a lot more diversity of supplies in the world in 1991, but if we did not have at least one producer with substantial excess capacity and the willingness and the ability to swing its production up to immediately meet the gap that was created, it would have been a much more disastrous outcome than we had. So diversity of supplies in that case would not have helped.

The second concept that I would like to focus on is suppliers of commercial significance; and third, suppliers of strategic or security significance. There is a huge difference in my view between the two. Suppliers of commercial significance are definitely Russia, probably the largest one in the non-OPEC field. Norway is a very significant supplier of commercial significance.

But we have right now in the world, whether we like it or not, regardless of the politics, regardless of shared values, only one strategic supplier; strategic meaning a supplier that is willing and able to hold substantial amounts of idle capacity and is willing and able to swing its own production very radically to meet market demands. And that is Saudi Arabia.

Iraq one day can become a very significant commercial supplier along the lines of Russia and Norway. And, Mr. Chairman, I appreciated your comments here about Iraq; in order for Iraq to become that significant supplier, I think, it is very important that the oil is managed by them, that it is held by them. But it is also very important that substantial amounts of transparency and accountability are introduced in the way they run it.

Finally, I would like to come to the natural gas issue. I think the United States is far more vulnerable to supply disruptions in natural gas. U.S. demand for gas is outstripping supplies as it was mentioned earlier by the Secretary, by—both Secretaries, I think, mentioned that. And, frankly, Washington has not been particularly helpful in this case. It has encouraged consumption, and it has discouraged domestic production of natural gas. And that does not help.

Maintaining production itself, let alone increasing it to meet demand, has become extremely difficult in the United States. The fundamental difference there between natural gas and oil is that natural gas is not a global commodity. Global markets do not equilibrate as fast as they do in oil, and sometimes never.

Had natural gas been a global commodity, easily transportable, where markets equilibrated faster, and had we had the 30 years experience in dealing with disruptions and shortages in gas that we do in oil, this probably would not have been a problem, but we do not have any of those things.

I will not go into the details about why domestic production is falling, nor details about why demand has been rising. Those are all in my written testimony, Mr. Chairman, so I will not take the time.

But I would like to stress that right now we are at the period of historic lows in gas storage in the United States, at the time when production is falling by 4 to 5 percent. At these rates, we can-

not meet both current demand and build enough stocks in preparation for the winter high demand season.

Most often what happens in a situation like this is that we cannot cut supplies from residential use. We cannot have homes dark and not air conditioned. We cannot cut supplies from power plants. So we end up cutting supplies from the industrial sector, which means factories shut down and jobs are lost. It is a real cost, and we are not adequately addressing it.

I would conclude there. Thank you.

Senator HAGEL. Thank you very much. Thank you.

[The prepared statement of Mr. Zanoyan follows:]

PREPARED STATEMENT OF VAHAN ZANOYAN

Good afternoon. Senator Hagel and distinguished members of this Subcommittee, it is a pleasure to come before you today to address such a timely and critical issue. My name is Vahan Zanoyan and I am the President & CEO of PFC Energy. PFC Energy is a strategic advisory firm in global energy, based in Washington, DC. We work with most of the companies in the global petroleum industry on various aspects of their international oil and gas investments and market strategies.

Crude Oil and Natural Gas: Different Security Challenges

This hearing is about global energy security issues, which covers both oil and natural gas. The definitions of supply security of oil and natural gas are the same: sustainable, reliable supplies at reasonable prices. However, I would like to start by highlighting an important distinction between security of crude oil supplies and security of natural gas supplies, because these two commodities represent entirely different security challenges globally, and particularly for the United States. Oil is a global commodity. Conditions in crude oil markets in Houston, New York, Singapore and Rotterdam change together and in the same direction. Global oil markets equilibrate. Gas is not yet a global commodity. Vast natural gas resources in various parts of the world remain stranded because natural gas cannot be transported as easily as crude oil. Global gas markets do not always equilibrate—it is possible to have a natural gas supply shortage in North America without causing a disruption in Europe or elsewhere.

I will argue that although security of oil supplies receives most of the attention in policy discussions and debates, oil is not the most pressing energy security problem faced by the United States. On the other hand, natural gas, which rarely gets into the limelight of the energy security discourse, has emerged as a major supply security problem for the United States.

Security of Oil Supplies

The world has had thirty years to adapt to and prepare for oil supply disruptions. Both consuming nations and producing nations have participated in this process. After the oil shock of 1973, the term ″Energy Security″ became synonymous with "Oil Security" and was firmly embedded in the mindset of policy-makers in the West. Their response to real and perceived supply threats was massive, coordinated and effective, leading to such results as the building of strategic petroleum reserves, substantial new taxes on oil use, diversification of sources of supply, new efficiencies in both energy use and production, and the establishment of more transparent and efficient markets. The oil industry and producing countries made major contributions to these outcomes by investing substantial sums of money in developing new resources and technologies and in increasing production capacity. Security of oil supplies may still receive lip service now and then, it may even enter into various political agendas, but it is no longer a burning concern, and justifiably so.

The record of global oil markets in dealing with major supply disruptions during the past fifteen years is truly impressive. In 1990, in the immediate aftermath of Iraq's invasion and occupation of Kuwait, the world lost two important OPEC producers at once. The combined loss of production from these two countries was over 4.5 million b/d. It is not easy to imagine larger and more sudden physical supply disruptions than this. And yet, neither the market impact of this disruption nor its implications for the world economy was that great (although the U.S. economy slid into a short recession). Oil prices rose for a brief period of about two months, and then came tumbling down as soon it was known that additional supply disruptions,

this time from Saudi Arabia, were not likely. The lost production was made up elsewhere, mostly by Saudi Arabia, and markets calmed down.

As the world was adjusting to the loss of Iraqi and Kuwaiti production, output from the former Soviet Union was also falling. From 1989 to 1996, crude oil output of the FSU crashed from over 12 million b/d to 6.8 million b/d. And although domestic demand also fell considerably, FSU exports dropped by over 1.5 million b/d during a period of serious setbacks in the Persian Gulf, without causing any shortages or sustained price spikes in the world. Again, other producers were happy to make up for the difference.

Let's look at a more recent example. The latest weekly statistics from the Department of Energy put U.S. crude oil imports at 10.4 million barrels/day for the week of March 28, 2003, the highest weekly import rate ever. While our country is at war with a major producer in the Persian Gulf, while Venezuelan production has not yet fully recovered from a devastating collapse in output, and while Nigerian production was down by 750,000 b/d in the past two weeks, the United States managed to record the highest imports of crude oil ever, amid declining prices from their recent highs. If this is not supply security, I don't know what is.

Before I go into the reasons for this record of supply security, let me address an important misplaced concern that such statistics often evoke, namely, the concern with "dependence" on foreign oil suppliers. We will always depend on imported oil. Interdependence among nations is not a bad thing. "Energy independence" for the U.S. is a meaningless concept. U.S. production of oil is falling due to the maturity of U.S. oil fields. U.S. reliance on imported oil has already surged by 1.2 million barrels per day in the last five years, and is likely to continue to grow in the next ten years, bringing U.S. net imports to 13 million barrels per day, equivalent to the combined 2002 production of the entire North Sea and Saudi Arabia. Greater energy efficiency can help slow down the increase in imports, but the direction is inevitable in the medium term.

The proper way to frame concerns about "dependence on foreign oil" is to talk about vulnerability to oil supply disruptions, such as the ones described earlier. In this regard, diversity of supply clearly enhances security of supply. The more producing areas there are around the world, the better. International oil companies have actually done a good job in diversifying oil production in a wide range of countries over the past two decades. But the role of supply diversity in providing security, though very important, can be exaggerated. Given the highly skewed distribution of oil reserves in various geographic regions, there is a limit to how much diversity can achieve in terms of security of supplies and there is an even more critical limit to the ability of some producers to replace others as strategic suppliers of crude oil (more on this below).

Oil Market Dynamics

The ability of the global oil sector to deal with such major supply disruptions is not accidental. It derives from a complex set of interactions and developments in and among producing countries, consuming countries, traders, and the industry. Thus, the realities that have reduced the world's vulnerability to oil supply disruptions have a permanence that will keep them relevant and effective in the foreseeable future.

One of the most basic features of this dynamic is the divergence between the degree of dependence of oil importing and oil exporting countries on oil. In the past thirty years, while the industrialized countries successfully diversified their sources of crude oil imports and greatly reduced their relative dependence on energy, the major oil exporters remained dependent on oil revenues. Today, oil exporters have much more reason to worry about security of their markets than importers have reason to worry about security of supplies. This persistent dependence on oil revenues has meant that the major exporters—largely the member countries of OPEC—have had to constantly balance between two conflicting interests and needs: their short-term financial requirements and their long term market share interests. The former calls for relatively higher prices, which jeopardize the latter. The latter requires relatively low oil prices, which jeopardize the former.

So it is not a coincidence that price moderation and stability have been the key policy objectives of the major exporters for the past quarter of a century. They pursue this objective because it is the only way to optimize the balance between their revenue and market share requirements. When oil prices rise too high, the industry and the world economy strike back through both reduced demand and higher non-OPEC supplies, eroding the producers' market share and revenue base. When oil prices fall too low, the industry and the world economy respond with higher demand and lower investments in exploration and production, eventually curtailing the rise in non-OPEC output and sometimes even causing a reduction in existing flows.

While this helps to eventually turn around the eroding market share of the exporters, it does cause considerable short-term financial pain and economic and budgetary instability in the major producing countries.

This has led to an alignment of interests between major exporters and the U.S.. The U.S. has itself opposed both very low (single digit or low teens in terms of dollars/barrel) and very high (over thirty dollars per barrel) crude oil prices. Thus, the producers have tried to manage crude oil market supplies, mostly successfully, to achieve a price range centered around $25 per barrel. This price is high enough to continue encouraging substantial investment in the global upstream sector as well as in technology, but not so high as to cause any major economic dislocations in the industrialized economies.

I'd like to stress that I do not advocate complacency regarding security of oil supplies; just a recognition of all that has been already achieved in the past thirty years to reduce the world's vulnerability to supply disruptions. These are real achievements with very solid safety nets such as strategic petroleum reserves, which have not yet been used to their full potential.

Diversity of Supplies and the Role of Various Producers

I would like to briefly comment on the oil policies and roles played by selected exporters in the context of market dynamics and oil supply security. As mentioned earlier, diversity of supply enhances security of supply, but it is not sufficient to guarantee security of supply. It is important to distinguish between crude oil suppliers of commercial significance and suppliers of strategic or security significance. Size and growth potential are important and generally sufficient determinants of the former. They are not sufficient determinants of the latter. In order to qualify as a strategic supplier, a producing country needs to also have the capability to cause large swings in its production at very short notice in order to compensate for a disruption elsewhere in the world.

Saudi Arabia

Since September 11, there has been growing skepticism towards the kingdom of Saudi Arabia, not only as an ally which does not share our goals and values, but also as a key supplier of crude oil. Although September 11 did not change the below-ground realities of oil reserves, it did change above-ground perceptions enough to challenge Saudi Arabia's continued role as strategic supplier of crude oil. The central concern that has been raised in the U.S. is that if Saudi Arabia is unreliable as an ally in the fight against terrorism, it may also be unreliable as an ally in providing energy security, regardless of the record of the past twenty-five years. To reinforce this position, some critics have maintained that we will soon not need Saudi oil, and that the Kingdom's role of supplier of last resort can be replaced by new energy from the FSU—Russia and the other Caspian states. This reasoning is flawed and could have catastrophic consequences if turned into the bedrock of a new energy security policy. We can do a lot more harm than good by trying to "fix" the current well-functioning system, especially through policies that are based on misconceived notions and wrong assumptions.

Two unique features give Saudi Arabia strategic significance as a crude oil supplier (as distinct from purely commercial importance): First, its willingness and ability to maintain substantial excess production capacity; and second, its willingness and ability to swing production to meet changing market conditions. No other country in the world can perform these two roles to the same extent as Saudi Arabia. In the past twelve months, Saudi Arabia increased its crude output from 7.3 million b/d to nearly 9.4 million b/d, an increase of nearly 2.1 million b/d. This increment is substantially larger than the entire production of Kazakhstan and Azerbaijan put together, which was close to 1.3 million b/d last month.

The role of a swing producer in stabilizing prices is central to the orderly operation of international crude oil markets. The excess capacity that Saudi Arabia maintains allows world oil markets not to panic at every incident, civil war or revolution. Without it, there would be cyclical booms and busts which would destabilize economies and countries. Saudi Arabia is the supplier of last resort, the central bank of the global oil market that provides liquidity and reassurance in difficult times. Neither the Caspian nor Russia is likely to ever play the role of swing producer, because of the resource gap and structure of ownership of the sector.

Saudi Arabia has been a reliable supplier of oil for over a quarter century. Our policy should not be to reject the Middle East in favor of Russian or Caspian oil. The world will need as much Russian, West African, Caspian, Latin American and European oil as it can get. As argued already, such diversity of supplies enhances security. But it is a simple fact that the Middle East in general, and Saudi Arabia in particular, will continue to be the keystone of the oil markets so long as the in-

dustrialized world relies on petroleum. The size of their resource endowment, the commitment of the Saudi government to play this role, the unrelenting dependence of the region's governments on oil revenues and the negative consequences of their own past experience with politically interrupting oil supplies will almost guarantee this.

Iraq

There is no question that Iraq, with its massive proven oil reserves and vast potential, will be a major player in world oil supplies for decades to come. In the near term, the conduct of the war and the extent of field damage will be of concern. Longer term, the post-war oil administration structure will be crucial to setting the foundation for Iraq's future role in global oil markets. I commend the Administration's calls for Iraq's oil sector to be run for the benefit of the Iraqi people. But simply replacing President Saddam Hussein with an agreeable general is not going to achieve this objective. Iraq should retain sovereign ownership of its principal national resource, and it should be credible and competent Iraqi professionals, not foreign nationals, who run Iraq's oil and gas sectors. Furthermore, the participation of foreign capital and technology in the sector should be ensured through production-sharing agreements under terms designed by the Iraqis—a strategic decision that Iraqi technocrats made as far back ago as 1990, before the first Gulf war. However, transparency and accountability will be crucial, not only to ensure that the oil sector is in fact being run for the benefit of the Iraqi people, but also to provide a level playing field for the international oil and gas companies to compete in Iraq and to successfully bring capital and technology to maintain and increase Iraq's production. This can be achieved through scrutinizing the oil revenues, not controlling the physical oil assets or running the sector.

However, even if such a system is put in place and Iraq's oil production capacity increases, Iraq cannot act as a strategic alternative to Saudi Arabia. First, the financial pressures that a new government will face over the next decade will be tremendous. Iraq may produce below capacity as part of OPEC policy, particularly in the latter half of this present decade, but it will not be able to afford keeping spare capacity simply to play the role of swing producer. Moreover, with significant additional production capacity increases being dependent on foreign investment, Iraq would be forced to decide whether idled production capacity should be at the expense of international oil companies operating in the country or the Iraqi people. Neither Iraq's finances nor its reliance on foreign investment bodes well for its emergence as a new swing producer. It is worth recalling here that the excess capacity in Saudi Arabia was developed a long time ago not from the Saudi government budget, but by the former American partner companies of Aramco. Saudi Arabia compensated these companies when it nationalized Aramco through the huge oil surpluses accumulated in the 1970s. It would be next to impossible for any government today to allocate billions of dollars from its current budget to build substantial production capacity for the intention of keeping it idle.

Russia

Russia's oil production and exports have grown substantially in the past few years, and this has contributed to diversity of supplies. Russian oil companies have made progress in transforming themselves to have the governance, management skills and capital structure of Western companies, but are still striving for stability, transparency and accountability. The Russian companies are producing low cost oil, which had already been discovered in huge, but aging fields. Although their oil production is increasing, it is largely through enhanced recovery techniques, producing more oil in place, rather than exploration. Oil companies there are not organized or capitalized for ongoing exploration in order to sustain growth.

Currently Russia blocks Western companies from investing in exploration and development. It is difficult for foreign oil companies to operate there. It does not appear that there will be a legal framework for further production-sharing agreements for foreign companies to invest in the upstream oil sector, outside of joint ventures, such as the recent TNK-BP agreement—which is not likely to be repeated easily. There are other hurdles as well, such as inadequate transportation infrastructure, which means that most Russian oil must be sold into Europe. Oil pipelines are still controlled by the state and there are no signs that this will change.

Although Russian production is rising rapidly to be on par with that of Saudi Arabia, there are important differences between the two producers from a supply security viewpoint Russia cannot replace the Middle East, as some have speculated. Russian production was over seven million barrels per day in 2002 and could rise to nine million barrels per day, or over ten percent of world production, by 2007, with exports of about five million barrels per day, if all goes well with pipeline and

port additions and expansions. While these are substantial additional volumes for world markets, Russia is not another Middle East—by any relevant measure such as swing production potential and significant excess production capacity. It would be a mistake to base the energy security of the industrialized world on Russian oil.

Washington can take constructive steps which could make a difference in solving some of the constraints which limit Russia's future oil growth. Washington should urge the Russian government to open up to foreign investment in exploration and production, with reasonable, stable terms and enforceable laws. Russian oil output would grow and would reach world markets. America should not worry if the oil actually gets to U.S. shores. It is one global market and the U.S. and its consumers are part of it.

The Caspian Region

The Caspian brings together a complex package of "above ground" and "below ground" risks. The region held great promise for international oil companies because of the expected large scale of opportunities that could be accessed. Since 1993, when the first contract was signed by Chevron in the Tengiz field in Kazakhstan, there have been a few steps forward, but also many disappointments. Government relations are difficult and corruption remains a problem.

The two main producers in the Caspian are Azerbaijan, with current output of approximately 300,000 barrels of oil per day, and Kazakhstan with current production of approximately one million barrels per day. By 2010, these two Caspian producers could have combined production of perhaps three million barrels per day, with exports slightly below this level from all pipelines and other routes. This is the best case scenario. While this is an important contribution to the diversification of world oil supplies, it does not come close to challenging the Middle East. For the most part, the Caspian is and will remain constrained by uncertain reserves, exploration risk, technical hurdles, commercial risks, political risks and chronic transportation bottlenecks.

West Africa

Another region where oil supply is surging is West Africa, notably Angola, Equatorial Guinea and Nigeria. The industry's capital and technology is pouring in to explore and produce in the offshore. Production will rise from 3.7 million barrels per day in 2001 to over six million barrels per day by 2007.

West Africa is the mirror opposite of Russia when it comes to oil and gas agreements. Terms and conditions are very competitive, which, combined with its high potential for oil, has attracted massive investment from international oil & gas companies—far more investment than Russia, the Caspian or the Middle East. As a result, production is swelling. Unlike the Caspian or Russia, West African oil can be easily loaded and moved anywhere by ship. However, this increase in production does not change the global supply picture in any significant way: it increases the volume coming from West Africa at the expense of the more mature areas of the Atlantic Basin, namely, the North Sea and North America. This shift of production from politically stable regions to West Africa will increase overall market volatility and will enhance the role of more stable suppliers such as Saudi Arabia and Russia.

Latin America

Despite the success of the deep water in Brazil, the restrictions on foreign investments in Mexico, and the political polarization in Venezuela may delay the realization of the considerable potential in this region. There is a huge opportunity in Mexico to increase output of oil and gas. But difficult political decisions will have to be made to either allow the Mexican national oil company, Pemex, to increase its capital expenditures and take higher exploration risk, or to allow foreign investment in the oil and gas sector—or both. The former is difficult because governments generally do not find it politically acceptable to take large commercial risks. The U.S. government could play a role in helping Mexico help itself by encouraging a policy of allowing foreign capital and technology into the Mexican oil and gas sector. While the Mexican economy is being transformed into a world class exporter that can be competitive against any country in its class, its energy sector remains constrained by 1970s style resource nationalism.

In Venezuela, the government has long overcome the hurdle of political resource nationalism, and is anxious to attract foreign investment in the oil and gas sector. The new Hydrocarbon Law of Venezuela allows for private sector participation of up to 49 percent in upstream oil and 100 percent in upstream natural gas developments. Most of the gas development effort in Venezuela, especially in the offshore, is aimed at delivering natural gas to the U.S. market, making it especially relevant for the U.S. energy security concerns. However, the perceived risks by foreign companies of investing in Venezuela are greater than the actual risks. The challenge

of the government is therefore to demonstrate to international oil and gas companies that the rewards of investing in Venezuela outweigh the risks, and that Venezuela offers a competitive commercial environment relative to other host countries. Some international oil and gas majors already have come to this realization and are actively pursuing projects in Venezuela, but more needs to be done. Thus, only by removing the real and perceived hurdles to foreign investment in Mexico and Venezuela will there be any significant additions to production capacity from the region during this decade.

Security of U.S. Natural Gas Supplies

The domestic pressure on natural gas supplies and prices poses a greater threat to energy security and to the U.S. economy than the rising cost of crude oil. As discussed earlier, oil is a global commodity; natural gas is not. Because it can be easily moved by tanker and stored, the price of oil is set by an efficient and transparent world market. Natural gas prices are set in regional markets because it is difficult and expensive to ship over long distances.

U.S. demand for natural gas is outstripping supply. For the second time in the last three winters, natural gas prices spiked over $10 thousand cubic feet and there was genuine concern that there could be spot shortages in some areas. Demand will rise even further when the economy rebounds, aggravating the problem. Warm winters can mask the problem of inadequate growth in supplies by providing temporary relief to markets; but this simply helps prolong our complacency about the adequacy of natural gas supplies and exacerbates the fundamental problem.

The main problem facing the gas industry is the rapidly shrinking supply in the lower 48. Washington has not been helpful—it has encouraged consumption of natural gas but actively discouraged production in such gas rich areas as the Mountain west, the Eastern Gulf of Mexico and offshore the Northern East Coast. This has become more of an issue as traditional U.S. gas production areas have passed their peak production and will see declines in the years ahead.

The reasons behind the rapid rise in gas demand are numerous and complex, but could be summed up as follows: (a) capital stock put in place during 1990's to take advantage of artificially cheap gas; (b) excellent environmental benefits of natural gas; (c) high efficiencies—especially in the power sector.

But it is becoming extremely difficult to maintain production, let alone increase output in line with demand, no matter how high the price. A number of factors are at play causing the slow supply response, including the following:

First, basin exhaustion is a fact of life in a mature asset base, and the number of drilling prospects is declining in the traditional areas of production.

Second, accelerating decline rates per well have created the so called treadmill effect: the annual decline rates are around 20 percent, which means that every year just to keep production flat, a fifth of the production has to be replaced.

Third, regulatory hurdles act as a constraint. Large areas, over hundreds of millions of acres, were excluded from exploration and production. The U.S. is the only producing country in the world where a resource base of such significance will be kept off limits to development.

Fourth, Liquefied Natural Gas (LNG) can provide only modest support in the foreseeable future, because of infrastructure capacity limitations. Presently there are four LNG receiving terminals in the U.S., all located near the consumption centers on the East and Gulf Coasts. All of these facilities are over twenty years old, and more will be needed to import the required volumes of gas. However, the Federal government is gridlocked over issuing permits for new terminals and for the expansion of existing terminals, with different agencies including the EPA, Commerce, Interior, Homeland Security, and Defense Departments squabbling over muddled and conflicting authority. The energy industry is eager to build new terminals, but without permits it cannot proceed. Some of the energy industry concerns have been heard. Late in 2002 new rules were implemented to streamline the approvals process for onshore and offshore regasification terminals. This has allowed for at least one new terminal in the Gulf of Mexico to be approved. But much more needs to be done in this area.

Fifth, although there are vast natural gas reserves in both the Canadian and Alaskan Arctic, expensive pipelines are needed to transport the gas to U.S. markets. These pipelines would require over five years for permitting, financing and construction, so they are not a short-term solution. Recent high natural gas prices are likely to reinvigorate development of these long-distance pipelines, just as they did two years ago after the last price spike. To the extent possible, steps should be taken to facilitate development efforts to bring Arctic gas to the lower 48. The Alaskan and Mackenzie Delta pipelines are the right answers, but not for this decade.

Complacency about gas supplies rose with the unusually warm winter of 2001–02. This past winter, which was only slightly colder than the norm but still brought spikes in gas prices, should be a wake up call that gas supplies, not oil, are actually a greater threat to the nation's ability to provide reliable supplies to consumers at a reasonable price. Gas stocks are at an all time low, and with production declining by 4 percent to 5 percent this year, it is unlikely that adequate storage will be built by the beginning of next winter to meet the high seasonal demand. Industrial demand, which has already fallen, will be suppressed further to make sure that homes, schools and hospitals can keep their lights on. This suppression of gas supplies for industrial use means something concrete: factories will have to shut down, production will move offshore, and jobs will be lost. This is what is happening right now, and will continue to happen until the supply bottlenecks are cleared.

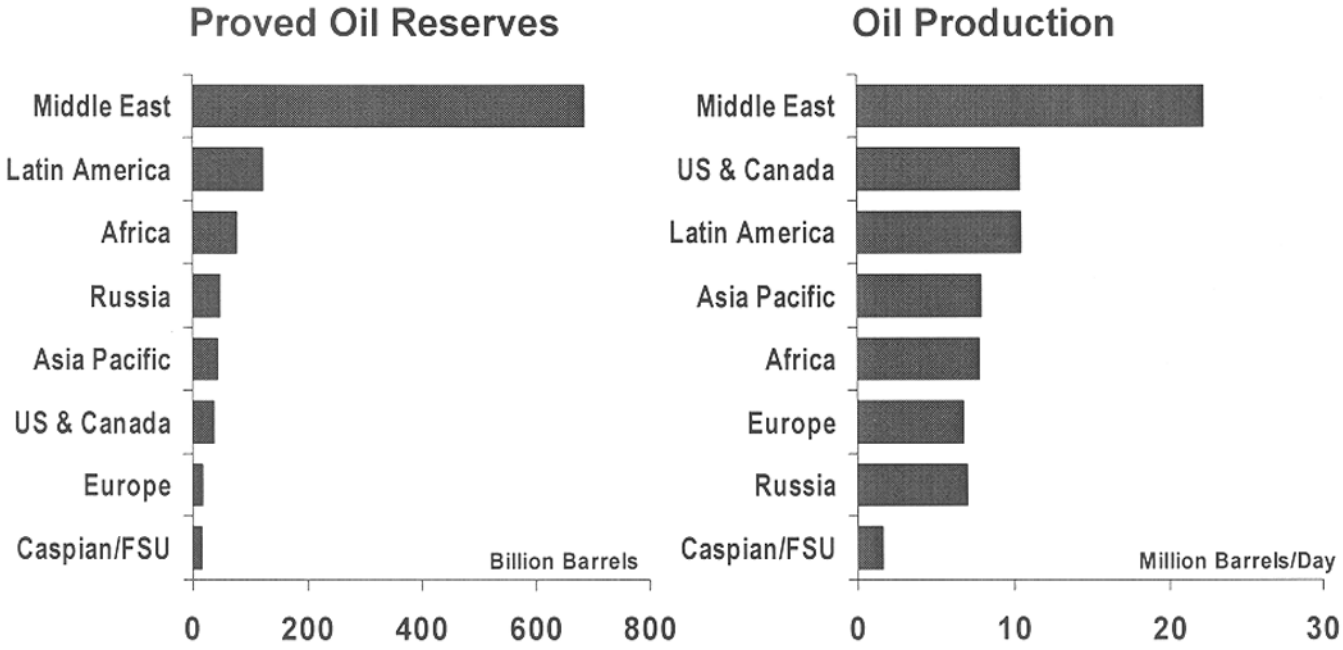
Conclusions

In conclusion, it is important to understand that energy security applies equally to natural gas and crude oil. The global crude oil sector has established an impressive set of structures, procedures and safety nets that reduce the vulnerability of consumers to supply disruptions. Volatility in global crude oil markets is unavoidable, but diversity of supplies can help enhance both security of supplies and stability in markets. It is critical to distinguish between commercial and strategic significance when it comes to key crude oil suppliers. Although Russia is a very significant commercial supplier and Iraq can become one in the medium-term, only Saudi Arabia can play the role of strategic supplier to world oil markets.

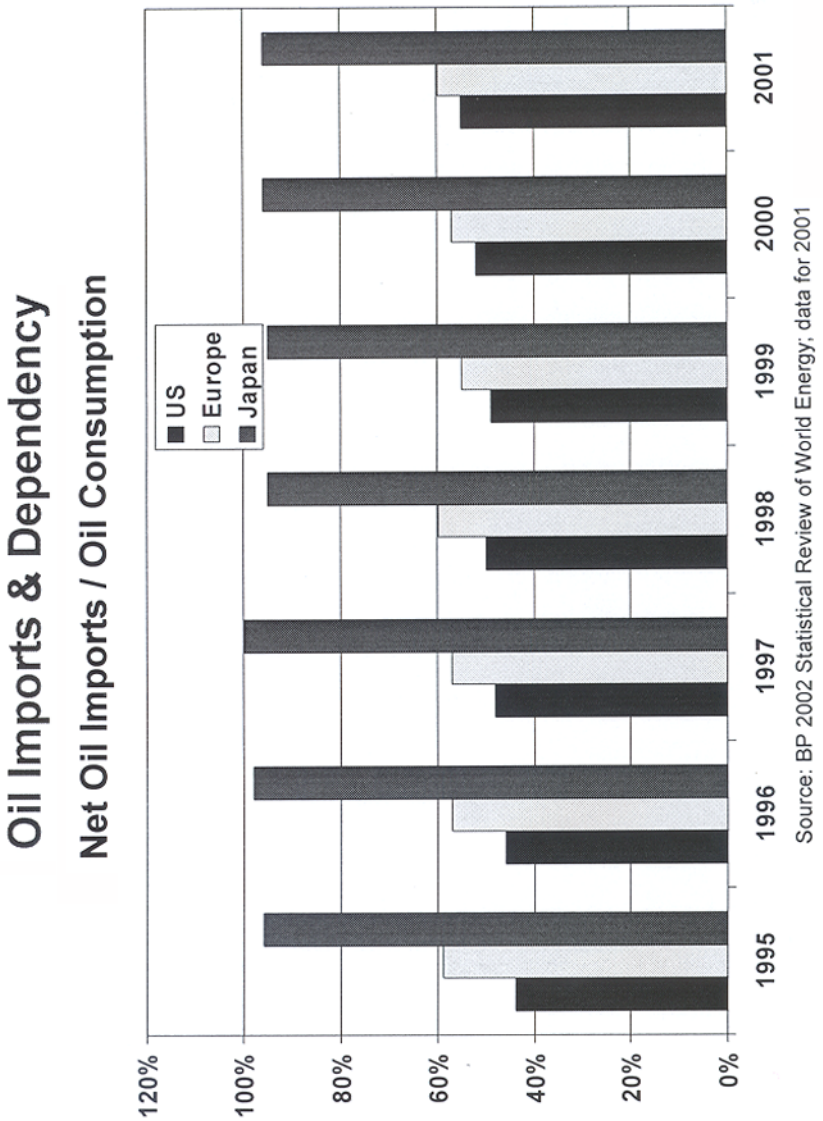
The United States is much more vulnerable to shortages and disruptions in natural gas supplies than to shortages in crude oil. The economic costs of this vulnerability are substantial. The challenge is to increase domestic production and, as importantly, facilitate the transportation of new and more distant supplies of natural gas to the U.S., because the traditional sources can no longer meet demand. Many of the constraints handicapping progress can be cleared through legislative and regulatory measures, but this requires effective coordination and focus by the government on the gas supply issues.

[See charts on the following two pages.]

World Oil Reserves & Production by Region



Source: BP 2002 Statistical Review of World Energy; data for 2001



Senator HAGEL. Dr. Martha Brill Olcott, welcome again.

STATEMENT OF DR. MARTHA BRILL OLCOTT, SENIOR ASSOCIATE, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE

Dr. OLCOTT. Thank you so much for having me. It is an honor to be asked to testify before you. I am going to offer some short comments to highlight some of the points in my written testimony.

As has been pointed out, the U.S. campaign to liberate Iraq has occurred without the shock to the world oil market that many had feared might occur. There has been relatively little additional destruction to the Iraqi oil industry, and it has occurred without endangering the production or shipping of oil from other producers.

As already pointed out as well, the success of this war will soon lead to a slow increase in Iraqi production and to long-term increases in the supply of oil and the stability of supply of oil from Iraq. This said, I think it would be a mistake to prematurely conclude that the war in Iraq has substantially changed calculations of U.S. energy security.

As has been pointed out by all of the speakers, the U.S. uses more oil than we produce, and our close allies also traditionally use more oil and gas and other forms of energy than they produce. And so this challenge is going to stay before us.

I would also like to highlight—and that is what I am going to spend the bulk of my testimony on—that in recent months the greatest glitches to production have been, of course, outside the Persian Gulf, in Venezuela and in Nigeria. And these disruptions have in no way, shape or form been caused by or affected by the war on terrorism.

The kinds of domestic economic problems that produce these halts in production, in my mind as a Caspian expert, provide ominous warning of the kinds of problems we might see from other new producing states and from the states of the Caspian region in particular.

The Nigerian crisis in particular is a portent to what might come in Kazakhstan. In fact, I begin my recent book on Kazakhstan with a quote from Chinua Achebe, about Nigeria, arguing that Kazakhstan has the risk to become Nigeria without ports.

In both Kazakhstan and Azerbaijan, the problem of corruption is a huge one. I will talk about Turkmenistan afterwards for a few minutes. Both Kazakhstan and Azerbaijan have introduced new national oil funds which have the potential to distribute revenue to the population. But I would like to point out that these oil funds are still largely untried and we will not know how well they work until the revenue stream is in place and we know how much money comes in as income and how much money is siphoned off by the national oil companies as—prior to being declared as income.

The populations in both countries feel excluded. It has been a very difficult transition period. And the kinds of risks one faces in the long term in both of these countries is the risk of regional tensions and not so much the kind of ethnic tensions we saw in Nigeria. Obviously, I think it is not too late to see the current negative trends in both countries be reversed, but we should be well aware of how few effective levers we have in both places to effect change.

Both countries face transitions in the next several years. Azerbaijan is likely to be the first to go through a transition of power. The Kazakh regime, Nazarbayev is younger and healthier, but it too is under considerable stress that has been increased by the recent indictments in New York that have brought attention to the Kazakh oil industry.

The attention of most of our efforts at economic and political reform are long-term efforts, predicated on the notion that things in

ten, fifteen or twenty years will begin to bear fruit, that these reforms will begin to bear fruit. But the crises points in both countries will come in five to ten years, and may well come well before we can hope that these—that the reform programs will have borne fruit. So worrying about what is ten years down the line may well turn out to be several years too late.

There was discussion in the last panel about the recent glitches, as they were called, in the Kazakh oil industry with regard to U.S. investors. I am much less sanguine than our previous speakers, that these are short-term glitches that have been worked through. I find through close monitoring of the Kazakh press that there is over the past year a real increase in discussion on the need to consider re-nationalization of assets in Kazakhstan. And I am not arguing that this means the big projects will be overturned, but the whole vocabulary of talking about assets has changed in Kazakhstan, and the argument in favor of the Kazakhs taking more control of their energy sector is being made by the kinds of young reformers that the U.S. had looked hopefully toward.

So I take this trend as one that poses some long-term risk to the security of projects in Kazakhstan. The problem of renegotiation may constantly come before us.

I want to say something just for a minute about Turkmenistan. We have talked about gas some today. Turkmenistan's gas does not come to the U.S. market, and it is unlikely to come to the U.S. market. But the development of Turkmenistan's gas is a critical part of any long-term solution in Afghanistan. To the degree to which there are problems with the regime, and the regimes in Azerbaijan and Kazakhstan are far from ideal, but they are model states by comparison to the conditions of investment in Turkmenistan, where we have a regime that is at best barely functioning, and at worst really on the verge, potentially, of becoming a client state of Russia, which I see as a fairly negative long-term trend of the Niyazov Government.

Let me say a few things about Russia itself. If you had asked me a year ago to talk about this, I would have said that I thought that the improving U.S.-Russian relationship and the improving U.S.-Russian energy partnership was a potential stabilizer for Caspian supply more generally. A year ago it seemed that the skeleton of that energy partnership could take on the flesh necessary to support a dramatically redefined U.S.-Russian relationship.

A year later, I think we are all more cautious about talking about the future of U.S.-Russian cooperation outside of the energy sector. Inside of the energy sector, there is much positive to look toward. But I think we have seen now, unlike a year ago, that the process of finding coincidence of national interests between the U.S. and Russia is going to be more difficult than we might have thought.

We in the U.S. are very aware of the political pressures of our own election cycle, but for the first time we are becoming conscious of what the Russian election cycle means for U.S.-Russian relations and for Russia's foreign policy more generally.

I would argue that much of what we see occurring in the Russian-U.S. relationship is predicated by the conditions of Putin facing reelection in 2004. He will be a much stronger and more self-

confident leader after that election, but beginning one day after 2004, the 2008 election cycle will begin in Russia. And that creates the possibility of a much greater transition in Russian politics than we have seen today.

So I think that it will be a mistake for the U.S. to rely on Russia to serve as a stabilizer for some of these states. I should point out that Russia is increasingly taking this role and has been trying to take this role since the increased U.S. military presence in Central Asia in the aftermath of September 11. Russia actually has closer relationships with all of these states than they did previously.

But what I would say is that there is no quick-fix on the horizon for the problems in the political and economic and energy sectors of all three new producers in the Caspian.

I am just about out of time, and I want to make just a couple of comments about the Persian Gulf, and then one concluding comment.

I would like to argue quite strongly that the period of transition in Iraq, rather than simply the war itself, is the beginning of what will be a period of great uncertainties throughout the region; that U.S. military occupation, which is going to be what begins this period of transition, is really going to be a shock in the greater Arab world and in the greater Muslim world. And this is going to create great stresses on the regimes. The attitude of the population in these countries is going to create great stresses on a whole host of energy producing regimes upon whom we rely.

I would strongly urge that as the U.S. tries to win the hearts and minds in Iraq with our ambitious program of nation building, we not lose sight of the need to reach out to the populations in the Arab world and Muslim world more generally, and be sensitive to the increased risks for the regimes to whom we are so closely tied and to whom so much of our energy depends.

It is important to remember that Saddam was much more of a hero abroad than he was at home.

Finally, in conclusion, I would like to make a comment about energy security and U.S. security from my prism as a regional expert. When we talk about U.S. energy security, and virtually everybody testifying today has emphasized energy security as the challenge of ensuring that the U.S. and its allies have enough energy, but we also must be aware of the ways in which U.S. security is put at risk by the inability of other kinds of states to ensure that they have sufficient access to oil and gas, and by disruptions in supply and by rapid price increases.

This really changes the security environment for poorer countries and for rapid industrializers who have trouble paying rapid increases and going on the spot market and paying top dollar. Let me give you two examples from my own work, from my own area, where uncertainties in the energy prices have real impact on security.

I would say, looking about at both Uzbekistan and Kyrgyzstan and especially on Kyrgyzstan and Georgia, three states that are critical to us in the war on terrorism, these are all states that have energy security problems. Georgia's economic situation has been shaped from the onset by their inability to pay for their gas. But

in Kyrgyzstan, which is an energy importer, the high prices in energy have really made that regime much, much more fragile.

Finally, one last comment about energy security and inadvertent impacts on U.S. policy, has to do with China. China, too, is beginning to totally reshape its foreign policy, considering totally reshaping its foreign policy as a result of trying to cope with the volatility of supply and their need to cope with energy for their market.

At least in my part of the world, in Central Asia and in Russia, China's efforts to copy with its energy needs have the capacity to create a strategic tidal wave for all of the states of the region.

Thank you for your attention.

Senator HAGEL. Dr. Olcott, thank you very much.

[The prepared statement of Dr. Olcott follows:]

PREPARED STATEMENT OF MARTHA BRILL OLCOTT

Let me thank you for the opportunity to testify.

It is always an honor to appear before this committee. But it is a particular honor being asked to speak at the current hearings, coming as they do at so critical a time in our nation's history.

The U.S. led war to liberate the people of Iraq is certain to be a watershed event, one whose full impact on the post-Cold War international security system we will not be able to accurately describe or fully comprehend for at least several years. Many of the reverberations of this action will not even begin to form or be felt until the culmination of the war, and others until military occupation makes way for Iraqi self-rule.

The events in Iraq will pose a lingering risk to U.S. energy security, irrespective of the fact that the war is being undertaken to meet a set of broader security concerns. Although the speed with which increased amounts of Iraqi oil can be brought to market will be difficult to calculate until a careful survey of the Iraqi oil industry is done, the end of the war will mean the resumption and expansion of Iraqi oil production.

Increasing Iraqi oil production only addresses one small part of the energy security problem. Much more important to the long run energy security of U.S. and its closest allies is the success with which the U.S. goes about the post-war reconstruction in Iraq. For here the U.S. is sailing in far more uncharted waters than it did throughout the phase of military operation.

It is likely to be several years before the democracy-building experiment that the U.S. will engage in the aftermath of this war can be judged as a success, until an Iraqi civilian government is able to demonstrate its capacity to govern the state with public approval. Until that time the risk of instability in other oil-producing states in the Persian Gulf is likely to remain quite high, and if U.S. led democracy building efforts are successful in Iraq the risk to many of these regimes may well be intensified. No matter what, the relationship of the U.S. to other oil-producing states has been redefined, as have the relationships of the leaders of many of the neighboring countries to their populations.

There are other threats to the energy security of the U.S. and its allies that bear little relationship to the War in Iraq. Two other oil-producing states have also been frequently in the news in recent months, whose reserves figure importantly on the U.S. market, Venezuela and Nigeria. Industries in both countries have been temporarily shut down, the first because of a national strike, and in the second case because of ethnic disturbances. In both cases American held assets have been directly affected, and the work-stoppages have affected the supply of oil to U.S. markets.

These developments too could be a harbinger for problems that may lie ahead, for other small producers in Africa, and more importantly, in Russia and in the new producers of the Caspian region, whose production is set to increase dramatically over the next 5–10 years. The kind of risks that are posed to U.S. energy security in these states will not be minimized by U.S. success in war in Iraq, or by a smooth process of nation-building in its aftermath.

My testimony will look at the energy security threats that could originate from these "new" oil producing states that lie outside of the Persian Gulf. I will then talk about the possible threats to energy security that could come from the Persian Gulf region in the aftermath of the current war for the liberation of Iraq. Finally, I will

conclude with a discussion of the "hidden" security costs for the U.S. of crises in the oil industry and energy sector more generally.

Threats to Energy Security in "New Producing" States

The recent crises in Nigeria and Venezuela may well be harbingers of the kind of problems that will develop in the Caspian region, as the Soviet-era rulers make way for a new generation of rulers.

Of the five states of the Caspian region, only Iran does not in some way qualify as a new producer. Turkmenistan, Kazakhstan and Azerbaijan all achieved their independence in late 1991. The situation in Russia is somewhat different, as it is a case of statehood restored. However, the economic revolution that has accompanied the fall of communism means that Russia should be viewed as a kind of new producer as well. Russia's reserves are vast, larger than the other new Caspian states, and foreigners as well as Russians have been entertaining hopes of developing these assets.

All of these states have also experienced enormous political changes, going from constituent units of a highly centralized ideologically drive political system to self-administering political units each with its own evolving national identity. Probably nowhere have these changes been greater than in Russia, which has already experienced a peaceful political transition, with Boris Yeltsin's choice of political successor being ratified by a popular election process.

The other three new Caspian oil and gas producers have yet to undergo this same transition. Octogenarian Heydar Aliyev who rules Azerbaijan is not nearly as sickly as his much younger former Russian colleague was. He hopes to serve out both his current, and one additional term of office. If Aliyev's health holds, the outcome of the 2003 presidential election is not in doubt, But although Aliyev has been one of the greatest political survivors of the last fifty years, even he cannot cheat death indefinitely, and when construction is complete and "big" oil begins to flow through the much debated Baku-Tbilisi-Ceyhan pipeline, Azerbaijan could find itself going through a difficult political transition.

Saparmurad Niyazov of Turkmenistan and Nursultan Nazarbayev are in their early sixties. The latter seems quite fit, and the former has both had serious health problems and is the more unhealthy and more unpopular of the two. Niyazov, has been responsible for the development of an increasingly more despotic cult of personality, and has grown so unpopular with the Turkmen elite in recent years that in November 2002 there was a failed political coup effort against him. In the aftermath of the failed coup, the Turkmen leader has moved even closer to Russia than previously was the case, and negotiations awarding Russia long-term control over the export of Turkmen gas are coming to a conclusion.

For all his much publicized praise of the special relationship between the U.S. and Kazakhstan, in recent months Nursultan Nazarbayev has also become more closely associated with Russia's president Vladimir Putin on a number of key issues, including almost mirroring Russia's position on the war in Iraq. The Kazakh president has not required the same bailing out as his Turkmen counterpart. Nazarbayev has not been guilty of the same political excesses as his Turkmen colleague, but he too has been responsible for a sharp restriction of political competition in his country. Increased pressure on political opposition groups in Kazakhstan has come at a time when stories of his personal corruption, accentuated by an ongoing grand jury investigation in New York's southern district, are increasing. While developments in Kazakhstan have led to periodic rebukes of the Kazakh leader by reasonably low-level administration officials, even as the drama in NYC has continued to unfold, the leader of oil-rich Kazakhstan has remained a welcome visitor in Washington.

The deteriorating political situation in Kazakhstan is not wholly dissimilar to that of Nigeria, although the level of corruption in the landlocked Caspian state is still not as all pervasive as it was in Nigeria under military rule. It is often said, in my opinion with great justice, that the U.S. is too generous in the treatment of dictators of oil-rich states. In tolerating the foibles of these men policy-makers in Washington often help create the very outcomes that their support is designed to avoid, that is to make access to oil less rather than more dependable. As estimates of the size of Kazakhstan's unexploited oil reserves began to grow, so too it seemed to Washington's degree of tolerance for Nazarbayev's "bad" behavior.

We are already seeing what this kind of outcomes such a strategy can lead in Nigeria, where the damage done in the years of corrupt military dictatorship left the economy of the country in ruins, creating hard-to-fulfill popular expectations of the civilian rulers who took power four years ago.

When the government of Nigeria was returned to civilian rule four years ago it was already too late to introduce relatively easy fixes for the country's growing economic crisis. Nor were there any ready solutions for reversing decades of deterio-

rating social conditions in many parts of the nation. In a country as ethnically diverse as Nigeria, the introduction of a participatory form of government with the backdrop of social and economic crises was a recipe for ethnic conflict, much like we have seen in recent weeks in the Nigerian Delta region, where U.S. and other foreign producers have recently suspended oil production.

The trigger for the most recent violence is Nigeria's current election cycle, which culminates with presidential elections in mid-April. The real cause, though, is the decades of neglect by Nigeria's rulers. While the military dictators were in power the thrust of U.S. policy was to support U.S. businesses involved in the country, and provide only minimal assistance to the regime in power. Since the return of civilian rule, the U.S. has made a substantial increase in assistance money available to the Nigerian government, and non-governmental agencies working in the country. But this assistance money is unlikely to lead to rapid solutions in Nigeria. A slow improvement in the country's economic and social situation could develop, but this is not guaranteed. Civilian government could be abandoned in favor of a military or even other form of dictatorship, and the country could devolve into further chaos or a civil war on ethnic and or regional lines. As bad as the recent level of ethnic violence has been, and there have been over ten thousand deaths in four years, under a dictatorship or during a civil war things could grow much worse, with full-scale genocide resulting.

Although one should not generalize too far from the situation in Nigeria, many features of this African country's crisis could be duplicated in Kazakhstan, albeit in somewhat muted forms. In any political succession, elite groups from Kazakhstan's oil-producing regions (found largely in western Kazakhstan) are certain to demand greater representation and a greater share of the spoils (both in terms of personal wealth and as investment in the economy of their region).

The demographic mosaic of Kazakhstan is not nearly as complex as that of Nigeria, but ethnic and sub-ethnic divisions are critical there too. Should political succession fail to meet the expectations of the prominent families of the Small Horde (from western Kazakhstan) and solely reward those from the Great Horde (which is the group that President Nazarbayev is from), or those of the Middle Horde (in northern and eastern Kazakhstan, whose prominent families have generally favored close ties with Russia) then the threat of territorial secession could become more than a hypothetical one.

One of the complaints that helped set off the current protests in Nigeria's Delta region has been the shortage of petrol as well as problems with energy supply more generally. This has been a recurrent problem in Kazakhstan and Azerbaijan both, and in both places there has been a sharp differentiation in the standards of living between the urban rich and the rural poor, and the percentage of the population falling into the latter category is an increasing one.

The situation in Venezuela while different from that of Nigeria, is in many ways equally disturbing, proving the case of what scholars have called "the Dutch disease." Oil is the principle source of income in Venezuela, and the state oil company is that country's largest employer, and economists have been warning that Kazakhstan, Azerbaijan and Russia could all fall victim to "the Dutch disease."

Venezuela's crisis was caused by the mismanagement of the oil industry, by a sharp turnover in management as well as bad choices in how income from foreign investments was used. Add to the mix a controversial and unpopular president, and you get a situation that developed into a nation-wide strike in both the oil extraction and petroleum refining industries.

It is not difficult to imagine variants of the Venezuelan crises potentially developing in either Azerbaijan or in Kazakhstan, especially if the newly organized National Oil Funds do not receive or properly distribute the amount of money in oil revenues that most of the populations of these countries are counting on. This is especially true because the next group of presidents could be less popular and more controversial than the current group. This is very likely to be the case in Azerbaijan, but could also be true in Kazakhstan, as in both countries the new leaders will have to create the foundations for their political legitimacy.

Moreover, despite Washington's long-time support for these less than popular regimes, the presidents of Kazakhstan and Turkmenistan remain likely to turn to Moscow instead to bolster their regimes. The Kazakh oil and gas industry is becoming more intertwined with Russian interests than was previously the case. At the same time relations between the Kazakh government and leading U.S. and other western energy companies are becoming more strained, and the Kazakh government seeks to redefine terms of existing contracts, and to insure that the Kazakh national oil firm gets majority ownership stakes in all new projects that are let.

The conditions of political succession are likely to put new and more serious pressures on foreign investors in Kazakhstan, who even if they back the winning side

are likely to find the ground-rules of doing business increasingly more set in sand. What makes this most unfortunate, from the U.S. point of view, is that these developments are likely to occur in the period (2005–2010) when Kazakhstan's new large oil fields begin to become significant producers. Russian elite groups are already working closely with competing economic and political forces within Kazakhstan, determined to ensure that the outcome of a political succession struggle is to their benefit. And unlike U.S. groups, that are also interested in protecting themselves against unfavorable outcomes, the lack of transparency of the playing field works much more to their advantage.

The relationship between Baku and Moscow is more complex, given the enmity on the Azerbaijani side that dates from the Karabakh crisis and Moscow's tacit support of the Armenian position. But the realist camp in Azerbaijan, of whom Heydar Aliyev is certainly the most prominent representative, is well aware of the critical role that Moscow can play to help secure the position of the country's next president. Azerbaijan is the only one of these oil-producing states to have joined the current coalition in the war to liberate Iraq, but in the past few years President Aliyev has also sought to improve relations with Russia.

Can Russia be a stabilizer in neighboring states?

In the first year of the War on Terrorism there was reason for U.S. policy-makers to be optimistic that improved U.S.-Russian energy cooperation could advance the cause of U.S. energy security as well as U.S. security interests more generally. Putin had great hopes for a strong U.S.-Russian energy partnership, and had hoped that it would stimulate foreign investment in Russia's oil industry as well as advance the cause of Russia's geopolitical interests more generally by creating a new and strengthened international role for Russia.

From the onset, there has been a strong element of pressure to the Russian-American energy partnership, hype generated by the two states involved rather than by the media. From the U.S. side, talk of enduring cooperation with Russia put Saudi Arabia and other Gulf producers on notice, that there were new energy sources becoming available to the U.S., and that if they wanted to preserve their privileged place in the U.S. market they had to be more forthcoming with their oil reserves.

From Russia's point of view the partnership gave Putin's presidency a seeming international success, at a time when U.S. policies were marginalizing Russia in Europe and in the international community more generally. It also seemed to give the Russians a reward for participating in the War on Terrorism, and for quietly standing aside when the U.S. opened military bases in Uzbekistan and Kyrgyzstan.

Developments in the last few months are making clear that Russia's sense of national interest diverges in many key ways from that of the U.S. At the same time, Russia's energy resources are real and considerable, and their oil reserves in particular can be developed in ways that if coordinated with the development of Azerbaijani, Kazakh and Turkmen reserves can be to everyone's advantage. Moreover, the changing nature of Russia's relationship to the other former Soviet republics also makes it seem less imperative for the U.S. to take great pains to "protect" these states from Russian bullying in oil, gas, and other commercial sectors. This is especially true, if being partisan in this way would restrict U.S. access to Russia's own reserves.

Although conditions have improved for western firms doing business in Russia under Vladimir Putin, they are still far from problem free. In part they reflect the unstable relationship between Russia's oil industry and the economy more generally. The health of the Russian budget is directly linked to the current high price of oil, and when the price of oil drops Russia's leaders look to other forms of income, which include the sale of arms, weapons systems and various forms of military technology by state monopolies. The oil industry is not the major employer in the same way that it is in Venezuela or in the Gulf states, and there is real debate among Russian economists as to how rapidly Russia should expand the oil and gas sectors of its economy.

While Russia is unlikely to have a Venezuelan style economic crisis, it is still not clear how large or how stable a force Russia will be in the international energy market. Russia's oil industry is still evolving, and the divide between private and state-owned companies is still not a fixed one. Moreover, it is unclear whether the Russian government will ever give up full ownership of its assets, nor regularize the terms for foreign investors' participation in their development. Russians investing in their own in the oil and gas sector has also faced serious road-blocks, not the least of which is the difficulties posed by the continuing state monopoly on the transit of oil and gas.

All of these problems affect U.S. and Russian cooperation in the energy sector, and make it unlikely that this is going to turn into a real "partnership" anytime

soon. While changes in Russian policy, not the least of which is a growing western-style corporate culture among some of the large Russian firms, make projects in Russia seem more desirable, very few firms seem eager to leap into the Russian market with both feet at least until they evaluate projects in other parts of the world that may become available to them in the near future.

BP's acquisition of a 25 percent stake in the Russian TNK oil company is a major development, and the first real show of western confidence in the Russian oil industry in quite a long time. But it is less clear what kind of harbinger it is, whether western firms will want to buy large stakes in Russian oil companies, and whether other Russian firms will sell stakes large enough to give western companies the managerial role necessary for them to make such an investment. For all of Putin's interest in attracting western investment, the rules of political engagement in Russia have been fixed to insure that westerner firms don't have "unfair" advantage over Russian firms, but little is being done to make the world of "insider" transparent to those from without.

The increased tensions between U.S. and Russia owe their origin to the different stances of the two countries on the need for a war to liberate Iraq, but the idea of a close U.S.-Russian energy partnership was based on a confluence of interests that for many other reasons was not likely to develop. The fact that Russian and U.S. national interests sometimes overlap does not mean that their core values have much in common.

Looking Ahead in the Persian Gulf

While most of the non-Arab oil producing states outside of the Persian Gulf region will be able to minimize the impact of the current war in Iraq on energy and other security issues, the same is not true of those within the Gulf region. There is no way that the states of the Persian Gulf and the nations of the Arab world more generally can insulate themselves from developments in Iraq. The fighting in Iraq also could lead to security problems in Indonesia, another oil-producing state in which radical Islamic groups enjoy popularity.

The fact that the U.S. enjoyed rapid military success in Iraq is a very hopeful sign, but as the reconstruction and nation-building stages in Iraq have yet to begin in earnest means only those analysts who enjoy second sight have much sense of how developments are going to play out.

The period of U.S. military occupation will be a time of real stress in the Persian Gulf and in the Muslim world more generally, where many will see the U.S. military presence as a form of thinly disguised twenty-first century-style colonialism. U. S. policy-makers are now gearing for a massive humanitarian assistance and nation-building effort to "win the hearts and minds" of the Iraqi population. But the protection of U.S. national security, of which energy security is only one element, really demands that the Bush administration launch a successful public relations battle in the rest of the Arab and Muslim world.

As is so often the case with tyrannical figures, Saddam Hussein was a much greater hero outside of his country than within it, and even Iraqi public opinion may remain divided over just how Saddam Hussein was removed. In much of the Arab and Muslim world the evil one knows often seems preferable to the risks of the unknown, especially if the unknown is to be delivered by as problematic a force as the U.S. military. The discovery of weapons of mass destruction in Iraq, would go a long way to repairing relations with U.S. allies in Europe, but this will not have the same impact in the Islamic world, where strong leaders are expected to take strong steps to protect their populations.

Public opinion outside of Iraq has been heavily against the U.S.-led war effort. Protests in both the Arab and the Muslim world more generally are likely to continue throughout the period of U.S. military occupation and this kind of public reaction will make the regimes that have supported the U.S. effort more vulnerable from their critics. When one adds up active and inactive supporters, the regimes in Kuwait, Qatar, Saudi Arabia and Jordan have all been put at greater risk, and the last two were already quite vulnerable.

The long-term security of all of these regimes is dependent upon the success of reform movements within each of these states. But U.S. policy in the region can serve to further destabilize these regimes in the short-run, and could serve to undermine the political security of the states that provide so much of our energy needs.

It is also hard to imagine that the U.S. can devise successful public relations efforts in the Arab world in the absence of a comprehensive peace settlement for the Arab-Israeli conflict. It is bad news for the Saudi regime in particular, if the U.S. image in the Arab world becomes increasingly more tarnished in the coming weeks and months, for they are probably the most fragile of the states upon which U.S. energy security depends. In time, the Saudi regime could experience its own version

of the Venezuelan oil crisis. The country faces a demographic bulge, with growing numbers of young people being rendered virtually unemployable by the religiously dominated education system that all but the most privileged elite children pass through. In recent months the regime has at least making the right noises that it recognizes the need for economic and political reforms (although the role of religion in Saudi Arabia will at best only he tinkered with a bit). But the reform process is certain to produce change slowly, at best, in leave the regime with serious opposition for the foreseeable future.

U.S. policy-makers should also make sure that they have drawn all the appropriate lessons from our military engagement in Iraq before challenging the regime in Iran by military means. First there is the question of international support for such an operation, which is certain to be even more difficult to obtain than for the current operations in Iraq. But even if U.S. policymakers were convinced that we could successfully overcome the international diplomatic fall-out of proceeding militarily with a small coalition of allies, there is the question of how the Iranian military and Iranian people would each respond in the face of a military incursion. While it is certainly the case that the Iranian political and religious establishment are in an uneasy alliance at best, Iranian nationalism is a much more formidable and deeply rooted force than Iraqi nationalism, and there is little or no evidence to suggest that outside forces would be welcomed by any significant sector of the population as the source of moving the Iranian polity toward a more secular and pro-western form of government.

U.S. energy security in the Persian Gulf will be very heavily influenced by how the U.S. exercises its authority in Iraq, once Saddam Hussein is ousted from office. The less the transition authority seems like an occupation force, and the less the transitional regime can be accused of being a puppet for U.S. interests the less anti-American sentiment will be thither stimulated in other oil-producing states and the Arab and Islamic world more generally.

Most outside observers will be closely watching how the Iraqi oil industry is managed, whether oil income goes to help support military occupation and administrative costs, or if it is solely directed for the purchase of food and other humanitarian assistance for the Iraqi people. There will also be a lot of attention to how the contracts are let for rehabilitating Iraq's oil-wells and repairing the country's infrastructure, with the question being whether the process is a transparent one in which non-U.S. firms are offered a level-playing field from which to tender their offers. It will be critical how decisions are made about the ownership Iraq's still undeveloped oil reserves, as well as how the choices will be made as to how and by whom they will be developed.

It is one thing for the Bush administration to insist that the war for the liberation of Iraq is not about oil, but their claims will not dissuade U.S. and foreign critics until such time that U.S. policies give evidence to the contrary. The way that the U.S. goes about the reconstruction of the Iraqi oil industry will either dispel these rumors, or insure that they are never able to be dispelled.

Security and Oil Dependency

The fact that the U.S. and virtually all of our principal allies consume more oil resources than they produce insures that the question of energy security will remain a vital one until such time that new sources of energy or new patterns of consumption emerge. That time is not imminent, although estimates of when it may occur vary dramatically.

This means that the U.S. and its allies will continue to depend upon all of the existing producers to meet their energy needs, no matter how problematic the stability of some of these states may be. Many new oil producers could come on line whose domestic political stability could be even more problematic than those states described in this testimony.

Forecasting the course of international developments is never easy, but it is never more difficult than in a period of rapid international change. Modifications in how the international oil market operates that began to be introduced in the aftermath of the 1973 Yom Kippur War have done a lot to cushion the U.S. and other major oil consumers from sudden changes in the international oil market. But all the industrialized and rapidly industrializing nations remain vulnerable both to cataclysmic changes in oil supply and to dislocation provided by several producing nations simultaneously reducing their exports.

The U.S. and its allies are also vulnerable to the subtle impact of policies that are designed to increase energy security, but that oftentimes have a long-term effect that is quite opposite to their intended purposes. U.S. policies that offer support of non-democratic leaders in oil-producing states may maximize the supply of oil in the short-run, but often have exactly the opposite effect in the long-term.

While the U.S. and most of our closest allies have the economic means to insulate ourselves from paying too big a price for such mistakes, as we are generally able to absorb sharp increases in costs that are caused by the vagaries of uncertain supply and a fluctuating price structure other states have less flexibility. Uncertainties in the oil market have great impact on less developed states, as well as those that are in the midst of rapid industrialization. Both groups of states have difficulties paying high spot prices for oil when oil supplies that they counted on are no longer available at the price that they expected to pay.

For this reason, uncertainties in the international oil market can cause all sorts of seemingly unrelated security problems for the U.S., even when steady supply to the U.S. markets is maintained. High prices of oil, especially unexpectedly high prices, disrupt the economic plans of less developed states, making fragile states even more fragile, destabilizing whole sub-regions of the world.

Rapidly industrializing states with growing energy needs are also highly vulnerable to changes in the price and supply of oil in particular. One state worthy of mention in this regard is China, a country whose need for energy resources is growing and whose economy can not easily absorb sharp jumps in price or shortages in availability. For that reason China's leaders are looking for stable partners who in partnership with leading Chinese firms will insure that China's long-term energy needs are met. More than most any other country, China's search to protect its own security interests could create unexpected security challenges for other states.

And as China is looking to Russia, Iran and the Caspian for some of these new partnerships, U.S. interests are sure to be affected in the process. If the war in Iraq does not produce any major dislocations in world oil supply China is apt to move reasonably slowly to better protect its economy from future dislocations. But if the war does at some point produce even temporary major shortages, then the Chinese will certainly rethink their strategy and be more aggressive about asserting their national interests in the energy field.

It is still too early to predict the impact that this war will have on the oil industry in Iraq, not to mention the political climate in neighboring oil producing countries and in the Middle East region more generally. The fact that there are certain to be long-term and unpredictable outcomes of the War in Iraq on energy security highlights the way in which oil specifically, and energy more generally, is intertwined with a host of other security factors.

Senator HAGEL. You mentioned in your book—you have a new book.

Dr. OLCOTT. I have a book called *Kazakhstan: Unfulfilled Promise,* that came out last February.

Senator HAGEL. All right. Well, we should plug that as well. I mean, Dr. Yergin gets a couple of plugs here, and so we are going to plug your book.

And where can we get it? Is there a book signing that you and Yergin can go to? I have to deal with people like McCain around here, and every month he has a book signing for a new book.

So when will we get to——

Dr. OLCOTT. Actually, we are going to do an event next month. I will make sure your staff is notified.

Senator HAGEL [continuing].——All right. There you go. That is the way to do it. I am glad I asked, thank you.

Well, all three of you have presented insightful, lucid testimony that is very relevant to the challenges of today and what we are going to have to deal with down the road.

Beginning with your quote from your friend, Lady Thatcher, "The unexpected happens. You had better prepare for it," and that certainly has been a theme from the three of you this afternoon.

And I would like to pick it up at that point and ask your two wise, learned colleagues, Dr. Olcott, to respond to your last or almost last comments regarding what you see as great uncertainty unfolding in the Middle East that will put great stress on energy producing friends and allies of ours as a result of the military ac-

tion in Iraq, and I guess your point is more to the point that there will continue to be American and allied security forces in that region for some time to come, and then you developed it, I thought, in a very clear way.

And then your last point, if I recall, was: It is going to be important for the United States and its allies to make a significant effort to reach out to the Muslim and Arab populations of the world. I happen to subscribe to that theory, but I am not giving testimony today. I am just running the hearing. So I would be very interested in your colleagues' response to that point.

Dr. Yergin.

Dr. YERGIN. I think we may not really full understand in this country how deep is the breach in public opinions between how things are seen in this country, how they are seen in the Middle East, Europe, China, in terms of what is unfolding, and that is going to be a lasting question to deal with. And critics and enemies of the United States and others will put it into the framework of new crusaders. And so I think that is going to be a very major issue. And I think what Martha said about reaching out and being very cognizant of how deep is the division on opinion, is going to be a major political factor for us.

Senator HAGEL. Thank you.

Mr. Vahan? Mr. Zanoyan?

Mr. ZANOYAN. Thank you very much. I think this is a very pertinent question right now. I happen to travel a lot both to the Middle East region almost every month, and throughout Europe. And, frankly, right now if you look at the disconnect between the way things are viewed from Washington and the way things are viewed from outside in the world, it is coming to a point where it scares me. It is not just in the Arab world.

We mentioned Arab and Muslim world. There, there is an enormous amount of confusion. There is a very schizophrenic attitude about what is going on, because almost all of them would like to see the final outcome of Saddam Hussein being toppled. I do not think you will find a single critic of American foreign policy who opposes that aspect.

But there are all kinds of other issues which are far too complicated right now to get into, that make them very wary of our real intentions.

But you go outside the Middle East, throughout Europe and Asia, and for those countries the big threat is not Osama bin Laden, is not Saddam Hussein, is not al Qaeda. The big threat is this new radical, militant United States, a country which has superior military capabilities, is not afraid to use them, and is not afraid to use them unilaterally. So they do not trust us—it is not just our strength that they worry about. It is our intentions, plus the strength. And there is a lot of mistrust about this. And it is all over Europe also.

My colleague, Dr. Yergin, mentioned critics and enemies in one breath; well, if he meant that they are the same, I would like to take issue with that.

Dr. YERGIN. No. No, I did not.

Mr. ZANOYAN. Okay. They are not the same. We have a lot of critics out there who are our friends, and if we cannot tell the dif-

ference and if we keep saying, "If the people are not with us, they must be against us," I think we are missing a very important nuance in the whole international environment right now.

Senator HAGEL. Thank you. Is there anything you would like to add, Dr. Olcott, to this?

Dr. OLCOTT. Just that I think that there is a difference—I mean, I agree. I just came back from Europe as well. There is very sharp—I have never seen this degree of criticism of the U.S. and I was a student in Europe during the period of Vietnam.

But I think the difference between what we see going on in Europe and what we see or potentially see in the Muslim world is that it is potentially regime-rocking in the Muslim world in a way that I do not think—you know, I am not worried about revolution in England despite the size of the protests that we saw against Prime Minister Blair.

So I think that the threat to U.S. security by the dissatisfaction in the Middle East, by the crowd, by the streets in the Middle East, is much greater than the threat to U.S. security by whatever the displeasure in Europe and Asia is, except that I would add, places like Indonesia or the Philippines, those go on the list. I mean, that is why I said that, the Arab and Muslim world.

I think the occupation is really—it is creating a set of circumstances in the Middle East that have not been there for over 50 years. And if one remembers, at the time of the Suez crisis what kinds of response that was, and that was a much less destabilizing act to the status quo.

So I agree with everything Dr. Yergin said about the street being content to see Saddam gone. But at the same time, the whole prospect of a long-term U.S. military presence or an occupation is one that just is fodder for radical ideologues. It is like—it is as if they created the conditions. It so meets what they want ideologically to attack. We have created a strawman of, you know, absolutely of their—that is just totally in line with their vision of what they accuse us of being.

Senator HAGEL. Thank you.

We have been joined by the Ranking Democratic Member of the Foreign Relations Committee on this subcommittee, a man who has been on this committee I think since 1977, so he knows a little bit about what we are talking about today, Senator Sarbanes from Maryland.

Senator Sarbanes.

Senator SARBANES. Well, thank you.

Thank you very much, Mr. Chairman. I want to welcome this very able panel. We are very pleased to have the benefit of your thinking.

I would like to sort of look out into the future a little more and broaden the context. We tend to talk about this energy security problem, in a sense, in the current context and the U.S. demand and so forth. But think with me for a moment about where economies are going worldwide, what their growth would imply for energy demand, and what kind of impact that would have on geostrategic considerations.

And let me just illustrate what I am thinking of with one example: China. You know, we have this huge population. They grow

year to year economically in very impressive terms, considering what is being done elsewhere. And of course, as they do that, their demand for energy increases at a very rapid rate. Where are they going to find that energy? What is the implications of that? On how things develop internationally, and what are the implications for the U.S.?

And it is not only China. I mean, there are other countries one could cite, too, where this is all taking place. So there is a dynamic at work that I do not think we focus on sufficiently in terms of where we may end up with energy security. If that makes any sense to you, I would like you to take a crack at it.

Dr. Yergin.

Dr. YERGIN. Okay. Yes, you start with China and you start with India because of their size. Chinese oil consumption has doubled in a little more than a decade. It is now the third largest consumer of oil in the world. It will soon overtake Japan and become the second.

And over the last several years, there has been much debate about what is China going to do about it? A few years ago there was this fear that there would be resource wars in Asia over that. But at least so far, what China has decided to do, more or less, is do what it has done with the rest of its economy, sort of go with the world economy. It is partly privatized. It is oil industry and its companies are around the world, seeking to be players, and I think they will become much bigger players. And the best solution is to see China seek to deal with these issues through the market and through the strength of its economy, rather than, in a sense, deal with it geopolitically.

Senator SARBANES. All right.

Mr. Zanoyan.

Mr. ZANOYAN. Yes, I agree with what Dr. Yergin said about China. I am not going to dwell on that part too much, except for adding one issue. I think longer term, since you wanted to have this longer-term picture in mind, China is probably our most important, in general, strategic competitor. Not just a country that would be an important player in energy markets, but it will go even beyond that. This is specifically true when it comes to the Middle East.

Senator SARBANES. When it comes to what?

Mr. ZANOYAN. To the Middle East.

Senator SARBANES. Yes.

Mr. ZANOYAN. In the Middle East, a lot of our other current trade partners, allies, or competitors are there, basically, in the same way, essentially for trading oil or developing oil, but not to compete with us in a strategic way. I think China could play that other role.

But I would like to raise another issue here, which is much closer to home to us. This was in my testimony, Mr. Chairman, but I did not have time to raise them. And it is the issue of Mexico and Venezuela. They are two interesting countries. Both have enormous potential to increase their both oil and gas production, but they face different problems.

In Mexico, the challenge is to open up. The challenge is to overcome this 1970s-style resource nationalism that says, "No, no. Nobody else can touch our oil."

In Venezuela, they have long overcome that challenge. The country is open. They have a new hydrocarbon law that allows for up to even 100 percent participation in the upstream gas sector, 49 percent participation in the upstream oil sector. Their challenge is to convince the oil and gas companies that, in spite of some of the political problems there and in spite of Chavez' very populist policies, the country is not going to confiscate their investments tomorrow morning, and that this is still a viable place to invest.

There are different challenges. But I think in the longer-term it may be in the United States' interest to try and encourage both of those countries to enhance or increase foreign participation in their oil and gas sectors, because that definitely will make a very big impact on even short-term supplies, let alone long-term.

Senator SARBANES. Dr. Olcott.

Dr. OLCOTT. I concluded my testimony with a very brief discussion of China because I feel really strongly that China's search to meet and guarantee its own energy security creates security risks, potentially, for all of the neighboring states.

I am much less sanguine than Dr. Yergin that China will use the market and solely the market to meet and provide for its energy needs. I have trouble believing that the Chinese firms, as you point out, will be competitive with the Western firms on any sort of even basis, even playing field. And if Central Asia is at all a window into Chinese strategic thinking and other places, they have certainly used geopolitical weapons—I mean, geopolitical tools—"weapons" is way too strong—and not just market tools in order to advance their interests in the energy business.

And I see the evolving Russian-Chinese relationship is going to be increasingly having to deal with these energy issues as well. So it is of critical importance for China's dealings with Central Asia. But it will, if we are going ten years down, certainly be of critical importance in the Russian-Chinese relationship which is a very complicated relationship in many ways.

Dr. YERGIN. But, I would say that it is a good and appropriate thing for Russia and China to have their relationship based less on Marx and Lenin and more on oil and gas. It is a natural course.

Dr. OLCOTT. I am not disagreeing, but it——

Senator SARBANES. Yes.

Dr. OLCOTT [continuing].——But I see the Chinese as mixing the market and the geopolitical. They do not have two separate arsenals that they bring to the table. They try to use whatever advantage, strategic advantage they have in these deals; at least that is how I see it.

Senator SARBANES. This may have been asked before I got here, but I am interested in to what extent, if any, you think human rights concerns should play into our thinking with respect to having a global energy policy, or as we address the questions of global energy security? [Pause.]

Dr. OLCOTT. I guess I can—I think it is a really tricky question, obviously. And I did not talk about it in my testimony. I think that from the point of view of the states that I study most closely, the

long-term instability of these states is predicated on the fact that they have not had economic reform—I mean, that they have not emphasized transparency, and not emphasized political participation. So the real difficulty is for: How can we be more effective in trying to get the message that, "You are making yourself unstable by virtue of not addressing these issues"?

I think that we cannot preserve our energy security in the long term if these regimes do not reform. But I do not see easy solutions for us to do it.

I talked a little bit about Turkmenistan. I mean I think that Turkmenistan is a case where we really have a disaster, where it is a crisis situation where the human rights policy of the regime is making the state a highly ineffective potential partner for us. And as I mentioned in my oral testimony, in the absence of Turkmen gas, it is very hard to see long-term rebuilding in Afghanistan. So that is the one place that I see it as a crisis at this point in time.

And the other is—the other places in the Caspian is less than ideal and it could undermine the stability of the regimes as we move forward.

Mr. ZANOYAN. I would like to make a brief comment on this. If the issue of human rights, if the issue of human rights appears as a matter of principle, as a United States policy principle that in our dealings with foreign countries we should always consider this, then it should not be tied just to oil policy or just to energy security issues. It should be tied to any bilateral relationship regarding any kind of trade or investment and so on, in my view.

The only way it comes specifically into the oil side is what Martha was suggesting, that if there are countries whose internal stability depends on more representative governments, more human rights, more equality of income distribution, and, frankly, less corruption is the way I would put it, more of the oil revenue being used for the good the people rather than just being squandered by the leaders abroad, then that becomes a much more specific energy-related issue, and I can see how that can be applied.

The problem is: How do we apply it then uniformly across all countries? Like it was mentioned earlier, some of the new states in the Caspian have so much corruption that some of our oil company clients tell me that they would put even Nigeria to shame. So these are the issues that we should address, if it is for internal stability issues.

More than human rights, I would look at how oil is used. Is it really used properly for the country? And then, I would not know what kind of policy to structure around that, but that is how I would cut the issue.

Senator SARBANES. Okay. Before I hear from Mr. Yergin, let me just put one follow-up question to you. You said that if we are going to include human rights considerations, it should not just be on oil countries or in the area of the oil policy but more broadly, across the board as I understand it. Having said that, assuming that it is across the board, are you in favor of including it in or in favor of excluding it out?

Mr. ZANOYAN. I am in favor of using human rights as a broad policy and dimension, among many others, in the way in which we form our bilateral relationships with other countries.

Senator SARBANES. Okay. Dr. Yergin.

Dr. YERGIN. Like the other speakers, I see human rights, as we look out at the 21st century, as one of the sources of stability for government. And the development of human rights in some of the governments we have been talking about, that is a big consideration. I also see it in terms of the issues of transparency and corruption.

The way you phrase it, it is so broad that I am not sure what you are looking for on human rights in terms of suggesting that we do not buy oil from countries where we object to the human rights, or whether it is one of the principles, one of the issues that is engaged in our dialogue with them. And so that makes it hard to be a little more specific in the answer.

Senator SARBANES. Well, I tried very hard to give you an open-ended question, because I am really interested in the weight you would place upon it rather than having you react to the weight I might place upon in.

Dr. YERGIN. All right.

Senator SARBANES. So as an open-ended question, what weight would you place upon it.

Dr. YERGIN. I think it is one of the critical questions. What you see in many oil exporting and producing countries is that one of the areas of biggest contention is between the central Government and the region, whether you are looking at Nigeria or whether you are looking at Indonesia. And I think that is a tough one for us to engage in because, of course, for them it is also issues of sovereignty. So I think to go back to what Dr. Olcott said, it is a tricky question, but it is one of the areas where we can apply our influence, and I would say that it is one of the elements.

Senator SARBANES. Well, thank you, Mr. Chairman.

Senator HAGEL. Go on if you want to.

Senator SARBANES. No, no. I think I am done. No, that is all right.

Senator HAGEL. Okay.

Senator SARBANES. Oh, well, let me ask—if I can ask one more question.

Senator HAGEL. Of course.

Senator SARBANES. I apologize again; I was not here at the outset. What are your expectations as to the balance between the demand for oil as we go out into the future, and the supply of it, supply of oil, oil and gas?

Dr. YERGIN. The picture we have is that we see world oil demand, going back to the China question, growing very substantially, in fact, over the decade, but we see supply keeping up with it. And one of the things that I think has not gotten as much attention is this huge addition to Canadian proven reserves because of bringing down the costs of oil sands.

So we look around the world, and the viewpoint I think of oil companies is that it is always an uphill struggle to add new reserves and discover them. But when we do our numbers we see those supplies increasing, led by the Middle East, Russia, Caspian,

West Africa, and that Canada will play a larger role than people may have anticipated.

Senator SARBANES. Yes. Okay.

Mr. ZANOYAN. Yes, when it comes to crude oil, I think that over time, no matter how fast demand grows, I think supplies will definitely be there to meet it.

And I spent some time in the beginning of my testimony saying that the world has had 30 years to adapt to and prepare for all kinds of disruptions in crude oil supplies and, frankly, we have a very successful record in the last 15 to 20 years where the global oil sector has responded very well to these kinds of disruptions. Sometimes I get the feeling that these achievements on the part of both oil consuming and producing Nations have not been adequately recognized. And, you know, this is very fashionable to worry about oil supply security.

But when it comes to natural gas, I think we will have a different story. We have natural gas reserves; it is not a reserve issue. We have as much, if not more, gas reserves in the world as we have oil. It is a simple market reality that gas is not as global as oil is. It is not as easily transportable. Gas markets do not equilibrate. We can have a gas shortage here in the United States and a gas surplus somewhere in Europe, and it is not necessarily automatically obvious like it will be with oil, that the commodity will just move to fill the gaps.

And, therefore, I can see more discontinuities, if you want, looking ahead in the way in which supplies and demand will meet each other in the gas side in specific markets than I see in the crude oil side.

Senator SARBANES. All right. Dr. Olcott.

Dr. OLCOTT. Well, I am going to leave that question.

Senator SARBANES. What?

Dr. OLCOTT. I am going to leave that question, I mean, to——

Senator SARBANES. Yes. Well, we got two pretty good answers, I thought.

Dr. YERGIN. If I could respond.

Senator SARBANES. Yes.

Dr. YERGIN. From public policy perspective, we will be dealing with the growing role of gas imports into the United States. And will we be or end up being a significant importer of L&G into the country? And then the question is: Where will those terminals be?

Senator SARBANES. Yes. How much room do you think there is on the demand side in terms of more energy efficient uses? How much of a benefit can we gain on that side if one were really committed to major policies in that regard?

Dr. YERGIN. I have always believed that energy conservation is one of our most available and cheapest energy resources and think of it that way. In fact, we have accomplished a lot. We only use about half as much oil for every unit of GDP as we did in the 1970s. We are a lot more efficient than we were, but I am sure there is a lot more—even before we switch over to other technologies decades in the future, there is obviously a lot of ground to be more efficient between here and there.

Senator SARBANES. Yes.

Dr. OLCOTT. I want to add something from the last question.

Senator SARBANES. Yes.

Dr. OLCOTT. One point that I talked about in my testimony, which I think is really critical, has to do with the security risks that are caused by other states not being able to afford their energy. And that is something that I think is going to increase. So we may be able to—there may be enough energy out there for us to meet our needs; but I see, in the countries that I study, a lot of states that are really falling off the map economically because they cannot afford the energy, that it is just being priced out of their range. And that is creating a whole host of security crises for us.

And I point to the case of Georgia as one where the long-term security of that state, which is critical in part to our energy security because of the Baku-Ceyhan pipeline, is being affected in part by ethnic problems in Georgia, but also by the inability of Georgia to pay its gas and electric. And that is not improving.

Senator SARBANES. Yes. Thank you very much, Mr. Chairman. And I thank the panel as well.

Senator HAGEL. Senator Sarbanes, thank you.

Let me go to one question that we have. We came as a result of exploring from your ending comments, Dr. Olcott, and your testimony, about the uncertainty in the Middle East which you believe will put great stress on our energy producing friends, specifically Saudi Arabia.

As we have talked this afternoon about future sources and reserves and the unknowns that Lady Thatcher talked about, Churchill talked about, how do you see this playing out in specific terms with Saudi Arabia? And all three of you mentioned Saudi Arabia in different aspects. One of you mentioned it is the one ally we have that has always reserved the capacity that we needed, essentially, when we needed it.

So I would be interested in your thoughts on this as to how they relate to Dr. Olcott's last thoughts in her testimony, because I think my understanding is you generally have, all three of you, agreed with the general premise of that uncertainty.

Dr. Olcott, we will begin with you.

Dr. OLCOTT. All right. I see the situation in Saudi Arabia as tied in part to what is going to happen in the Arab street more generally, so that even if you—you are not going to get large-scale demonstrations in Saudi Arabia no matter what happens, or you are unlikely to. If you get those demonstrations, you are in a situation of really on the edge of final crisis there. But if there are large-scale demonstrations against the U.S. presence throughout the Arab world and if it is a continuing sense of Arabs feeling aggrieved by this, what they see as this intrusion, then I think it is going to create an increased environment for receptivity for extreme groups that are Saudi-funded, you know, that you are going to get—even if we stamp out bin Laden, you are going to get bin-Laden-ism without bin Laden, or you are going to get some form of new kind of radicalism or continued fuel because he was just part of a whole radical cycle in that part of the world.

So it will be that the rifts within the Saudi polity will only become more pronounced and I think that there will be confusion on the part of the regime with how to deal with it. What happens is

there is mass demonstrations in Egypt, regular demonstrations in Egypt? I am very concerned about the stability of Pakistan. What you fuel is a cycle of crisis in the Muslim world, which puts threats, puts risks on the Saudi regime.

So I am talking about—I am not so concerned with what happens today to tomorrow, but what kind of environment we are building for the next few years.

Senator HAGEL. And how then does that apply to further production capability or the willingness of the Saudis to continue to produce, essentially, what they have done over the last 25 years, less likely, more stress, more conditions, more problems?

Dr. OLCOTT. I think—and others may have very different opinions—that the Saudi regime will try to continue to accommodate us in production, but the question is: What does this do to the long-term security of that regime if it—if the situation in the Arab world continues, becomes more volatile?

Senator HAGEL. So if I understand this, your point is that the uncertainty of whether we can count on that continuing, that steady stream of resources when essentially we have needed them, is or could well be in jeopardy if it plays out in any way the way you have noted.

Dr. OLCOTT. The security could be in jeopardy if the regime comes under jeopardy. But the divisions within the society, within the ruling elite, will become more profound if there is a greater politicization in the Muslim world and if Saudi money is going to fund it.

Senator HAGEL. But does that still continue to produce oil for the United States?

Dr. OLCOTT. As long as this regime is in power. But to the degree to which those rifts within the elite make that regime more fragile, then you increase the risks that that regime will be pushed from power. I mean, you make the regime less stable in the long term.

Senator HAGEL. Yes. Thank you.

Mr. Zanoyan.

Mr. ZANOYAN. Mr. Chairman, I would like to separate, as I think you were trying to do here, the issue of Saudi oil policy from the big imponderable, whether the current structure as we know it is sustainable or not.

The oil policy, they do not do it just for us. You mentioned the phrase, "Will they still produce oil for us." Well, they do not produce oil for us. They produce oil for themselves, for their own oil revenues. They need it. As I think I explained in my formal testimony, it is that they have a vested interest themselves in this price moderation and stability of the oil market. More than $30 oil is not good for them. It is great for them in the very short term and for their treasury. But they have learned very well that when prices are that high, both the world economy and the industry hits back and they strike back with a vengeance by reducing demand and by creating all kinds of non-OPEC supplies.

So they have come to the conclusion that it is in their best interests to keep prices within a certain moderate band and to keep the market supplied for their own long-term strategic interests. If they were doing it just for us, I would not trust them, by the way. The reason I trust them is because they are not doing it just for us, and

it is also in their best interests to continue this type of market management.

Now, I am not as sure, though, as Dr. Olcott may be suggesting that the oil policy alone could bring the system down because it is so unpopular.

Dr. OLCOTT. I did not say that.

Mr. ZANOYAN. Oh, I am sorry.

The oil policy in Saudi Arabia is one of the few things which is not politicized in terms of public debate. There is no public debate of oil policy as such. There is a lot of public debate on whether in general Saudi Arabia is too pro-U.S. There is a lot of debate on whether the American troops should be there. There is a lot of debate whether, given U.S. policy towards Israel, that Saudi Arabia should even have relations with the United States. But there is no public debate—at least I have not seen it in all of my trips—that: Do we have right oil policy here vis a vis United States? That is not as politicized as one might think. Actually, it is a very interesting situation.

So I think given the fact that, number one, it is in there own interests and, number two, it is not as politicized, just the anti-Americanism alone is very unlikely to change this.

Now, what would change this is something truly much more radical than we have seen so far, more than what is happening in Iraq. I think what would change something like this would be a major change in the West Bank and Gaza, if Israel were to annex them, for example, or if you had these scenes on al Jazeera television with hundreds of thousands of Palestinians being force-marched across into Jordan, something like that, then the system may say, "There is no way we can keep producing or trading or doing anything," given something like that.

Short of that, I do not see sufficient political pressure internally to change the oil policy.

Senator HAGEL. Thank you. Before I go to you, Dr. Yergin, Dr. Olcott, did you want to respond to something.

Dr. OLCOTT. I was implying that the general rise of anti-Americanism in the Middle East and in the Arab world has a capacity to increase rifts within the Saudi ruling class. I was not implying that it was going to be on the oil policy at all.

Senator HAGEL. Okay. My only point, and my point about producing oil for us—I am agreeing completely with what you just said, that they produce oil for themselves.

But my point is: It is the one large capacity producing nation that we have been able to rely on when additional capacity has been required or whatever. They are probably keeping the prices down, again, for their own interests, of course. Thank you.

Dr. Yergin.

Dr. YERGIN. I have a few points to follow up on what has been said. I think, number one, this issue of anti-Americanism is not a temporary phenomenon. This is a big deal in the world, and we have to make a very big effort to understand it. I do not think it is just issue specific. It is very significant.

I think, secondly, the producers and these supplies, as Vahan Zanoyan said—and it applies to Saudi Arabia and to others—we talk about security of supply; but they worry about security of de-

mand, because this is their national revenue. It is very important to them.

The sooner a transition can be made in Iraq to an Iraqi government the better. The issue of perceptions and how the U.S. role is seen is very important. One cannot forget that one of the things that got al Qaeda going was the American military presence in Saudi Arabia. That was a mobilizing issue.

In terms of threats to the supplies throughout the region, in my testimony I mentioned war in Iraq and turmoil and crisis in the Middle East, but we also need to consider the demographic pressures throughout the region. Generational changes are very significant. In countries where a large part of the population is made up of young men without jobs, we become very quickly a focus of their ire.

Senator HAGEL. Any other points on this? [No response.]

Senator HAGEL. Thank you. Well, let me mention that each of your testimony will be placed in the record in full. I know you have all given abbreviated statements which we appreciated. That way we had a little more time for an exchange which, by the way, I thought has really been very exceptional actually between the three of you, having nothing to do with Senators.

But that is what you always hope for when you get the best in witnesses, and I think we had that today. Your knowledge of not only the subject matter but the area and the bigger, wider lens scope of the world is exactly what we needed to hear and understand a little better. We will be calling upon you again as we have called upon you many times in the past to help us sort this out.

Mr. Zanoyan, do you have a book? I forgot to ask. Recently, anything that is current.

Dr. YERGIN. Start one now.

Mr. ZANOYAN. I am too busy.

Senator HAGEL. Making money, yes, that is a noble effort.

Anything that you would like to add before we adjourn, any of the three of you?

Dr. YERGIN. No. Thank you.

Mr. ZANOYAN. Thank you.

Dr. OLCOTT. Thank you.

Senator HAGEL. Thank you again. You have assisted immensely in our understanding of a very complicated issue. Thank you.

The hearing is adjourned.

[Whereupon, at 4:40 p.m., the hearing was adjourned.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

STATEMENT SUBMITTED BY THE AMERICAN PETROLEUM INSTITUTE

ON GLOBAL ENERGY SECURITY ISSUES

It is extremely timely that the Committee take a fresh look at the issue of global energy security given events in the Middle East and following a winter which witnessed major oil supply disruptions in Venezuela and Nigeria, and sharp upward spikes in natural gas prices for the second time in the last three winters. As it does so, it is essential to recognize how significantly our understanding of the energy security issue has evolved over the past several decades.

Energy Security: Then and Now

Thirty years ago, faced with an embargo of oil from several key Gulf producers, the security problem was widely characterized as an import problem, premised on the notion that trade was inherently risky and to be avoided if at all possible. Largely in response to this paradigm, we embarked on policies designed to insulate ourselves from these risks with domestic price controls and allocation schemes, and expensive subsidies to the development of alternative domestic energy sources, such as synfuels. Today, those schemes are universally recognized as having been colossal failures. Not only did they fail to insulate us from the risks associated with trade, they unambiguously aggravated the very problems they set out to correct.

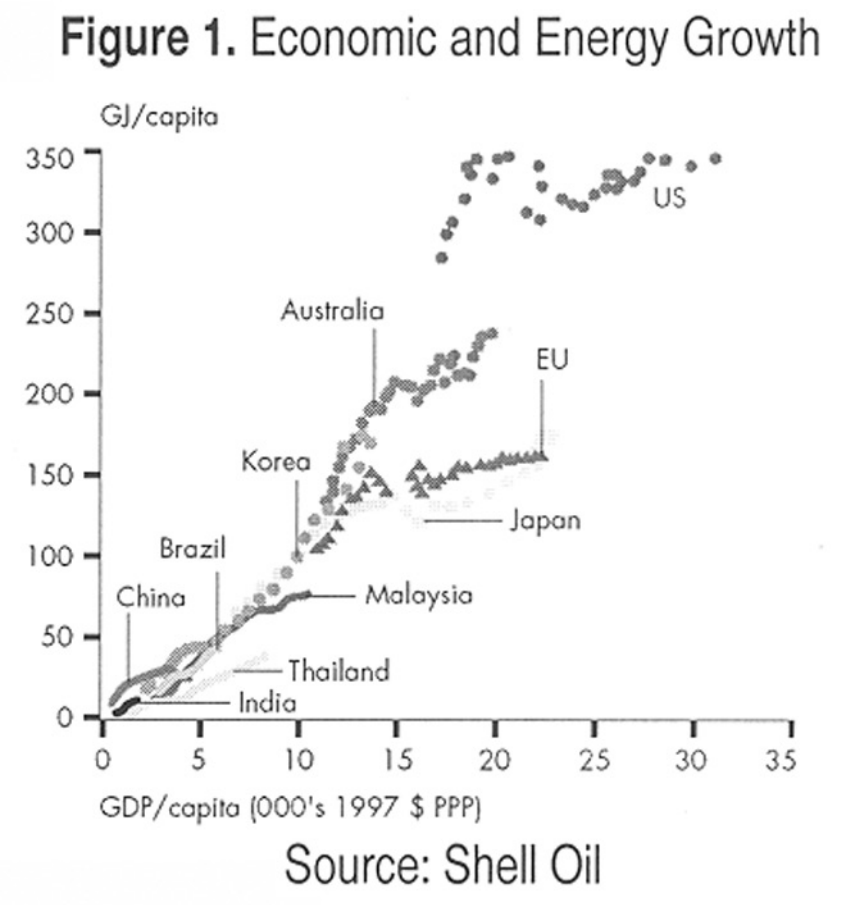
For more than two decades now, the US has come to rely heavily on the functioning of global energy markets, and the active protection of those markets through the normal channels of defense and diplomacy. This increased reliance on trade, by increasing competition and promoting diversity of global supplies, has generally increased global energy security. While disruptions of oil markets have occurred in the past two decades, such as the disruption associated with the Gulf war of 1990/91 and the several disruptions experienced this year, both the magnitude and duration of those disruptions have been far less serious than those associated with the disruptions in the 70s. This more recent experience has demonstrated clearly that trade is not the cause of the energy security problem, but rather a potential remedy to it.

As the U.S. develops an energy policy suitable for the future, it is essential to recognize the essential and productive role of expanding trade in energy. Clearly, our current energy situation contains risks, but these risks are not confined to imports. Domestically, our entire energyinfrastructure is strained, both from the standpoint of the very limited domestic areas we can explore and produce U.S. oil and natural gas and from the standpoint of refinery capacity and delivery of the energy required by a growing U.S. economy. The risks associated with neglect of these domestic constraints are no less serious than those associated with growing imports. Internationally, the U.S. will continue to rely on global markets to supply the bulk of both our own growing oil demand and that of our major allies and trading partners.

The U.S. faces three energy challenges in this emerging environment. First, a massive volume of new global production capacity must be developed within the next two decades to sustain the world economy. Second, this capacity must be developed without recourse to the large volumes of readily available surplus capacity typical of global markets in the past two decades. Third, this development must occur in a setting where the market share of the OPEC cartel is expected to be rising. Despite a number of key uncertainties in this outlook, failure to develop such new supplies will have major long term costs to both the U.S. and global economy. While the U.S. has influence over meeting these three international challenges, it has little direct control over any of them. Its greatest channel of influence is promoting free trade and investment in energy worldwide, and encouraging U.S. firms to participate in that trade and investment to the fullest extent possible.

A Growing World Economy Will Require Growing Volumes of Oil and Gas

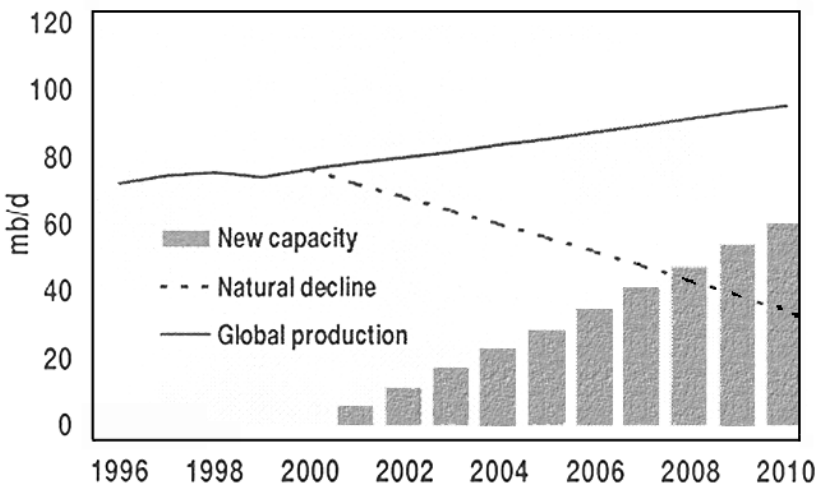
The sustained growth in the world economy over the past two decades has been fueled by a steady growth in the use of oil and gas. In 2000, the world used 77 million barrels of oil per day (mmb/d). As seen in Figure 1, energy growth is required to sustain economic growth in virtually any country examined. Moreover, because of the key role of transportation to such growth, and the key role of oil in fueling transport demand, there is a similarly close relation between economic growth and oil consumption. Global demand for oil grew by 13.1 million barrels per day (mmb/d) between 1985 and 2000. This was not an aberration. As the center of economic growth continues to shift from industrial to the developing countries, this growth is expected to accelerate, even with continued progress in conservation and aggressive development of alternative fuels. In the reference case scenario examined in the 2002 DOE International Energy Outlook, for example, nearly 42 mmb/d of new global oil supply is expected to be required by 2020.



Massive New Oil and Gas Investments Will Be Required To Satisfy Economic Growth

Supplying this worldwide growth will be especially difficult. Many of the traditional areas of expansion over the past several decades are already in decline or expected to be so. In Figure 2, demand growth between 2000 and 2010 is likely to be in the neighborhood of 20 mbd. But at the same time, production from existing reservoirs is in decline. Some of the major companies report decline rates as high as 10 percent per year. But even a decline at half this rate, shown here, would require replacement of 40 mbd of oil production capacity over ten years. This is double the amount required to satisfy demand growth, so that between satisfying demand growth and replacing lost supply, a conservative measure is that 60 mbd of capacity needs to be installed over the course of this decade. This increment is nearly eight times the current output of the world's largest producer, Saudi Arabia. The investment required to finance this oil and gas growth is estimated to exceed one trillion dollars over the decade.

Figure 2. Required Oil Capacity Additions



Source: International Energy Agency

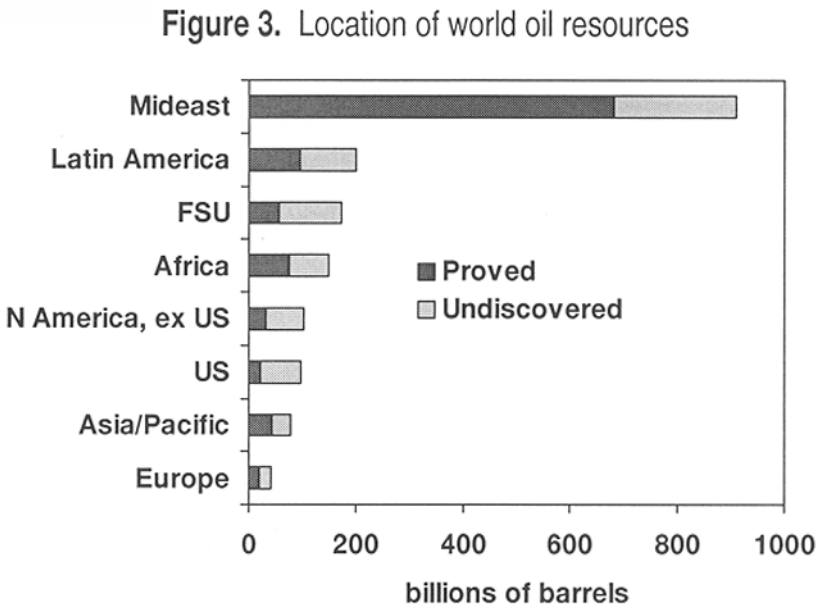
Meeting This Challenge Will Require Global Expansion on Old and New Frontiers

The world's oil and gas resources, unfortunately, are not always conveniently located. First, there is no escaping the fact that the bulk of remaining world oil resources is clearly concentrated in the Middle East, especially the Persian Gulf The required growth in global supplies will not occur without a major expansion of supply from the Gulf In the Department of Energy reference case scenario, supply from the Gulf nearly doubles over the next two decades. But this alone is not enough. In fact, the anticipated growth will require major expansion into new frontier areas as well. While half of the world's increased energy production from 1980 to 2000 came from OECD countries, over the next two decades the International Energy Agency estimates that over 95 percent of the increase will originate in non-OECD countries, with the Middle East and the transition economies (Russia and the Caspian region, primarily) accounting for half of this.

The Cost of Failure to Develop These New Supplies

There are major challenges to be overcome in each of the geographic areas where new supply is projected. There is no inevitability that such supplies will be forthcoming. However, what is inevitable is that failure to develop the new supplies will have costs. If the estimated supply growth falls short of the levels suggested above, prices will be higher, and economic growth lower, than in the DOE's reference case. In a hypothetical scenario constructed by DOE, in which supply by 2020 falls 5 mbd short of that estimated in the reference case, world oil price is over $6 per barrel higher, causing an increase of over $200 billion annually in the global cost of oil.

Beyond direct effects on oil markets, the role of oil in the world economy is sufficiently significant that such impacts may have consequences for broader economic growth. While there is a range of opinion as to the magnitude of these effects, there is broad consensus that higher oil prices damage economic growth. The reasons for this are clear.



Oil, like capital and labor, is a productive input into a broad range of economic goods and services. If higher oil prices reduce oil use, economic growth will be reduced unless the lost contribution of oil can be offset by increased supplies of labor, capital, other energy, or by technical change. It is not easy to augment such factors, especially in the short run. The extent of the economic damage will depend on the magnitude and the duration of the increase. A recent paper by the International Monetary Fund (IMF) estimates that a $5 per barrel permanent increase in oil price would reduce world GDP by as much as 0.3 percent during the first several years following the increase, entailing a loss to the world economy of about $100 billion annually.

The Role of U.S. Energy Policy

Since the early 80s, the U.S. has generally pursued a domestic and foreign policy that has relied on markets, combined with the active promotion of free trade and investment, to ensure development of the necessary worldwide oil and gas supply capacity. The supply diversification that has resulted has proven to be a very effective tool for managing the risks associated with import dependence. Sustaining this diversity in a growing global market will be challenging, and will require continuous diligence to encourage both the development of competitive world class domestic resources, and freedom of trade and investment to allow U.S. oil and gas firms to be competitive both at home and abroad. Relaxing restrictions on federal land access, decreasing reliance on economic sanctions for foreign policy, and preserving the competitiveness of U.S firms operating abroad via tax policy are all essential elements of a strategy designed to meet this challenge.

For the future, continued success in managing the problem of global energy security will rely on continued expansion of global trade and the full participation of US firms in that expansion.

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