United States Government Accountability Office

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Report to the Chairman, Committee on International Relations, House of Representatives

December 2006

INTERNATIONAL ENERGY

International Forums Contribute to Energy Cooperation within Constraints

GAO-07-170

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GAO Accountability · Integrity · Reliability

Highlights

Highlights of GAO-07-170, a report to the Chairman, Committee on International Relations, House of Representatives

Why GAO Did This Study

Rising oil prices, resulting from growth in energy consumption by rapidly developing Asian nations and by most industrialized nations, have increased concern about competition over oil and natural gas resources. In particular, Congress expressed interest in how the United States participates in energy cooperation through international forums. GAO was asked to review: (1) what are the key international energy forums in which the United States pursues energy cooperation, (2) what are some of the key emerging energy market issues that are important for international energy cooperation, and (3) how is the United States addressing these issues through its participation in these forums. GAO's work is based on contacts with agency officials and energy experts and review of documents.

What GAO Recommends

GAO recommends that the Secretary of Energy emphasize improving international energy information efforts, particularly by examining how EIA statistical expertise can contribute to data efforts and U.S. data submissions to IEA can be made more timely. DOE expressed concerns and provided alternative language related to EIA's role and efforts.

www.gao.gov/cgi-bin/getrpt?GAO-07-170.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Loren Yager at (202) 512-4347 or yagerl@gao.gov.

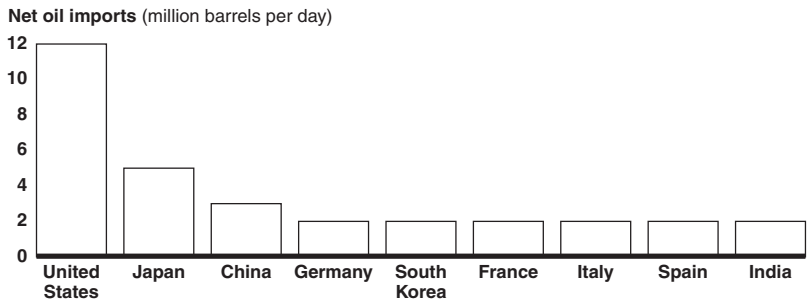
What GAO Found

The United States pursues energy cooperation through several international energy forums designed to meet specific cooperative needs. They include a formal institution with binding petroleum reserve obligations, regional associations, and informal gatherings designed to facilitate information exchange. Major forums include the International Energy Agency (IEA), the Asia Pacific Economic Cooperation Energy Working Group, the North American Energy Working Group, and the International Energy Forum.

GAO identified three energy market issues that are important for U.S. efforts in international energy cooperation. First, a tighter energy market with higher, more volatile, prices has developed. This is due to (1) an unanticipated rise in energy demand and (2) constrained supply due to less spare crude oil production capacity and increased political frictions in certain supplier countries. Second, market participation of national oil and gas companies, which are majority owned by governments, has led to limitations on access to resources. Third, more reliable energy market information is needed to facilitate market stability and plan investment.

The U.S. government has addressed these issues through its participation in international energy cooperation forums; however, the nature of the forums can limit their impact. Forums have restricted membership, consensus-based agendas and decisions, and voluntary participation. They generally focus on noncontroversial issues such as energy efficiency and technology. Within these constraints, the United States has tried to mitigate effects of tight markets by supporting emergency preparedness. It has not directly addressed the impact of national oil companies, but it has pursued related areas. It has sought to improve energy information, but Energy Information Administration (EIA) statistical expertise has not been consistently leveraged for purposes beyond data exchange, and U.S. data submissions to the IEA have not been timely.

Top World Oil Net Importers, 2004



Source: GAO analysis of EIA data.

Note: This includes all countries that imported more than 1 million barrels per day net in 2004.

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Abbreviations

APEC	Asia Pacific Economic Cooperation
DOE	Department of Energy
EIA	Energy Information Administration
EUROSTAT	European Communities
G-8	Group of Eight
GDP	gross domestic product
IEA	International Energy Agency
IEF	International Energy Forum
JODI	Joint Oil Data Initiative
LNG	liquefied natural gas
NAEWG	North American Energy Working Group
OECD	Organization of Economic Cooperation and Development
OLADE	Organization Latinamericana de Energia
OPEC	Organization of Petroleum Exporting Countries
UNSD	United Nations Statistics Division

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

December 19, 2006

The Honorable Henry J. Hyde
Chairman
Committee on International Relations
House of Representatives

Dear Mr. Chairman:

One of the emerging forces affecting the global economy has been the rapid growth of Asian economies, increased energy consumption in these economies, and the rising oil prices accompanying this growth. Congress has raised concerns about the nature of international competition for oil and natural gas resources and how the United States can secure the energy resources needed to support U.S. economic growth. In particular, Congress has expressed interest in how the United States has sought to advance one of the key principles of energy security—international cooperation through participation in international energy cooperation forums.

To determine how the U.S. government participates in international energy cooperation forums, at your request, we reviewed: (1) what are the key international energy forums in which the United States pursues energy cooperation, (2) what are some of the key emerging energy market issues that are important for international energy cooperation, and (3) how the United States is addressing these issues through its participation in these forums.

To answer these questions, we reviewed documents and interviewed officials responsible for international energy cooperation at the Departments of Energy (DOE), State, and Commerce. Our work at DOE also included the Energy Information Administration (EIA), a DOE statistical agency that provides independent data, forecasts, and analyses to promote sound policy making and efficient markets. We focused on the oil and natural gas sectors and on the following key international energy cooperation forums: the International Energy Agency (IEA), the Asia Pacific Economic Cooperation (APEC) Energy Working Group, the North American Energy Working Group (NAEWG), and the International Energy Forum (IEF). We neither evaluated these forums and their impacts on energy policy and the global energy market nor did we evaluate U.S. energy policy goals. Rather, we reviewed the forums' mission, structure, and activities. We conducted fieldwork at IEA and the U.S. Mission to the

Organization of Economic Cooperation and Development (OECD) in Paris, France, and interviewed U.S. members of the IEA and APEC Energy Working Group business advisory groups, as well as private sector energy experts. To determine some of the key emerging energy market issues that are important for international energy cooperation, we reviewed documents and data and interviewed officials at the DOE and the Departments of State and Commerce, as well as reviewing relevant reports and studies and discussing them with energy experts. We conducted our work from January 2006 to November 2006 in accordance with generally accepted government auditing standards. (See app. I for details about our objectives, scope, and methodology.)

Results in Brief

The United States pursues energy cooperation through international energy forums that are designed to meet specific cooperative needs. These forums range from formal institutions to regional associations to more informal gatherings designed to facilitate a frank exchange of information. IEA is the only formal institution with binding obligations for a petroleum reserve system. It focuses on responding to supply disruptions through emergency planning for the coordinated release of members' petroleum reserves, such as in its response to Hurricane Katrina in 2005, as well as on providing oil and natural gas market information. The APEC Energy Working Group focuses on the rapidly growing Asia Pacific economies; it is a voluntary regional effort that seeks to build consensus on energy policy issues through sharing best practices and technology insights. NAEWG focuses on developing an open, efficient, and transparent North American energy market through greater regulatory cooperation and exchanges of energy data, information, and technology. IEF—formerly known as the "Producer-Consumer Dialogue— facilitates dialogue between oil-producing and -consuming countries in biennial ministerial meetings and sponsors the Joint Oil Data Initiative (JODI), a recent effort to establish a world oil database.

We identified three key energy market issues that are important for U.S. efforts in international energy cooperation in the oil and natural gas sectors. First, world oil demand has risen more rapidly than expected, particularly from major developing countries such as China and India. At the same time, supply has become more constrained and more susceptible to disruptions, due to such constraints as political or energy sector frictions in certain producing countries such as Iraq, Nigeria, Venezuela, and Iran and less spare crude oil production capacity. This has resulted in a tight energy market characterized by higher prices. Second, the market participation of national oil and gas companies—which are majority

owned by national governments—from both energy consuming and producing countries has led to limitations on access to oil and natural gas resources. Concerns have arisen that some national oil and gas companies may not be able to efficiently bring energy resources to the market and that constrained investment climates in some producing countries dominated by national companies may inhibit the investment needed for continued production and growth. Third, tightened markets and the need for substantial investment in the oil and gas sectors have increased the importance of more reliable oil and natural gas market information. For example, key industry forecasts failed to anticipate the 2004 surge in Chinese and global oil demand due in part to unreliable data.

The U.S. government has addressed these key emerging energy market issues through its participation in international energy cooperation forums; however, these forums, by their nature, can be constrained in the degree to which they can have an impact on these issues. Discussion of energy issues among sovereign nations for which energy has great domestic economic and political sensitivity generally means that forums focus on noncontroversial issues, like energy efficiency and technology. Forum efforts are also constrained by inherent limitations in restricted membership, consensus-based decision making, and the voluntary nature of participation and follow-up. However, within these constraints, the U.S. has tried to mitigate the imbalances associated with tight markets by supporting efforts such as emergency preparedness, policy and technical outreach to developing countries with fast increasing energy needs, energy technology research and training, and cooperation with producer countries. The United States has not directly addressed the impact of the growing participation of national oil companies on the energy market at the forums, but it has pursued related areas such as investment climates. Forum initiatives to improve information have included capacity building, data sharing, and data standardization efforts. The United States has supported such efforts through its participation in the forums; however, EIA's involvement in initiatives to improve international data has been indirect and ad hoc according to a senior EIA official. Despite the importance of reliable international energy data for market stability, EIA's expertise has not been consistently leveraged for international energy cooperation. Furthermore, due to differing reporting schedules, U.S. data submissions to the IEA have lacked timeliness and contributed to the 18-month lag for which published international data is available.

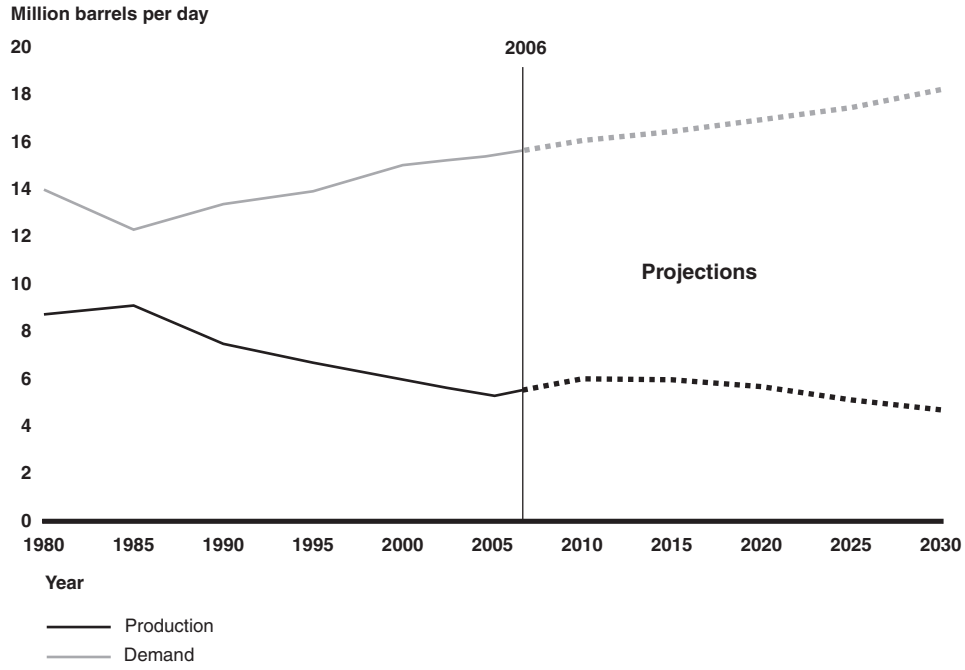
In this report, we make two recommendations to DOE to emphasize the priority of improving energy information efforts within the international forums, particularly by (1) examining how EIA expertise can contribute to

international forum data efforts and (2) examining how U.S. data submissions to the IEA can be made more timely. We provided a draft of this report to DOE and the Departments of Commerce and State. All three agencies provided written comments, which are reproduced in appendixes IV, V, and VI, respectively. The Department of Commerce agreed with our recommendations. The Department of State provided information about organizational changes it had made recently that highlight the importance of global energy challenges. DOE stated that the U.S. government has been actively engaged in international energy forums to advance U.S. energy security objectives and that our report adds to the greater understanding of these efforts. However, DOE expressed concerns with our characterization that EIA expertise has not been consistently leveraged to improve international energy data through the multilateral forums and with our description of how U.S. data submissions to IEA have not been timely. DOE provided alternative language that we incorporated where appropriate. Finally, DOE stated that it was concerned that GAO asserts that providing more data on a timely basis will resolve energy market and security issues. While GAO makes no such assertion, we emphasize that improving energy statistics is one important way in which the international forums can enhance the impact of international cooperation, especially as regards global energy market transparency. DOE and the Departments of Commerce and State also provided technical comments, which we have incorporated where appropriate.

Background

The growth rate of crude oil and natural gas demand in the United States has outpaced the growth rate of the country's crude oil and natural gas production over the last 20 years. This widening gap is projected to accelerate in the future. As shown in figure 1, EIA forecasts that this trend for crude oil will continue through 2030. Natural gas demand, as shown in figure 2, has similarly outpaced natural gas production, and EIA forecasts that this trend will also continue. This widening gap between U.S. domestic energy production and consumption of oil and natural gas has focused attention on the importance of these commodities to the U.S. economy.

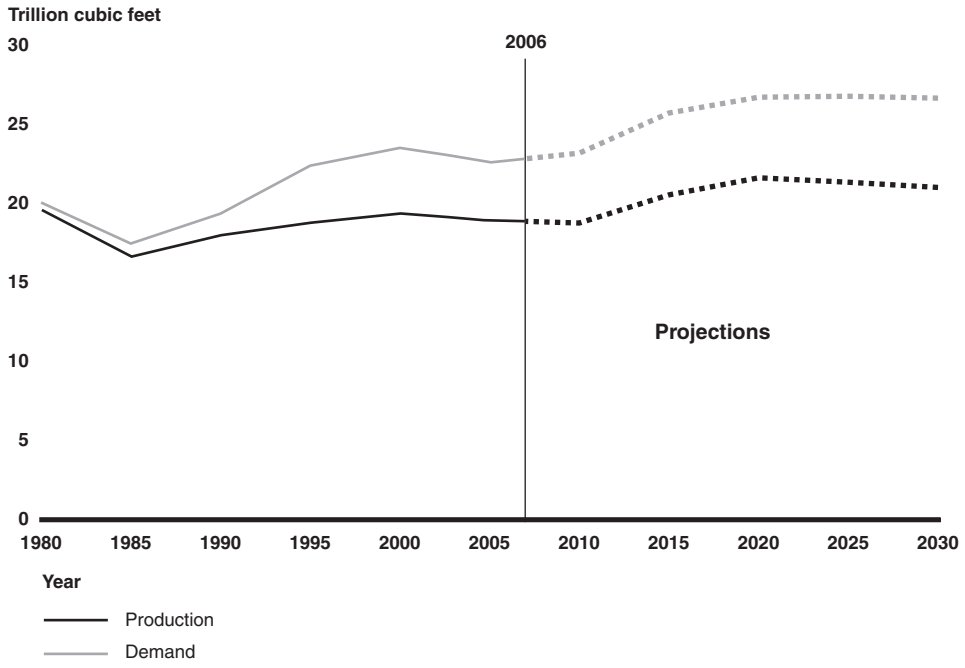
Figure 1: U.S. Crude Oil Production and Demand, 1980-2030



Source: GAO analysis of EIA data.

Note: Production is based on U.S. domestic oil field production data; demand is based on U.S. domestic oil field production plus net crude oil imports.

Figure 2: U.S. Natural Gas Production and Demand, 1980-2030



Source: GAO analysis of EIA data.

The United States' most recent "National Energy Policy" report, issued in May 2001, outlines several U.S. energy security objectives that are relevant for international energy cooperation.[1] The report states that the United States should work cooperatively with key countries and institutions to expand sources and types of supply, enhance the transparency and efficiency of markets, strengthen U.S. capacity to respond to disruptions, promote international trade and investment in the energy sector, and

[1]For recent GAO evaluations of related energy activities, see GAO, *National Energy Policy: Inventory of Major Federal Energy Programs and Status of Policy Recommendations*, GAO-05-379 (Washington, D.C.: June 10, 2005); GAO, *Energy Security: Issues Related to Potential Reductions in Venezuelan Oil Production*, GAO-06-668 (Washington, D.C.: June 27, 2006); GAO, *Natural Gas: Factors Affecting Prices and Potential Impacts on Consumers*, GAO-06-420T (Washington, D.C.: Feb. 13, 2006); and GAO, *Energy Markets: Factors Contributing to Higher Gasoline Prices*, GAO-06-412T (Washington, D.C.: Feb. 1, 2006).

enhance emergency preparedness, among other goals.[2] Several recommendations outlined in the "National Energy Policy" report provide guidance for the United States as it engages in multilateral and bilateral forums and discussions designed to enhance U.S. energy security, such as the following:

- Work with the IEA to ensure that member states fulfill their stock-holding commitments and encourage major oil-consuming countries that are not IEA members to consider strategic stocks as an option for addressing potential supply disruptions;[3]
- Work with producer and consumer country allies and the IEA to craft a more comprehensive and timely world oil data reporting system;
- Use membership in multilateral organizations, such as APEC, and bilateral relationships to implement clear, open, and transparent rules and procedures governing foreign investment and reduce barriers to trade and investment;
- Engage in a dialogue through NAEWG to develop closer energy integration among Canada, Mexico, and the United States; and
- Assist U.S. companies in their dialogue with Russia on investment and trade and improve the overall investment climate.

[2]The "National Energy Policy" report contained over 100 recommendations that it stated, taken together, provide a national energy plan that addresses the energy challenges facing the nation. In a 2005 report, GAO-05-379, GAO found it is difficult to fully assess the status of progress made in implementing the National Energy Policy recommendations because the information reported by DOE has been limited, some recommendations are open-ended and lack measurable goals, and the National Energy Policy recommendations do not reflect all federal energy-related efforts.

[3]For this recommendation, the "National Energy Policy" report specifically encourages the United States to work closely with Asian economies, especially through APEC.

The United States Pursues Energy Cooperation through International Energy Forums Designed to Meet Specific Cooperative Needs

The United States pursues energy cooperation through international energy forums that meet specific cooperative purposes. These forums range from formal institutions with binding obligations to regional associations to more informal gatherings designed to facilitate a frank exchange of information. Information related to these forums is summarized below in table 1.

Table 1: Overview of Major International Energy Cooperation Forums

Forum	Number of members	Forum structure	Forum objectives
IEA	26	Formal institution made up of OECD industrialized democracies, with binding obligations for petroleum reserve system, and about 150 professional staff	Collective response to oil supply disruptions Analysis and publication of energy market information Energy policy outreach to major developing countries, as well as energy producing countries
APEC Energy Working Group	21	Regional energy forum based on consensus decision making and analysis from multiple expert groups	Promoting development of Asia-Pacific energy market through sharing energy information, expertise, and best practices
North American Energy Working Group	3	Trilateral (United States, Canada, and Mexico) energy forum based on consensus decision making and analysis from multiple expert groups	Optimal integration of North American energy market by sharing policy, regulatory, and technical expertise
International Energy Forum	over 60	High-level international energy forum fostering dialogue among both energy producing and consuming countries	Supports JODI Informal discussion of energy security issues

Source: GAO.

IEA Focuses on Emergency Planning for Supply Disruptions, Oil Market Information, and Outreach to Major Developing Nations

IEA was established in November 1974 by most of the members of OECD, the major industrialized democracies that were generally also the largest consumers of oil, and today has 26 members.[4] It was a collective response to energy security concerns arising from the oil embargo imposed by the Organization of the Petroleum Exporting Countries (OPEC) the previous year to reduce the vulnerability of IEA members to a major disruption in oil supplies. IEA's primary mission was to respond to any future oil crisis through a binding emergency preparedness system that established emergency oil reserves equivalent to 90 days of members' net imports, countering any future threat of an oil embargo. In addition, it collects and analyzes oil market data in order to increase oil market information and transparency; assesses member countries' domestic energy policies and programs; makes projections based on differing scenarios; and prepares studies and recommendations on specialized energy topics.

IEA's goals have evolved over the years as the energy market has changed; today it focuses its emergency planning less on the threat of embargoes and more on supply disruptions that might arise from natural disasters, wars, or terrorist acts. More importantly, as the structure of the oil market has changed over the years, IEA's emergency response measures have also evolved from a government emergency allocation program to market-based measures, according to a DOE official. IEA's release of oil reserves in response to Hurricane Katrina in September 2005 is an example of its current focus. In addition to emergency preparedness measures, IEA also emphasizes outreach to nonmember countries, reducing dependence on oil through alternative energy and advanced technology, and integrating environmental and energy policies. Recently, IEA has also recognized that it needs to enhance its expertise related to the growing global natural gas market.

IEA is an autonomous international organization based in Paris, France, created within the framework of the OECD in order to implement the treaty establishing it.[5] IEA's main decision-making body is the Governing

[4]The members of IEA are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

[5]IEA was established pursuant to the Agreement on an International Energy Program. All IEA members must be OECD members. However, not all OECD members are IEA members. OECD nonmembers of IEA are Iceland, Mexico, Poland, and the Slovak Republic.

Board, composed of senior energy officials from each member country and meeting about four times per year.[6] Day-to-day operations are conducted by the IEA Secretariat, headed by an Executive Director and comprising a professional staff of about 150 energy experts drawn from member countries. IEA also receives the input of the IEA Industry Advisory Board, which has private sector representatives from member countries and meets three to four times a year.

The United States is significantly involved in IEA activities, according to U.S. and IEA officials. The Deputy Executive Director is traditionally an American. The DOE Assistant Secretary for Policy and International Affairs and the Department of State Deputy Assistant Secretary for Energy, Sanctions, and Commodities both serve on the Governing Board and play an active role. U.S. energy officials participate on almost every standing group and committee as either a Chair or Vice-chair. In addition, the United States has historically provided about 25 percent of IEA's annual budget, which amounted to $5.5 million in 2006, according to a Department of State official.

APEC Energy Working Group Seeks to Build Broad Regional Consensus on Key Energy Issues

The APEC Energy Working Group, comprised of 21 Asian Pacific economies[7] accounting for 60 percent of world energy demand, is a voluntary regional effort that seeks to build consensus on energy policy issues, primarily through sharing best practices and technology insights. This working group includes both net energy consuming countries, such as the United States, Japan, and China, and net energy producing countries, such as Russia and Indonesia. It was launched in 1990 to develop a program for energy cooperation. It seeks to maximize the energy sector's contribution to the region's economic and social well-being, while

[6]The Governing Board is supported in policy development by a structure of Standing Groups and Committees, also composed of member government energy officials, that each separately meet two to five times a year and focus on the oil market, emergency preparedness, long-term cooperation, nonmember countries, and energy research and technology.

[7]These are: Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Republic of the Philippines; Republic of Korea; Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America; and Vietnam. Members of APEC are called "economies" rather than "nations" in order to avoid the issue of the status of Taiwan, which is not recognized by China as a separate nation. The compromise was to refer to all members as economies and to refer to Taiwan as "Chinese Taipei," according to a DOE official.

mitigating the environmental effects of energy supply and use. Its objectives include strengthening the security and reliability of affordable energy to all members, and promoting clean and efficient technologies and the efficient use of energy to achieve both economic gains and environmental enhancement.

APEC Energy Ministers' meetings, generally held every 2 years, provide the Energy Working Group with political guidance regarding its activities. The APEC Energy Working Group has its own Secretariat in Australia, which has been financially underwritten and staffed by the Australian government. The Energy Working Group, generally comprised of member government energy officials, meets twice a year. It receives an update on the activities of the five expert groups, which focus on clean fossil energy, efficiency and conservation, energy data and analysis, new and renewable energy technologies, and minerals and energy exploration and development. It also guides the work of the Asia Pacific Energy Research Centre, an international organization based in Tokyo that receives the bulk of its financial support from the Japanese government. Finally, it is advised by the Energy Working Group Business Network, which provides private sector perspective on key energy issues affecting the region.

The APEC Energy Working Group fosters discussion of members' energy policies and planning priorities, sharing basic energy demand and supply outlook data, considering regional energy policy implications, and responding to wide-reaching energy-related issues. Recent efforts include its Energy Security Initiative, which comprises both short-term measures designed to respond to temporary energy supply disruptions and longer term policy responses designed to address the broader challenges facing the region's energy supply. It has also focused on development of the Asia-Pacific natural gas market, particularly for liquefied natural gas (LNG).[8]

The United States generally sends two delegates from DOE's Office of Policy and International Affairs and an observer from the Department of State to the Energy Working Group meetings. DOE staff also participate on the various expert groups.

[8]LNG is natural gas, primarily methane, which has been cooled to its liquid state at -260 degrees Fahrenheit. Liquefying natural gas reduces the volume it occupies by more than 600 times, making it a practical size for storage and transportation.

NAEWG Focuses on Regional Regulatory Cooperation and Exchange of Energy Market Data, Information, and Technology

NAEWG is a trilateral regional forum—including the United States, Canada, and Mexico—focused on developing an open, efficient, and transparent North American energy market. The forum pursues this focus by emphasizing efforts such as greater regulatory cooperation, encouraging energy data and information exchange, collaborating on energy science and technology, and examining natural gas trade and interconnections.

NAEWG was established and initially led by the three Energy Ministers of Canada, Mexico, and the United States in its inaugural meeting in June 2001.[9] Natural Resources Canada, the Mexican Secretariat of Energy, and the U.S. DOE jointly chair NAEWG, with day-to-day U.S. leadership now provided at the Assistant Secretary level. DOE's Assistant Secretary of Energy for Policy and International Affairs is the U.S. lead, while both the Department of Commerce and the Department of State support the effort at the Deputy Assistant Secretary level.

The agenda of work identified at the ministerial level is carried out by nine expert working groups.[10] Members of these expert working groups share their policy, regulatory, and technical expertise and energy statistics from the three countries. According to DOE officials, the products of this work are enhanced regulatory cooperation, such as on project siting issues; workshops on various energy issues; and joint public written documents produced by the expert working groups. For example, in 2005, NAEWG published the "North America Natural Gas Vision," a report addressing the region's natural gas regulations and policies, production and consumption, trade, transportation, and supply and demand projections. Each expert working group also consults informally with energy industry representatives to enable numerous subject area workshops and to obtain private sector input on an issue area.

[9]The formation of NAEWG was one of 105 recommendations for action in the U.S. "National Energy Policy" report, released in May 2001. With support from the heads of state from each of the three countries regarding cooperation in the energy sector, Natural Resources Canada Minister Goodale, Mexican Secretary of Energy Martens, and U.S. Secretary of Energy Abraham established NAEWG in March 2001.

[10]These comprise the electricity, energy efficiency, energy picture, hydrocarbons, natural gas trade and interconnections, nuclear collaboration, oil sands, regulatory, and science and technology working groups.

IEF Seeks to Facilitate Dialogue and Information Exchange between Oil Producing and Oil Consuming Countries

IEF—formerly known as the "Producer-Consumer Dialogue"— is a unique forum established to facilitate dialogue on energy security issues between producing and consuming countries. IEF provides the largest recurring global gathering of Energy Ministers, with over 60 countries participating. The IEF Ministerial is held every 2 years, rotating in location, and is a venue for Energy Ministers to discuss energy security issues. IEF does not serve as a decision-making organization or a forum for negotiating formal agreements. However, according to Department of State and DOE officials, U.S. participation at the senior staff level has increased since 2000 in recognition of IEF's value in allowing for informal, frank, and wide exchange of information.[11]

IEF activities in addition to the Ministerial dialogue include the JODI and the International Energy Business Forum. JODI is a recent initiative to establish a world oil database, originally combining the efforts of six international organizations including APEC and IEA.[12] The International Energy Business Forum serves as a venue for Ministers to meet with industry representatives prior to the IEF Ministerial and had over 30 companies participating in 2006. The Ministerial dialogue, JODI, and the International Energy Business Forum are now facilitated by the IEF Secretariat, which was established in December 2003 and is headquartered in Riyadh, Saudi Arabia.

In addition to participation with IEA, APEC Energy Working Group, NAEWG, and IEF, the United States also participated in the July 2006 Group of Eight (G-8) Summit hosted by Russia, which served as an ad hoc forum addressing the need for international energy cooperation. The United States also pursues international cooperation through bilateral energy cooperation efforts. We reviewed U.S. bilateral energy cooperation efforts with Canada, China, India, Mexico, and Russia. Information related to these forums can be found in appendix II.

[11]The "Producer-Consumer Dialogue" was originally designed to be a dialogue and informational bridge between OPEC and IEA countries. U.S. representatives originally had concerns about this dialogue and possible price collusion resulting from the discussions that have been allayed in the past several years.

[12]The other international organizations include the Statistical Office of the European Communities (EUROSTAT), Organization Latinoamericana de Energia (OLADE), OPEC, and the United Nations Statistics Division (UNSD). These organizations began an assessment of the quality of world oil statistics in April 2001 under an initiative called the "Joint Oil Data Exercise." This exercise was transformed into JODI after the 8th IEF in 2002.

Emerging Energy Market Issues Include Tight Markets, Growing Role of National Oil Companies, and Increased Importance of Reliable Market Information

Three key energy market issues that are important for U.S. efforts in international energy cooperation in the oil and natural gas sectors are: a tight energy market, growing market participation of national oil companies, and increased importance of reliable energy market information.

Rising Demand and Supply Constraints Have Resulted in a Tight Energy Market

World energy demand has risen in recent years, particularly from major developing countries, at the same time supply has become more constrained and more susceptible to disruptions—resulting in a tight energy market characterized by higher prices. During most of the 1990s, real crude oil prices (in 2003 dollars) fluctuated around $20 a barrel. While crude oil prices started edging up with the economic recovery and production cuts at the end of the 1990s, upward price pressures became pronounced during 2003-2004. These market conditions contributed to world crude oil prices increasing by more than two-and-a-half times from about $30 a barrel in early December 2003 to a peak of about $77 a barrel around mid-July 2006.[13] While prices dropped by around $20 a barrel in the 3 to 4 months following this peak,[14] several energy experts believe that the fundamentals of the tight market still exist and are a cause for continuing concern.

Rapid Increase in Oil Demand by Developing Countries Has Contributed to a Tight Energy Market

In recent years, rapid growth in energy demand by major developing countries, such as China and India, and continued steady growth of demand by many industrialized nations has contributed to tighter oil markets. The main consumers of oil continue to be the advanced

[13]Prices are based on daily spot prices of West Texas Intermediate crude oil at Cushing, Oklahoma, as reported by EIA. The spot price of crude oil never dipped below $30 per barrel again after December 1, 2003, when it was $29.98 per barrel. It peaked on July 14, 2006, at $77.03.

[14]The spot price for West Texas Intermediate crude oil dropped to a low of $56.27 per barrel on November 14, 2006, and as of December 1, 2006, was back up to $63.44.

economies. The United States, OECD Europe,[15] and Japan together account for about half of annual global oil consumption. However, consumption in the major developing countries has generally been increasing at a faster pace. China, in particular, has gained prominence because its demand has grown so fast. One expert noted that China's demand in 2004 rose by an extraordinary 16 percent compared with 2003 and served as a "demand shock," or unexpected surge in demand.[16] From 2000 to 2004,[17] total world demand for oil grew by about 8 percent, increasing from nearly 77 million barrels per day to about 82 million barrels per day. China's demand for oil rose by 33 percent over this period, followed by India's growth in demand of 15 percent, while U.S. demand increased by about 5 percent, and OECD Europe by about 2 percent.

The data used to measure both oil demand and supply are subject to limitations described later in this report, including lack of timeliness and transparency, definitional inconsistencies, and national sensitivities. The estimates provided represent the broad trends from the most current market information used in forecasting and determining cost. Table 2 shows the top world consumers of oil—countries that consumed more than 2 million barrels per day—with their level of demand and the percentage change from 2000 to 2004, as well as their share of the world oil market in 2004. The United States far exceeds the rest of the world in its volume of consumption, accounting for a quarter of world demand, with about 21 million barrels per day in 2004. Most of U.S. oil demand arises from usage in the transportation sector. China's demand surpassed Japan's in 2003, and it became the second largest consumer of oil, with about 6 million barrels per day, or about 8 percent of world demand.[18] India's demand is also growing quickly. It consumed about 2 million barrels per day, the sixth highest level of demand.

[15]OECD Europe consists of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

[16] Daniel Yergin, Chairman, Cambridge Energy Research Associates, before the Government Reform Subcommittee on Energy and Resources and the Subcommittee on National Security, Emerging Threats, and International Relations, U.S. House of Representatives, May 16, 2006.

[17]2004 is the latest year for which data is available for all countries. The term "demand" is used interchangeably with "consumption."

[18]In 2005, oil demand data for the United States and China were 20.7 and 6.9 million barrels per day, respectively. Total world demand was 83.8 million barrels per day, and the U.S. and Chinese share of total world demand remained at 25 and 8 percent, respectively.

Table 2: Top World Oil Consumers, with Level of Demand and Percentage Change, 2000-2004, and Share of Total World Market in 2004

Million barrels per day

Ranking	Country	2000	2004	Percentage change	Percentage of total world demand
1	United States	19.7	20.7	5%	25%
2	China	4.8	6.4	33	8
3	Japan	5.5	5.3	-3	6
4	Russia	2.6	2.8	7	3
5	Germany	2.8	2.7	-4	3
6	India	2.1	2.5	15	3
7	Canada	2.0	2.3	13	3
8	South Korea	2.1	2.2	1	3
9	Brazil	2.2	2.1	-1	3
10	France	2.0	2.0	0.5	2
11	Mexico	2.0	2.0	-3	2
Total world		**76.6**	**82.5**	**8%**	**100%**

Source: GAO analysis of EIA data.

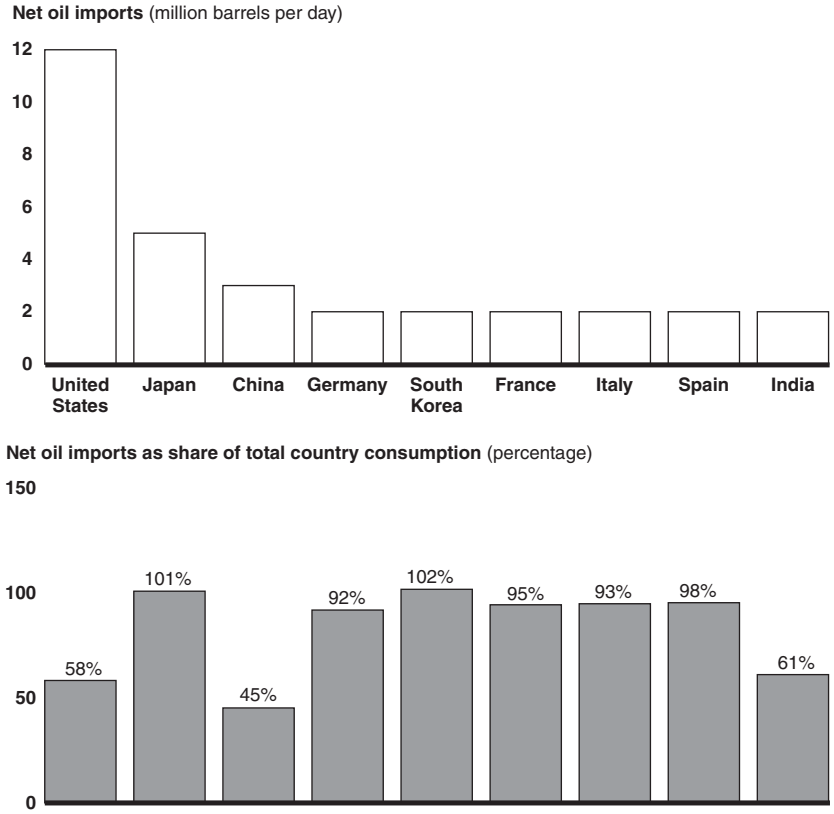
Note: All countries that consumed more than 2 million barrels per day in 2004 are included. This is the most recent year of data available for all countries.

As demand has risen, so have oil import needs. For instance, while the United States produced almost 9 million barrels per day of oil in 2004, making it the third largest world producer,[19] its production met only 42 percent of its demand, with net oil imports of about 12 million barrels per day meeting the remaining 58 percent of demand. China's import dependence has also grown, and it imported about 45 percent of its oil in 2004. Figure 3 shows the top world net oil importers in 2004, countries importing more than 1 million barrels per day net. Of these 9 countries, 6 were totally or almost totally import dependent for their oil consumption. For instance, Japan and South Korea were totally dependent on imports, predominantly from the Persian Gulf, while many European countries also

[19]Oil production is defined here as crude oil (including lease condensate), natural gas plant liquids, other liquids, and refinery processing gain. Saudi Arabia was the largest producer, with about 10 million barrels per day, while Russia was second, with about 9 million barrels per day, in 2004, according to EIA data.

imported from Algeria, Libya, and Nigeria. The largest net oil exporter to the United States was Canada, followed by Mexico, Saudi Arabia, and Venezuela.

Figure 3: Top World Oil Net Importers, 2004



Source: GAO analysis of EIA data.

Notes: This includes all countries that imported more than 1 million barrels per day net in 2004 and is the most recent year of data available for all countries.

Countries importing more than 100 percent of consumption are likely adding the extra oil to their petroleum stocks or this may be due to anomalies in the data.

Oil Supply Constraints Have Increased, Putting Further Pressure on an Already Tight Market

While the world supply of oil and refined products has risen to meet increased demand, supply constraints have also increased, eroding certain market cushions and contributing further to market tightness. Increased political or energy sector frictions in countries such as Iran, Iraq, Nigeria, and Venezuela and decreased spare crude oil production capacity have exerted pressure on crude oil markets. Given the tight market situation,

marked by less spare production capacity and other cushions, any oil supply disruption can cause the price of oil to rise dramatically.

One factor contributing to constrained oil supplies is that the political, or energy sector, friction in key oil producing nations led to supply disruptions and diminished production capacity, in some cases. Participation by international oil companies in the oil sector has been affected by political tensions in Iraq, Venezuela, and Nigeria, and economic sanctions on Iran and Libya. For example, in April 2006, Venezuela seized two oil fields operated by two foreign oil companies because the companies did not comply with new rules imposed by the Venezuelan government. In Nigeria, recent disruptions due to militant actions have shut-in about 650 thousand barrels per day of production.

A second contributing factor is that world production of oil is 84 to 85 million barrels of oil per day, and the rate of production increase has not kept pace with the rate of increased demand. Furthermore, there is very little spare production capacity given existing infrastructure. Spare oil production capacity— the ability to produce extra barrels of production in the short-term—is a key market cushion for responding to market disruptions. Since the mid-1980s, growth in world oil production capacity has lagged relative to growth in global oil demand, with the result that spare capacity has declined from a high in recent times of 5.6 million barrels per day in 2002 to between 1 and 1.3 million barrels per day today. Most of this spare capacity is held within Saudi Arabia. While in previous oil supply disruptions, the U.S. government has been able to negotiate with senior officials in Saudi Arabia and other oil-producing countries to increase their supply of crude oil, many oil industry officials, experts, and U.S. government officials said that today such efforts would be less effective given the limited levels of spare oil production capacity in world markets.

Downstream investment in pipelines and tankers has also lagged behind the growth in global oil demand in recent years, contributing to potential bottlenecks. Additionally, private inventories of oil have been in a long-term declining trend, in part because of a trend toward just-in-time inventory, according to energy experts.

Oil production is capital-intensive and heavily dependent on continuous investment to maintain existing wells, drill new wells for crude oil production, and develop and maintain the infrastructure supporting the production network. Extensive investment in the oil sector will be

required to meet future oil demand and maintain spare capacity, according to energy experts.

Looking ahead, there are additional uncertainties related to future supplies of oil. Expected new supplies of crude oil may be in places that are difficult to access and could involve high extraction and processing costs, as with offshore reserves and unconventional crude oils. There is also an ongoing peak oil debate—disagreement among oil market experts as to when the world will reach its level of peak production of conventional oil and then begin to decline.

For a discussion of the growing role of natural gas in world energy markets, see appendix III.

Growing Market Participation of National Oil Companies Has Led to Concerns

In an energy market characterized by relatively high oil prices and increasing energy demand, the growing participation and market influence of national oil and gas companies—which are majority owned by national governments—from both energy consuming and producing countries has contributed to limited access to oil and natural gas resources in some producing countries. National oil companies from producing countries already control about 90 percent of the world's crude oil reserves,[20] according to DOE. In contrast, the ability of the international oil and gas companies—the large, privately owned and publicly traded oil and gas industry entities—to maintain current production levels by replacing their energy assets with new reserves is affected by increasingly limited access to energy resources around the world. Additionally, access to capital and technical expertise by the national oil and gas companies of consuming countries has enabled them to compete with the international oil companies in the global energy markets. The impact of this industry shift is unclear, but some concerns have arisen over (1) the ability of some national oil and gas companies from consuming nations to efficiently bring energy resources to the market and (2) the constrained investment climates in some producing countries dominated by national oil and gas companies that may inhibit the investment necessary to ensure continued production and growth.

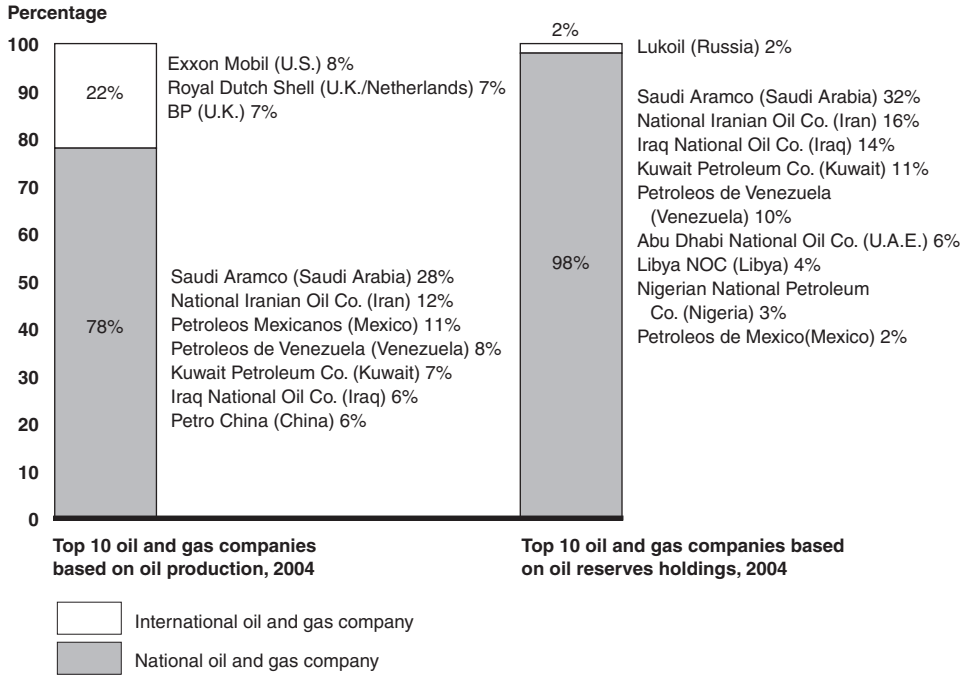
[20]Refers to "conventional" crude oil reserves. According to the EIA, conventional crude oil reserves are reserves produced by a well drilled into a geologic formation in which the reservoir and fluid characteristics permit the oil to readily flow.

National Oil Companies' Influence Is Growing Relative to International Oil Companies

The influence of the national oil and gas companies is perceived to be growing, as the ability of international oil and gas companies to replace their energy resource holdings becomes increasingly limited. According to DOE Secretary Samuel W. Bodman, in a speech to the National Petroleum Council in June 2006, 90 percent of the world's untapped conventional oil reserves are controlled by governments and their national oil and gas companies, many of which are in politically unstable regions of the world. Figure 4 indicates that 7 of the top 10 companies are national or state-sponsored oil and gas companies, ranked on the basis of oil[21] production. The three international oil companies that are among the top 10 are Exxon Mobil, BP, and Royal Dutch Shell. Ranked on the basis of oil reserve holdings, 9 of the top 10 companies are national or state-sponsored oil and gas companies. These top 10 oil and gas companies accounted for an estimated 42 percent of world daily oil production and an estimated 64 percent of world oil reserves holdings in 2004, based on EIA data for world estimates. Figure 5 shows a similarly strong position for the national or state-sponsored oil and gas companies, with respect to natural gas production and reserves holdings. These top 10 oil and gas companies accounted for an estimated 44 percent of world daily natural gas production in 2004 and an estimated 62 percent of world natural gas reserves holdings, based on EIA data for world estimates. Some agency officials and energy experts believe that, should some countries with national oil and gas companies continue to limit competition and investment opportunities in their energy sectors, the ability of international oil and gas companies to replace their energy resource holdings will become increasingly limited to locations marked by high geological, political, and financial risks.

[21]"Oil" includes crude oil, as well as natural gas liquids and condensates. Natural gas liquids are hydrocarbons in natural gas that are separated from the gas as liquids through the process of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Condensates are a natural gas liquid recovered from gas wells from lease separators or field facilities.

Figure 4: Top 10 Companies Based on Oil Production and Reserves Holdings, 2004

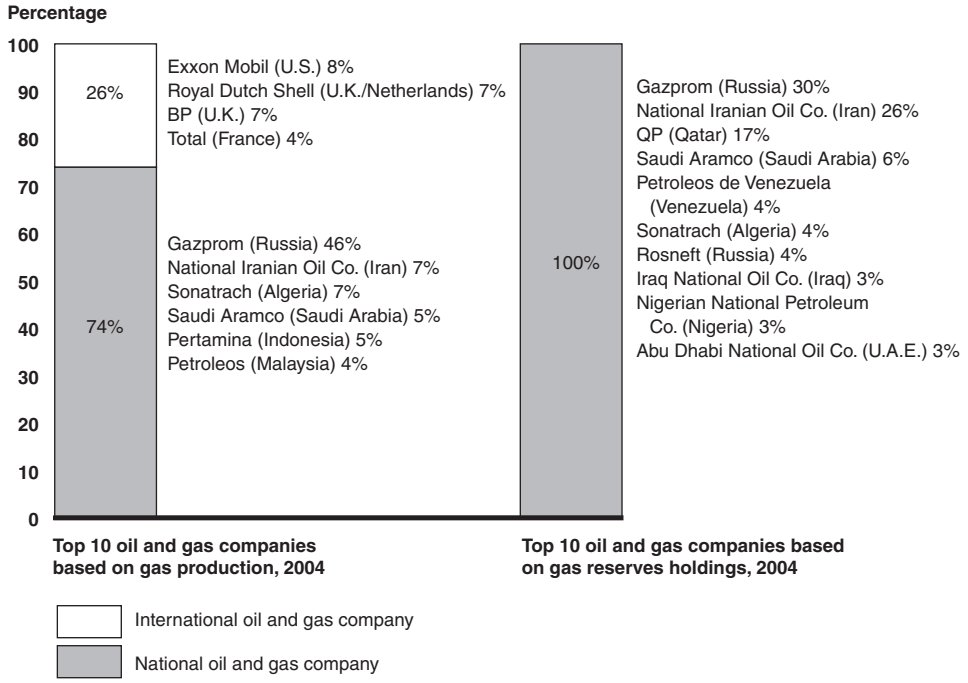


Source: GAO analysis of data from *Petroleum Intelligence Weekly*, Dec. 12, 2005.

Notes: "Oil" includes crude oil, natural gas liquids, and condensates. Natural gas liquids are hydrocarbons in natural gas that are separated from the gas as liquids through the process of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Condensates are a natural gas liquid recovered from gas wells from lease separators or field facilities.

The *Petroleum Intelligence Weekly* data relies on company reports where possible, as well as other information sources provided by companies. However, estimates are generated for those companies that do not release regular or complete reports. Estimates were created for most of the state-owned oil companies in the figure above.

Figure 5: Top 10 Companies Based on Gas Production and Reserves Holdings, 2004



Source: GAO analysis of data from *Petroleum Intelligence Weekly*, Dec. 12, 2005.

Note: Natural gas is net or marketable output.

Competition among consuming countries to procure oil and gas assets has also been affected by the growing participation of national oil and gas companies. Some energy experts stated that increased access to capital, combined with increased access to technical expertise available for hire from third-party service companies, has allowed these consuming countries' national oil and gas companies to compete with the international oil companies in the global marketplace for energy resources. Additionally, with political leverage and potential financial support provided from their governments, some national oil and gas companies may be willing to operate at a lower discount rate and a potentially lower profit margin. For example, there has been an increasing trend by some national oil and gas companies from energy consuming countries such as Brazil, China, India, and Malaysia to become active, competitive bidders for acquiring exploration rights to energy resources in other producing countries. Some experts say these national oil and gas companies may benefit from increased financial support and political leverage in negotiations with the host supplier countries.

National Oil and Gas Companies May Lack Resources to Develop Projects and May Inhibit Competition

According to some agency officials and energy experts, there are two main concerns about participation of national oil and gas companies in the energy market. One concern is that some national oil and gas companies from consuming countries may not have the combination of capital, technical expertise, and managerial expertise necessary to efficiently and effectively develop certain oil and gas projects, preventing some of the production from getting to the global energy market in a timely manner. Some energy experts stated that a Chinese national oil and gas company, for example, may have the capital to compete for the rights to explore for energy resources but may not have the technology and managerial expertise to develop some projects. Additionally, agency officials and energy experts expressed concern over the impact of national oil and gas companies procuring energy assets based on national policy goals rather than on commercial market business strategy. Whereas, international oil and gas companies typically seek to maximize returns, some national oil and gas companies' operations may be driven primarily by their government's energy policy interests and revenue requirements. This may result in (1) a national oil and gas company potentially preventing some or all of the production from the resource base under their control from getting to the global energy market in a timely way or (2) a national company entering into bilateral exploration based on foreign policy purposes. Some energy experts added that, although there may also be a net gain in the resulting energy supply on the market due to increased activity by national oil and gas companies from consuming countries, the ability of some of these companies to bring those energy assets to market is varied and remains a concern.

A second concern is that constrained investment climates in some producing countries' energy markets will inhibit the investment necessary to ensure continued production and growth is maintained by the country's national oil and gas company. For some energy producing countries, the national oil and gas companies serve as a source of general government revenues and funding for social programs, and as a result can be marked under-investment in the company that is required to maintain the country's energy output. In addition, some energy producing countries dominated by national oil and gas companies have failed to open their investment climates or reinvest sufficiently. Experts cited national oil companies in Russia, Mexico, Venezuela, and Indonesia as examples of oil sectors with constrained investment climates and insufficient government reinvestment in the energy sector.

Market Stability and Investment Require Reliable Energy Information

Energy officials and experts state that more reliable energy market information is an increasingly important element for market stability. The reliability of oil and natural gas market information is questionable due to systemic factors such as reporting delays, definitional differences, and lack of transparency. In a tight energy market, the negative impacts of uncertainty in market information on planning and current and future needed investment are amplified.

Unreliable Market Information Contributes to Energy Market Uncertainties

Energy experts and officials question the reliability of oil and natural gas market information in large part due to (1) concerns about historical demand and supply data based on a lack of timeliness in reporting, definitional differences, and national or industry sensitivities and (2) concerns about future demand and supply estimates based on unreliable historical data and insufficient transparency about projection assumptions and methodologies.[22] For example, concerns about oil demand information include the following:

- *Historical demand data:* Uncertainty results from successive revisions of data, a lack of timeliness in reporting, and questionable reliability of data, particularly from rapidly growing non-OECD countries such as China and India. Final demand data are generally available about 16-20 months after the reference year. By the time final data are reported, initial estimates may have been revised repeatedly. EIA officials also question the basic reliability of demand data for non-OECD countries like China and India. For example, Chinese demand estimates are derived from "apparent demand"—as a sum of estimated production and estimated net imports—or on inference from Chinese gross domestic product (GDP) growth estimates.[23] As an example of the uncertainty that results from such methods, the EIA indicated that Chinese oil demand had grown at roughly 500,000 barrels per day in 2005, while a widely quoted Morgan-Stanley report indicated that Chinese demand had declined.

- *Projections:* Uncertainty results from projected demand estimates that rely upon questionable historical data and that may not fully incorporate

[22]The IEA's *World Energy Outlook* and the EIA's *International Energy Outlook* are published annually and, according to energy experts, are widely considered industry standards for world oil market projections. Both agencies prepare a "reference" scenario that forms the basis for their expected projections, as well as various "high-price" scenarios. In addition to these publications, both agencies are working to expand their analysis of energy market volatility in the future through other studies and analytical tools.

[23]Both the reliability of estimates on Chinese net imports and Chinese economic growth have also been questioned.

data revisions. For example, both the EIA and IEA use historical demand and estimated economic growth as a basis for their demand projections. However, both the EIA and IEA forecasts failed to anticipate the surge in Chinese and global demand growth in 2004 due to the poor quality of Chinese data. According to economic experts, uncertainty in future demand is further compounded by insufficient transparency in EIA and IEA methodologies for projecting impacts of a high-price future.

Concerns about oil supply information include:

- *Historical supply data:* Uncertainty in production and stock (inventories) data results from the proprietary nature of the data, differences in definitions and conversion rates, and political sensitivities. According to the EIA, for example, OPEC countries often do not accurately report their current production levels. An EIA official reported that estimates of OPEC's June 2006 crude oil production varied by over 700,000 barrels per day, from a low of 29.3 million barrels per day by the Petroleum Intelligence Weekly, to 30 million barrels per day by the IEA. Reliability of OPEC production data is further complicated by OPEC quotas that are based on estimated reserves, which are suspected to have been inflated in order to generate higher quotas. For Russia, swings of up to 100,000 barrels per day have occurred in its production data since Russian data do not break out gas condensate from oil production, and conversion rates for a combined stream are uncertain.[24] Production data for some countries may be inferred from combining oil exports, oil demand, and changes in oil stocks. However, in addition to problems with demand data, oil stock data is incomplete and does not generally include stocks held in non-OECD countries (such as in China or India where stock data is considered a state secret) or in independent storage within OECD countries. In a previous GAO study, we found that missing stock data in IEA statistics, referred to as "missing barrels," were present in 24 of 26 years between 1973 and 1998.[25] Both IEA and EIA data for 1999 through 2005 still reflected these gaps.

- *Projections:* Uncertainty results from projected supply estimates that rely upon questionable historical data and an unknown level of oil reserves.

[24]The EIA defines crude oil as a mixture of liquid hydrocarbons in natural underground reservoirs that remain liquid after passing through surface separating facilities. Gas condensate is a mixture of heavier hydrocarbons recovered as liquids from natural gas.

[25]See GAO, *International Energy Agency: How the Agency Prepares Its World Oil Market Statistics*, GAO/RCED-99-142 (Washington, D.C.: May 7, 1999).

For example, both the EIA and IEA use historical data as a basis of projecting future world demand and future non-OPEC supply. Then, both agencies assume that OPEC production will "fill the gap." IEA and EIA projections call for around a 50 percent increase in current OPEC production, but there is growing debate over OPEC's ability to meet this requirement. [26] Supply projections are also based on widely debated estimates of oil reserves due to differences within and between industry and governments about the definitions and measurement of "known," "proven," "probable," or "undiscovered" reserves,[27] the impact of technology on those reserves, and the rate of decline in certain oil fields. According to energy experts, uncertainty in projected supply is further compounded by insufficient transparency in EIA and IEA assumptions about the impacts of high prices on future production.

Many of the concerns about oil demand and supply data also apply to natural gas data. Both the EIA and IEA have indicated the need to improve the timeliness and accuracy of natural gas demand, production, and stock information. Data reliability issues occur due to the increasing number of participants in natural gas markets, unspecified exports due to a multitude of small players, large increases in inter-regional trade and the loss of trade origin, longer supply chains, and industry sensitivities in response to increasing market competition.

Reliable Energy Market Information Is Needed for Investment and Market Stability

Reliable energy market information is important for reducing price volatility and facilitating planning and needed investment. For example, the EIA reported that unanticipated world oil demand growth in 2004 contributed to depletion in oil stocks and resulted in the recent high oil prices. Uncertainty about demand growth also negatively impacts needed investment for future expansion of world oil and natural gas supplies (including an estimated $3 trillion in each sector from 2005 to 2030 by the IEA), particularly given the long lead times and payback periods required for such investments. Oil and natural gas producer nations have stated the need to better understand future demand in order to undertake costly investment—according to the OPEC Secretariat, uncertainty about future oil demand, future non-OPEC production, and needed OPEC investment is

[26]This debate is in part related to uncertainty over Saudi Arabia's spare capacity level.

[27]These terms reflect the degree of certainty to which estimated reserves exist and the likelihood that such reserves can be profitably extracted. Other uncertainties have arisen from recent announcements by major oil companies that they have lowered their reserve estimates.

the largest challenge facing the organization.[28] Similarly, Russia's Gazprom has indicated the need for future demand certainty, indicating possible supply curtailments if its European consumers seek to diversify their supplies away from Russia. Oil and natural gas consuming nations have also indicated the need for more certainty in future supply. This is particularly important given needed infrastructure investment in non-OECD countries to use natural gas—EIA projects that 73 percent of future natural gas demand will occur in countries outside the OECD—and needed worldwide investment to expand the use of LNG.

Important Constraints Affect U.S. Ability to Address Key Energy Market Issues in Forums

The U.S. government has pursued emerging energy market issues through its participation in international energy cooperation forums; however, these forums, by their nature, can be constrained in the degree to which they can have an impact on these issues. The greatest constraint on the forums' ability to impact energy issues comes from the sensitivity of sovereign nations to discussing their domestic energy policies. Forum efforts are also constrained by limitations in membership, consensus-based decision making, and voluntary participation. However, within these constraints, the United States has tried to mitigate energy market imbalances through efforts such as promoting emergency preparedness and outreach to developing countries. While the United States has not directly addressed the impact of the growing participation of national oil companies on the energy market at the forums, it has pursued related areas such as improving the investment climate. Finally, the United States has supported international efforts to improve energy information through various data sharing agreements, standardization, and capacity building—though EIA involvement has for the most part been indirect and ad hoc, and U.S. data submissions to the IEA have lacked timeliness.

Sensitivity of National Energy Policies Is the Overriding Constraint

International energy cooperation forums, by their nature, can be constrained in the degree to which they can have an impact on energy market issues. The greatest constraint comes from the sensitivity that sovereign nations bring to discussing their domestic energy policies. Supplier countries may resist international efforts to increase opportunities for foreign investment in their energy sectors, and consuming countries, like the United States, may resist international

[28]In their long-term strategy, OPEC examined various rates of projected oil demand to 2020 and estimated that their needed investment could vary from $230 billion to $470 billion.

efforts to influence their energy demand levels. For this reason, discussion of energy issues at international energy cooperation forums is almost always addressed through an agenda decided by consensus. This generally means that forums focus on noncontroversial issues, like energy efficiency and technology, according to U.S. officials. Forum efforts are also constrained by inherent limitations in restricted membership, consensus-based decision making, and the voluntary nature of participation and follow-up.

For the United States, however, the consensus-based agenda does have the advantage of "de-Americanizing" some issues, according to U.S. officials. In some cases, an issue or action may be more likely to be addressed on its own merits than if the United States is seen to be the primary force behind it. Peer pressure can also be an important factor when a group of countries is endorsing an issue or approach.

The United States Tried to Mitigate Imbalances from Recent Tight Energy Markets through Energy Forum Efforts

The United States has tried to mitigate the imbalances resulting from the recent tightening of the energy market through its participation in international energy cooperation forums. U.S. efforts have primarily focused on support for emergency preparedness, including development of strategic petroleum reserves and contingency plans. The challenges to these efforts lie in factors such as key developing countries not being members of the forum, such as China and India not having IEA membership, or in the voluntary nature of participation and follow-up.

Enhancing Emergency Preparedness

The United States has sought to address tight energy markets and associated market imbalances primarily by supporting emergency preparedness in both IEA and the APEC Energy Working Group. IEA is the premier forum at which the United States addresses emergency preparedness. It has an emergency response plan—called "Coordinated Emergency Response Measures"—ready for use, supplemented by periodic emergency scenario planning exercises that allow member countries to practice how they would implement the plan in case of a real emergency. This IEA emergency response plan was used in response to Hurricane Katrina in September 2005, although such a situation had never been anticipated in IEA scenario planning. A senior IEA official told us that IEA's response to Hurricane Katrina showed the market that IEA would act to mitigate supply shortfalls by releasing oil stocks. He said that IEA does not act to affect price but showed that it would act to affect supply, and this had helped restore confidence in the market.

The United States has strongly supported the APEC Energy Working Group's Energy Security Initiative, which is also designed to respond to the volatility resulting from the recent tightening of the market. Short-term measures include improving the transparency of the global oil market through improvement of APEC energy data and participation in JODI, monitoring efforts to strengthen sea-lane security, implementing the Real-Time Emergency Information Sharing System, and encouraging members to have emergency mechanisms and contingency plans in place. DOE's policy and international affairs office and strategic reserve office both also worked with APEC Energy Working Group partners to identify best practices for strategic oil stocks. DOE then hosted a follow-up workshop in July 2005.

Conducting Outreach to Major Developing Countries

Another way in which the United States has tried to address market imbalances has been through outreach to major developing nations in both IEA and the APEC Energy Working Group. For example, IEA conducts a major outreach effort to developing countries and has established a separate office, the Office of Non-Member Countries, for this purpose. It has concluded "memoranda of policy understanding" to strengthen cooperation with China and India and has conducted numerous workshops, seminars, and training exercises.[29] IEA held its first oil security workshop with China in 2001, at which it provided training in emergency response measures and strategic reserve management. China's 5-Year Plan for 2000-2005 had raised the possibility of building a national strategic petroleum reserve, and it subsequently is building petroleum reserve tanks and has begun filling them, according to DOE. IEA also invited China to attend its emergency response training and disruption simulation exercise in October 2004 and hosted a follow-up workshop with China on oil security in October 2006. IEA held a similar oil security workshop with India in 2004. It has also conducted numerous workshops and training efforts with Brazil, members of the Association of Southeast Asian Nations, and others.

In contrast to IEA, U.S. outreach efforts to major developing countries at the APEC Energy Working Group are more direct since many of the major developing nations, such as China and Singapore, are members, providing

[29]IEA's workshops and seminars with China addressed energy efficiency, energy modeling and statistics, coal and investment, and electric power reform. IEA also jointly held a conference on Northeast Asia energy security and cooperation with the Korean Energy Economics Institute in Seoul, Korea. IEA also held workshops with India on efficiency standards, coal and electricity, and energy indicators.

a continuing opportunity to conduct outreach. The focus in the APEC Energy Working Group is on developing and sharing best practices and technology insights.

Promoting Best Practices, Training, and Energy Technology Research

The United States has also promoted best practices, training, and research across a broad range of energy issues. IEA and the APEC Energy Working Group both sponsor numerous conferences, workshops, and seminars designed to share information and technology and to encourage members to adopt practices and policies that are considered most beneficial. An example of this approach is the APEC Energy Working Group's focus on best practices in developing an Asian LNG market. The United States hosted an APEC Energy Working Group workshop in San Francisco in March 2004 to identify best practices for LNG trade, which were later endorsed by members' Energy Ministers. A follow-up workshop was held in Taipei in March 2005 to encourage acceptance of these best practices. That workshop resulted in the launch of an LNG Public Education and Communication Information Sharing Initiative to improve public understanding of the benefits of LNG, as well as to address safety concerns.

These forums also conduct economic analyses and research projects. IEA annually publishes its flagship World Energy Outlook, which provides global long-term energy market analysis. It also conducts extensive energy policy analyses to promote conservation and the efficient use of energy, as well as increased use of alternatives to oil (energy diversification). The Asia Pacific Energy Research Centre also publishes studies of global, regional, and domestic energy demand and supply trends and related policy issues. In the area of research, IEA's Energy Technology Collaboration Program currently sponsors more than 40 international collaborative energy research, development, and demonstration projects, known as "Implementing Agreements." Their purpose is to help coordinate national technology efforts so there are no redundancies of effort across participating countries, which can include nonmember countries.[30]

Greater Cooperation with Producer Countries

A final element of U.S. efforts to address market imbalances has been support for greater cooperation with producer countries. IEA's Office of Non-Member Countries has conducted outreach activities with producer countries, as well as developing countries. It studies oil developments in

[30]These projects are self-financed through voluntary contributions by the countries that decide to sponsor the research and, as such, are financed outside the IEA budget process.

major emerging non-OPEC regions such as Russia, the Caspian, and West Africa. For example, IEA has a memorandum of understanding with Russia and has conducted workshops and training with Russia. It completed an energy survey of Russia in 2002 that incorporated a review of its energy situation, policies, electricity regulatory reviews, and resulting recommendations. In addition, the United States participates in IEF, which is a producer-consumer dialogue that promotes the exchange of information among all parties with an interest in the energy market.

Challenges to Efforts to Mitigate Market Imbalances

The challenges to these efforts to mitigate market imbalances lie in the inherent constraints of each forum. Since IEA was established within the framework of OECD, a prerequisite for IEA membership is OECD membership, which means that the applicant country must be a democracy and have a market-based economy. This is one factor that complicates the issue of extending IEA membership to fast-growing, energy consuming countries like China. Another complicating factor is the requirement that IEA members hold at least 90 days of oil reserves, which would be difficult for most developing countries to achieve.[31] For IEA, deepening relations with nonmember countries is a delicate balancing act. A senior IEA official said that IEA wants to improve its relationship with developing countries like China and India—and, in fact, is considering how to offer them observer status—but it also does not want to give away the equivalent of membership without these countries having to meet the basic requirements of membership.

Another inherent limitation to what can be achieved in these forums is that participation and follow-up are voluntary. Apart from IEA's treaty obligations related to emergency preparedness (i.e., holding 90 days of oil reserves), IEA and APEC Energy Working Group activities are voluntary, and decisions are made by consensus. These forums can take steps to strongly encourage actions by members but cannot compel them. For instance, IEA country reviews, conducted every 4 years for each member, examine their energy policies and make recommendations. Two years later, brief standard reviews update the main energy developments and report on progress in implementing the recommendations. But, it is up to each country whether, and to what degree, it will take the recommended steps.

[31]The commitment is to hold at least 90 days of net imports of the preceding calendar year. Apart from the technical difficulties of building and managing a strategic petroleum reserve, it would be very expensive at current oil prices, and it could potentially further increase oil prices by putting greater demand pressure on the market.

U.S. Has Addressed Impact of Growing Participation of National Oil Companies by Pursuing Related Areas Such as Investment Climate

The international energy forums do not directly address the impact of the growing participation of national oil companies on the energy market. The forums, however, do focus on the development of open, competitive energy markets within countries. Opening the investment climates in energy producing countries can provide increased access and competition for the international energy companies. However, forum efforts are constrained by inherent limitations in consensus-based decision making, membership, and voluntary participation.

Encouraging Open Investment Climates Is a Priority in the Energy Forums

Both DOE officials and the Executive Director of the IEA stated that contributing to opening up energy investment climates is a high priority at the IEA and is an issue that has significant overlap with the emerging influence of national oil companies. The IEA Offices of Long-Term Cooperation and Non-Member Countries conduct in-depth reviews of the energy policies of both IEA member countries and nonmember countries to focus on their investment climate status and related regulatory reforms. The IEA Shared Goals[32] of participating member countries are in part based on the establishment of free and open markets as a fundamental starting point. For reviews of nonmember countries' energy policies, the IEA provides observations on the status of a country's investment climate and the regulatory reforms needed to enhance competitive access to its domestic energy markets. For example, the IEA conducted a 2002 Russia Energy Survey that identified the need for regulatory and legislative reform within Russia and focused on increasing competition and on opening its energy markets. Similarly, the IEA has also performed reviews of some of China's energy sectors that have focused on market liberalization and the transparency of the country's oil market and related transactions, among other issues.

Other international energy forums also contribute to encouraging the development of open investment climates and competitive access opportunities within member countries. For example, NAEWG focuses on improving the integration of the energy economies of Canada, Mexico, and the United States through data and information sharing across government-owned and privatized energy sectors. In addition, one DOE official stated that NAEWG efforts to demonstrate the benefits of open markets and expose the tight nature of gas supplies in North America, limiting the amount and affecting the price of pipeline supplied gas that would be available to Mexico, supported the development of the LNG

[32]Adopted by IEA Ministers in 1993.

market as a significant private investment opportunity for companies in what is primarily a government-owned energy sector in Mexico. The APEC Energy Working Group also encourages APEC member economies to create conditions to facilitate energy infrastructure investment through its Energy Security Initiative. For example, the APEC Energy Working Group developed a list of best practices for member countries to follow in financing energy infrastructure projects so as to develop a competitive energy investment climate.

Efforts Are Constrained by the Goals and Processes of the Forums

The goals and processes of the international forums do not lend themselves to directly addressing the impact of the growing participation of national oil companies on the energy market. U.S. agency officials and energy experts stated that the consensus approach and limitations of membership in the international energy forums covered in this review create challenges to addressing this emerging energy market issue. Related efforts for more open investment climates, such as through the IEA country reviews, or APEC Energy Working Group's development of investment best practices, have also been hindered by the voluntary nature of members' responses to forum recommendations.

The contentious nature of the topic of growing participation of national oil companies on the energy market conflicts with the general approach of the international energy forums in achieving consensus on the energy issues covered. DOE and Department of State officials stated that an international energy forum is not an appropriate venue for addressing potentially contentious issues because a forum's studies and action items are agreed to by consensus. Some energy experts interviewed also questioned what, if any, role the international energy forums can play on this issue. These experts emphasized that the international energy forums are essentially organizations that allow for gathering and exchanging of important energy data and information, but they do not have either the negotiating leverage or the focus needed to address this particular issue. One expert added that the increasing influence of national oil companies in the international oil markets may create a competition issue among the private sector players in the market, but it is not a problem for energy security or an issue that the international energy forums should or can address directly.

Limited membership in the international energy forums also inhibits addressing the impact of the growing participation of national oil companies on the energy market directly. Some of the major players influencing the topic, such as China and India, are not active participants in the discussion. For example, national oil companies from China and

India have been increasingly active in oil and gas exploration by pursuing a policy of procuring access to energy resources in various countries around the world. However, both have not been active members in the international energy forums. Similarly, Russia is one of the most influential energy producing countries in the world, with its domestic energy market dominated by national oil companies; but, it has not been an active participant in any of the major international energy forums.

Related efforts for more open investment climates are hindered by the voluntary nature of members' responses to forum recommendations. International energy forums like the IEA make recommendations for member countries and observations for nonmember countries to follow in order to move to market pricing and open up their investment climates. However, the forums lack the authority or mandate to require that these recommendations actually be implemented. For example, despite consistent recommendations to open up its energy markets from both multilateral and bilateral forums, Russia has actually reversed the liberalization of its energy sector and investment climate over the last 2 years. According to DOE and IEA officials, its energy sector is now less efficient, and the investment climate has worsened. Similarly, despite the IEA's efforts to engage Mexico in participating in a review of its energy policies, Mexico has shown no interest in the review or implementation of the recommendations that typically result.

U.S. Has Supported International Efforts to Improve Energy Data within Authority and Capacity Boundaries

Improved energy market transparency is an important theme for each of the major international energy forums. Through its participation in the forums, the United States has supported improving energy information with measures such as data sharing, data standardization, and capacity building (i.e., improving a country's ability to collect and analyze energy data). However, forum efforts often remain challenged in improving data quality and timeliness, for example, due to authority limitations and continued capacity needs in developing countries. Additionally, U.S. support for forum efforts has not benefited from consistent use of EIA expertise, and the United States has not provided timely data submissions to the IEA.

Improving Information Is a Key Forum Goal

International energy cooperation forums aim to facilitate the sharing and collection of information across multiple governments. JODI is one key data sharing effort and includes monthly oil data for over 90 countries,

representing around 95 percent of global demand and supply.[33] IEA officials report that, through JODI, the international community is able to view timelier world oil data and assess the current quality of that data. Forum officials also reported that JODI was receiving high-level political support and contributing to increased transparency in some cases—China has begun collecting and releasing some data on changes in levels of oil stocks to IEA, and the IEA "Oil Market Report" is now incorporating timelier OPEC production data. Additionally, through JODI, IEA and APEC are working to standardize data collection by agreeing to use the same oil market questionnaire. Both organizations are also considering developing a similar natural gas data initiative in the future.

In addition to data sharing and standardization, the forums have several efforts to improve energy information through capacity building. Such efforts include IEA memorandums of understanding with China and India to improve data sharing, the IEA Energy Statistics Manual, and the 2005 and 2006 G-8's political endorsements of the Extractive Industries Transparency Initiative through which data is collected on developing country revenues from extractive industries.

U.S. and Forum Efforts to Improve Information Face Important Challenges

While the United States has supported forum efforts to improve international energy information, EIA expertise has not been leveraged in a consistent manner beyond the data exchange activities, as discussed above. For example, the United States supports forum initiatives such as JODI or NAEWG statistical sharing, and EIA is a member of the IEA Energy Statistics Workgroup that develops reporting standards for IEA data submissions. The United States also supports the Extractive Industries Transparency Initiative through U.S. Agency for International Development funding and through participation in an International Advisory Group. However, when asked about consistent leveraging of EIA expertise for forum efforts to improve the quality and reliability of international data, a senior EIA official described the administration's involvement as indirect and ad hoc. For example, while EIA has provided briefings and analysis to DOE's policy office for its cooperation efforts, EIA has not been directly and consistently involved with international forum initiatives to improve data collection efforts in other countries or in training workshops. The EIA official also described EIA's participation as increasing and decreasing with staff availability. International cooperation

[33]The JODI world database was opened to the public in 2005 and is a relatively new data effort.

has been a small part of EIA's overall mission; however, given the importance of reliable international energy data for market stability and the emphasis on comprehensive and timely energy data reporting in the National Energy Policy, we believe that EIA's expertise can contribute to enhanced international energy data improvement efforts.

Another challenge for international cooperative efforts to improve energy market data is the fact that the forums must depend on independent member countries to be responsive. According to IEA officials, the IEA is criticized for providing annual statistical publications that are 18 months old. These officials believe that the IEA could publish annual data with only a 9-month lag if member countries submitted their data within requested time frames. However, according to the IEA officials we met with, several countries do not meet the requested time frames—including the United States. For 2004 annual data, for example, the United States had not provided its complete data submission to the IEA until March 17, 2006, although the data was requested by September 30, 2005.[34] According to a senior EIA official, the United States is unable to meet IEA's requested time frames, however, due to a national schedule for data collection that does not correspond with the IEA's data collection schedule and the fact that the United States may have to wait for data from industry entities such as the American Petroleum Institute. The United States anticipates submitting 2005 annual data to the IEA by February 2007 (around 4 months after the requested date but earlier than the previous year's submission).

Authority limitations also challenge international cooperative efforts to collect detailed and consistent information on oil reserves and production levels. Energy experts have emphasized the need for international field-by-field production data and a better understanding of future oil resources, as well as the true cost of developing them. Currently, however, reserve estimates are unaudited figures, and there are no common informational

[34]The United States submitted around two-thirds of its data by the end of January 2006 and the remaining one-third of data by March 17, 2006. The IEA prepares report cards for each of its members that record data timeliness, completeness, and overall quality. On its most recent report card, the United States was rated "poor" for timeliness—the lowest rating achievable— due to submissions provided more than 2 months after requested. The United States received high ratings in other areas.

disclosure requirements for reserves under international accounting standards.[35]

Capacity limitations, particularly in emerging market economies, are another challenge for international cooperative efforts to improve energy market information. While establishment of JODI has generally been considered a success by forum participants, periodic quality reviews of the database reveal a mixed record of improvement, for example. When asked about JODI data reliability, U.S. and IEA officials report that data from developing countries may lack reliability due to capacity limitations and that, despite organizational efforts to support JODI, the forums must ultimately rely on the political will of countries to improve and share their data.[36]

Exacerbating capacity limitations, the IEA has also emphasized challenges resulting from rapidly expanding data demands. According to IEA officials, interest has grown in information on natural gas, renewable energies, and energy efficiency. Additional statistical resources may be needed to acquire such information from new markets—many of them smaller and more dispersed, such as with renewable energies like biofuels—and to provide data at a more detailed level, such as within the household on energy use by vehicle or appliance. IEA reports that statistical resources to fill these additional needs are insufficient.

Conclusions

Both oil importing and oil exporting countries seek stable, predictable energy markets to support continued economic growth. Oil importing countries, such as the United States and China, are concerned about security of oil supply. Over the past few years, the unanticipated growth in demand for oil has outpaced the growth in oil supplies. Oil exporting countries have not been able to increase supply levels accordingly, and spare capacity has declined to the point where political, economic, and weather-related events can have disruptive effects on the market. Increasing future supplies of crude oil and refined oil will require high

[35]According to energy experts, the Securities and Exchange Commission system for reserve disclosure is based on outdated definitions of reserves and technology such that there is a growing divergence between what is reported under the Securities and Exchange Commission and how companies, using more modern technologies and tools, assess their own reserve position.

[36]To support continued data improvement, the organizations are preparing a JODI manual and JODI training sessions.

levels of investment and technical expertise because new discoveries are expected to take place in remote, offshore, and often politically risky locations. In some of these locations, the producing country lacks the capital and expertise to develop the resources and also lacks a predictable investment climate, open to foreign investment—thus raising questions about when potential supplies might come to the market. Energy market experts expect the tight supply situation to continue in the medium and long term.

At the same time, oil exporting countries are concerned about the security, or predictability, of oil demand. In the 1990s, demand for oil was affected by a global economic slowdown, including the Asian financial crisis of 1997-1998, and oil exporters experienced generally low oil prices. With exploration costs so high now, some exporting countries are concerned about committing to long-term investment projects without clear indications of demand predictability.

International cooperation among importers and exporters can be founded on the recognition that each group has a shared interest in market stability. If the market does not provide this stability and questions about demand and supply growth persist, "cooperation" may move more in the direction of bilateral agreements covering oil and gas exploration and pipeline routes. Such agreements may be perceived as excluding other countries.

International forums can serve an important overall purpose in providing the opportunity for oil importers and oil exporters to discuss common interests and concerns. The forums have not directly addressed matters that involve sovereign, sensitive decisions—such as Mexico's foreign investment prohibitions or the competitive practices of some national oil companies—but they do serve to keep channels of communication open and improve understanding of various members' concerns. By working on matters of interest to forum members—such as technical advice on emergency preparedness and management of strategic petroleum reserves and on ways to achieve cleaner, more efficient energy production—they can build on shared interests and contribute to the longer-term remediation of the demand-supply imbalance that has caused volatile prices.

International forums can serve another critical role by improving energy demand and supply statistics to facilitate investment planning. In examining concerns about current energy market issues, a common thread is that more reliable energy market information is increasingly important

for market stability, as well as to facilitate investment planning. As recognized by the National Energy Policy report, comprehensive and timely world energy data are needed. While the United States has provided important leadership in international emergency preparedness and the establishment of energy information systems, with the increased importance of reliable energy market information in a tight market, a greater effort may be needed to improve energy statistics.

Recommendations for Executive Action

To enhance the impact of international cooperation for improving energy statistics needed for market stability and investment, we recommend that the Secretary of Energy emphasize the priority of improving energy information efforts within the international forums, particularly by taking the following two actions:

- examining how EIA expertise can contribute to international forum data efforts, and
- examining how U.S. data submissions to the IEA can be made more timely.

Agency Comments and Our Evaluation

We provided a draft of this report to DOE and the Departments of Commerce and State. All three agencies provided written comments, which are reproduced in appendixes IV, V, and VI, respectively. The Department of Commerce agreed with our recommendations. The Department of State provided information in its letter about steps it has recently taken, through organizational changes, in order to highlight the importance of global energy challenges.

DOE stated that the U.S. government has been actively engaged in international energy forums to advance U.S. energy security objectives and that our report makes many valuable points regarding the nature and the potentials of various international forums in which it participates. DOE also stated that our report adds to the greater understanding of the U.S. commitment to international energy cooperation.

DOE disagreed with our characterization that EIA expertise has not been leveraged in a consistent manner to improve international energy data through the multilateral forums. DOE emphasized that EIA has been an active member in each of the four international forums that are the focus of this report. However, DOE also acknowledged that funding issues have constrained EIA efforts to assist other countries to improve their energy data and that this is an area where additional funding would be useful. We

have modified our report language to emphasize that EIA has been more active in data exchange activities rather than efforts to assist other countries in data collection and modeling, such as through training workshops.

DOE expressed concern with our description of how U.S. data submissions to IEA have not been timely, and it provided additional details about several timeliness issues. We have modified our report language to incorporate these clarifications. Additionally, while we recognize the challenge for improving U.S. data submissions due to an EIA survey schedule that does not correspond with IEA's scheduled due dates, we maintain our recommendation that DOE examine ways to improve the timeliness of U.S. data submissions. One consideration could include the suggestion provided in DOE's comments to this report that the IEA use EIA miniquestionnaires and monthly submissions to generate preliminary U.S. data.

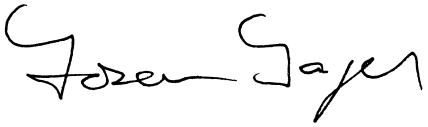
Finally, DOE stated that it was concerned that GAO asserts that more data and more timely data will resolve energy market and security issues. GAO makes no such assertion. Our findings highlight the increased importance of reliable energy market information in a tight market and, therefore, we recommend that DOE give greater priority to improving energy information efforts within the international forums. We specifically recommend that DOE address two relevant areas in which we saw opportunities for improvement, by examining how EIA expertise can be better leveraged and by examining how U.S. data submissions to IEA can be made more timely. Improving energy statistics is one important way in which the international forums can enhance the impact of international cooperation, especially as regards global energy market transparency.

DOE and the Departments of Commerce and State also provided technical comments, which we have incorporated where appropriate.

We are sending copies of this report to interested Congressional Committees and to the Departments of Commerce, Energy, and State. We also will make copies available to others upon request. In addition, this report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-4128 or yagerl@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VII.

Sincerely yours,



Loren Yager
Director, International Affairs and Trade

Appendix I: Objectives, Scope, and Methodology

To determine how the U.S. government participates in international energy cooperation forums, we reviewed: (1) the key international energy forums in which the U.S. pursues energy cooperation, (2) the key emerging energy market issues that are important for international energy cooperation, and (3) how the United States is addressing these issues through its participation in these forums.

Our review focused mainly on the following key international energy cooperation forums: the International Energy Agency (IEA), the Asia Pacific Economic Cooperation (APEC) Energy Working Group, the North American Energy Working Group (NAEWG), and the International Energy Forum (IEF). We neither evaluated these forums and their impacts on energy policy and the global energy market nor did we evaluate U.S. energy policy goals, which are based on private sector approaches. Rather, we reviewed the forums' mission, structure, and activities. In addition, our review focused on the oil and natural gas sectors of the energy market. These sectors provide the bulk of current energy traded in the market. For this reason, the nuclear, coal, renewable, and alternative energy sectors were outside the scope of our review.

To determine how the United States pursues energy cooperation in key international energy forums, we reviewed documents and interviewed officials responsible for international energy cooperation at the Departments of Energy (DOE), State, and Commerce. We conducted fieldwork at the IEA and the U.S. Mission to the Organization of Economic Cooperation and Development (OECD) in Paris, France, where we reviewed documents and interviewed officials. We also exchanged correspondence with the Secretariat of the APEC Energy Working Group and conducted telephone interviews with U.S. members of the IEA and APEC Energy Working Group business advisory groups. In addition, we interviewed several private sector energy experts and industry representatives. While we had planned to conduct fieldwork in Mexico City, Mexico, and Ottawa, Canada, with Mexican and Canadian government officials responsible for NAEWG, we did not conduct this fieldwork because the Department of State declined to facilitate our access to these officials.

To identify the key emerging issues in the international oil and natural gas markets in the past 5 years that are important for international energy cooperation, we reviewed documents and data and interviewed officials at DOE and the Departments of State and Commerce. We also reviewed relevant reports and studies, including past GAO reports, and discussed them with energy experts. We developed a list of three key emerging

issues and verified them with agency, forum, and energy industry officials. We did not seek to independently verify the nature and extent of these energy market changes but rather relied on analysis by energy experts, officials, and key market studies, as well as prior GAO work. Our report discusses various reliability concerns with international oil and gas data. While data improvement is required, we believe key international data, such as that from the DOE's Energy Information Agency is sufficiently reliable to indicate broad trends in world demand and supply.

To determine how the United States is addressing these emerging energy market issues through its participation in these forums, we reviewed documents and interviewed officials at DOE and the Departments of State and Commerce, as well as at IEA, the APEC Energy Working Group, and their business advisory groups, and private sector energy experts.

We conducted our work from January 2006 to November 2006 in accordance with generally accepted government auditing standards.

Appendix II: July 2006 G-8 Summit and Bilateral Energy Cooperation Forums

In addition to the international energy cooperation forums discussed previously, we also reviewed the July 2006 Group of Eight (G-8) Summit held in St. Petersburg, Russia, which functioned as an ad hoc forum focused on energy security, and U.S. participation in several selected bilateral energy cooperation forums, which comprise an important part of U.S. energy security and cooperation efforts. We focused on bilateral energy cooperation with five key nations: Canada, China, India, Mexico, and Russia.

July 2006 G-8 Summit, Hosted by Russia, Was Focused on Energy Security

The G-8 is an unofficial forum of the heads of the leading industrialized democracies—Britain, Canada, France, Germany, Italy, Japan, Russia, and the United States, where the European Commission is also represented and fully participates. One of the priority themes of the July 2006 G-8 Summit, hosted by Russia, was to formulate political commitments of the member states toward enhancing global energy security.

The G-8 is not an international organization based on an international agreement and does not have formal admission criteria, a charter, or a permanent secretariat. G-8 summit meetings are held regularly in the partner states, and the host country acts as the Chair of G-8 for a calendar year. Russia has chaired the G-8 during 2006. The Chair organizes the summit and ministerial meetings and the expert and working meetings, manages the agenda, and coordinates the routine work of the group. At the summit meetings, discussions of the heads of state and government are held behind closed doors with decisions adopted by consensus.

In preparation for the July 2006 G-8 Summit, the G-8 Energy Ministers met in March 2006 to discuss issues such as global energy security, energy efficiency, and energy saving. This meeting also included Energy Ministers from Brazil, India, China, Mexico, and South Africa, as well as representatives of the World Bank, the Organization of Petroleum Exporting Countries, the International Atomic Energy Agency, IEA, and the International Energy Forum. The July 2006 G-8 Summit resulted in the St. Petersburg Plan of Action, which is a high-level commitment on behalf of the G-8 members to enhance global energy security through efforts across several related issue areas, such as increasing the transparency and stability of global energy markets, improving the investment climate in the energy sector, and ensuring physical security of critical energy infrastructure.

Bilateral Energy Cooperation Forums Allow Focused Attention on Issues of Interest

The United States participates in many bilateral energy cooperation forums; we reviewed five selected bilateral forums—those with Canada, China, India, Mexico, and Russia. According to a DOE official, bilateral energy cooperation forums tend to address focused issues that may be of specific interest to the two parties. DOE and the Departments of Commerce and State play a role in the bilateral energy cooperation forums, with DOE personnel often co-chairing many of the working groups involved in the efforts. In some bilateral energy cooperation forums private industry is included in the discussion of certain issues, whereas other bilateral energy cooperation forums mainly focus on high-level dialogue between government representatives on energy policies and initiatives. The following are examples of some of the main bilateral energy cooperation forums:

- The DOE official responsible for managing U.S. participation in the U.S.-China Energy Policy Dialogue stated it was established in 2004 for high-level dialogue between the two countries on energy issues such as energy policy, energy efficiency measures and related technologies, renewable energy, and energy sector reforms. Other areas of focus have included shared concern over supply security and energy transport issues. The U.S.-China Oil and Gas Industry Forum, established in 1998, is a public-private bilateral relationship involving government and industry representatives from both countries. The forum is driven by consensus-based dialogue on commercial policy and on common goals such as development of secure, reliable, and economic sources of oil and natural gas while facilitating investment in the energy industry.[1]

- The DOE official responsible for managing U.S. participation in the U.S.-India Energy Dialogue stated it was established in 2005 with the primary goal of promoting energy security, increasing trade and investment in the energy sector, and deploying clean energy technologies. This forum consists of a steering committee and five working groups focused on oil and gas, power and energy efficiency, coal, new technology and renewable energy, and a civil nuclear initiative. Negotiations on a memorandum of understanding on energy information exchange began in 1996 and it was signed in February 2006.

- According to DOE, the U.S.-Canada Energy Consultative Mechanism was established in 1979 as a means for discussing key energy issues of interest

[1]The U.S.-China Energy Policy Dialogue is led by DOE. The U.S.-China Oil and Gas Industry Forum is led by DOE in conjunction with the Department of Commerce.

or concern to the United States and Canada. The two federal governments meet annually to share policy positions, identify areas of potential dispute, and clarify understanding on energy issues without requiring commitments regarding future actions. Subject areas usually covered include world oil market developments; domestic policy developments; and bilateral oil, natural gas, electricity, and nuclear issues.

- According to DOE, the U.S.-Mexico Binational Commission[2] Energy Working Group was established in 1996 as one of 16 working groups under the commission and includes issues of bilateral interest such as energy policy and legislative developments in each country, cross-border natural gas and electricity issues, science and technology cooperation, and world oil market developments. The Energy Working Group meets as requested by either country, but, in recent years, bilateral energy issues have been taken up under the auspices of the North American Energy Working Group.

- The DOE official responsible for managing U.S. participation in the U.S.-Russian Energy Dialogue stated it was established in 2002 and brought under its umbrella the U.S.-Russian Energy Working Group that had been established in 2001. The goal of this forum is to promote energy efficiency, alternative energy, data exchange, energy technology initiatives, and energy trade between the two countries while reducing barriers to investment in the energy sector. The bilateral energy forum originally met two times each year but, in 2005, reduced this to one meeting each year.

[2] The U.S.-Mexico Binational Commission was established in 1981 by then-Presidents Reagan and Lopez-Portillo to serve as a forum for regular meetings at the cabinet level on a wide range of issues critical to U.S.-Mexico relations.

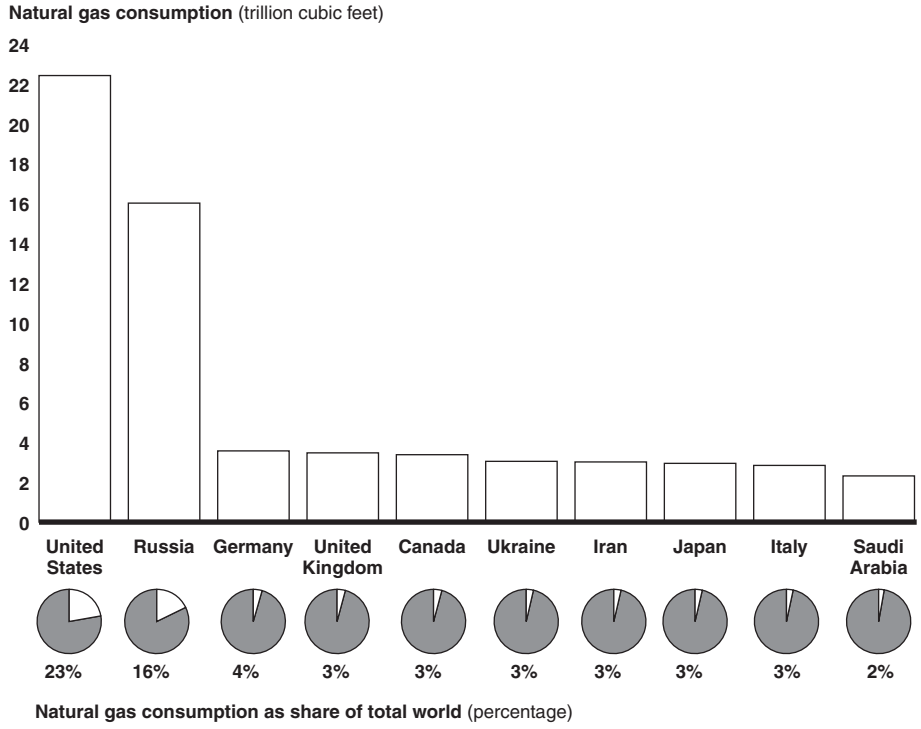
Appendix III: Role of Natural Gas Is Increasing in Tight Energy Market

While the tightening of the world energy market in recent years has mostly been the story of the world petroleum market, there have also been important developments in the natural gas market. Many countries have increasingly relied on natural gas. For instance, while the European Union's dominant fuel in 2003 was oil, accounting for 40 percent of energy demand, natural gas has been the fastest growing fuel over the past decade and accounted for 24 percent of energy demand in 2003, according to the Energy Information Administration (EIA). Historically, natural gas has not been a major fuel in China, but its share in the country's energy market is rapidly increasing, almost doubling from 1997 to 2004, according to EIA. While natural gas only accounted for about 3 percent of total energy consumption in China in 2004, this share is expected to increase.

The natural gas market has long been dominated by pipelines that deliver the natural gas from producers to consumers. For instance, 85 percent of U.S. natural gas imports were provided through natural gas pipelines from Canada in 2005. Much of Europe is served by pipelines from Russia, which provides around two-thirds of its imports. However, a gas supply pricing conflict between Russia and Ukraine in late December 2005 resulted in Russia's Gazprom shutting off gas supplies to Ukraine on January 1, 2006, resulting in an energy crisis for all of Europe. Although Russia had threatened a cutoff to demand higher natural gas prices in recent years, this was the first time that a supply disruption had affected flows to Europe. While the immediate crisis was soon resolved, the incident deeply undercut Europe's sense of energy security.

The United States was the largest consumer of natural gas in 2004, with about 23 percent of world demand. Russia had the second largest demand. Germany, in third place, had about a quarter of Russia's level of demand. Figure 6 shows the top world natural gas consumers in 2004.

Figure 6: Top World Dry Natural Gas Consumers, 2004



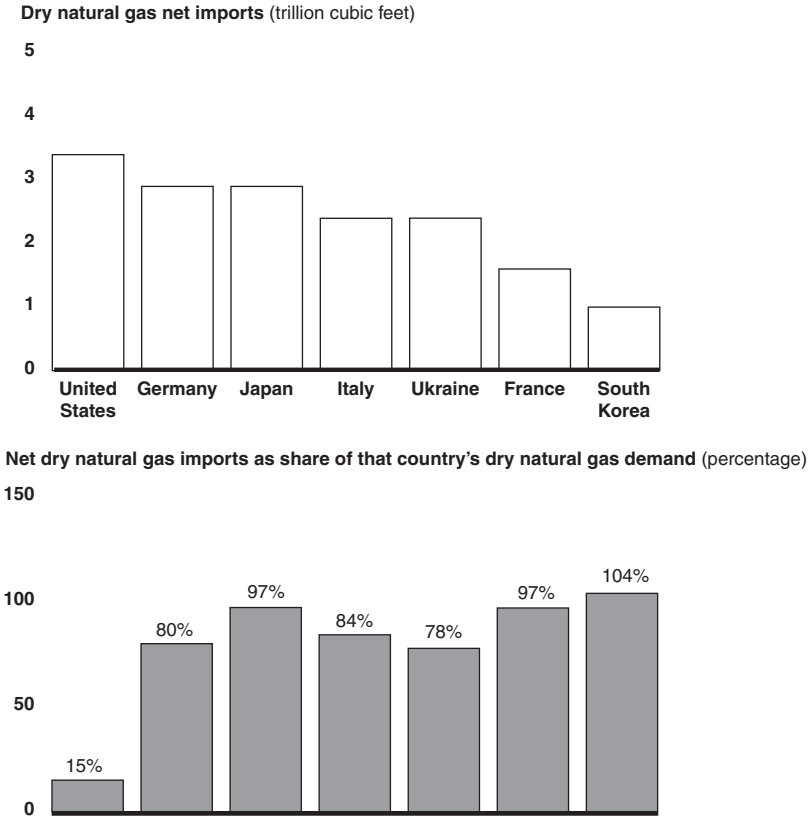
Source: GAO analysis of EIA data.

Notes: Dry natural gas is also known as consumer-grade natural gas.

Figure 6 includes all countries that consumed more than 2 trillion cubic feet in 2004. Total world demand was 99.7 trillion cubic feet.

However, as figure 7 shows, Germany's net imports accounted for 80 percent of its natural gas demand in 2004, while this share was only 15 percent for the United States. Of the seven top natural gas importers, six depended on imports for more than 75 percent of their demand—including Ukraine, which met about 78 percent of its natural gas demand through imports.

Figure 7: Top World Dry Natural Gas Net Importers, 2004



Source: GAO analysis of EIA data.

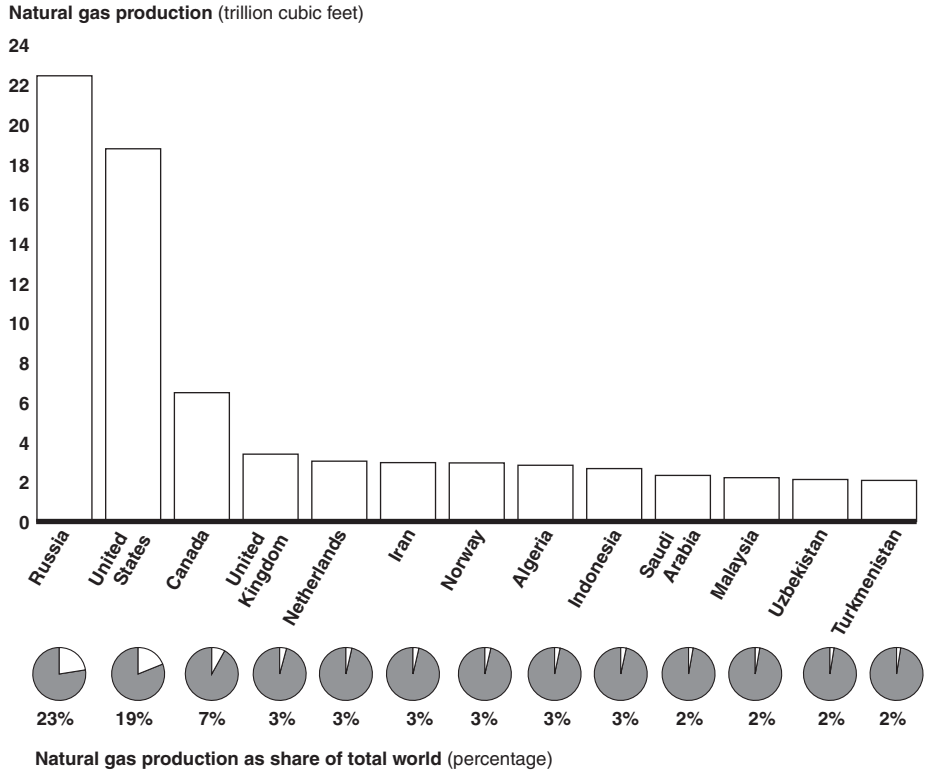
Notes: Dry natural gas is also known as consumer-grade natural gas.

Figure 7 includes all countries whose net imports were more than 1 trillion cubic feet in 2004.

South Korea's net imports were more than 100 percent of its natural gas demand because it was increasing its natural gas inventories.

In terms of natural gas production, Russia was the largest producer, with about 23 percent of total world production, as shown in figure 8. The United States accounted for 19 percent of total production. Canada, in a distant third place, produced about 7 percent of total production.

Figure 8: Top World Dry Natural Gas Producers, 2004



Source: GAO analysis of EIA data.

Notes: Dry natural gas is also known as consumer-grade natural gas.

Figure 8 includes all countries that produced more than 2 trillion cubic feet in 2004. Total production was 98.6 trillion cubic feet in 2004.

Until recently, as long as most natural gas was delivered by pipelines that required geographic proximity, there was not the possibility of developing a global market in which gas could be shipped to customers not connected with a pipeline. This has changed recently with the growing development of a liquefied natural gas (LNG) market, which is made possible because LNG can be shipped via LNG tankers that can go anywhere in the world where there is an LNG regasification terminal. LNG technology is not new—it had declined by the 1980s in the United States, for example, in part because it could not compete with lower priced domestic natural gas provided through pipelines. However, interest in LNG imports has been renewed due to higher U.S. natural gas prices in recent years, along with increased competition, and advances in LNG technology that have lowered its costs, according to EIA. LNG is expected to be particularly valuable for

so-called "stranded" natural gas reserves, which are located in areas too remote from major demand centers to affordably be developed using pipelines.

In 2005, Japan was by far the largest importer of LNG, with about 42 percent of total world LNG imports.[1] Its major suppliers included Indonesia, Malaysia, Australia, Qatar, Brunei, and the United Arab Emirates. South Korea, in second place, accounted for about 16 percent of total world LNG imports, from some of the same suppliers and Oman, while Spain, ranked third, imported about 11 percent of the total, mainly from Algeria, Nigeria, Qatar, and Egypt. The United States ranked fourth, with about 9 percent of the total, mostly imported from Trinidad and Tobago. While China is not yet an important consumer in the LNG market, it is taking steps to significantly increase its LNG profile. With its natural gas use increasing rapidly, and uncertainties surrounding the potential of piped Russian natural gas, China is increasingly considering LNG. Its first LNG import terminal received its first shipment in May 2006, and over a dozen new terminal projects are either under way or being considered, according to EIA.

[1] The EIA data on LNG imports do not provide a number for total LNG imports but rather provide it as apparent world exports of LNG, which the data show totaled 6,828 billion cubic feet in 2005. Japan imported 2,858 billion cubic feet, South Korea imported 1,075 billion cubic feet, Spain imported 769 billion cubic feet, and the United States imported 631 billion cubic feet.

Appendix IV: Comments from the Department of Energy

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

Department of Energy
Washington, DC 20585

December 12, 2006

Ms. Loren Yager
Director
International Affairs and Trade
United States Government Accountability Office

Dear Ms. Yager:

On behalf of the Department of Energy, I am pleased to respond to your email dated November 28, 2006, transmitting a copy of the GAO's proposed report entitled "International Energy: International Forums Contribute to Energy Cooperation Within Constraints (GAO-07-170)." We appreciate the opportunity to review the report before it is issued in its final form and would expect this letter and attachments to be included in the final report. We would also ask that where there are incorrect statements in the text of the report, GAO make the changes directly to the final report rather than just referencing them in DOE's comments.

We would like to emphasize that the United States Government has been actively engaged in international energy fora to advance the United States energy security objectives. The report makes many valuable points regarding the nature and the potentials of various international fora in which we participate, and adds to the greater understanding of the U.S. commitment to international energy cooperation.

See comment 1.

See comment 2.

DOE is concerned however, that GAO asserts that more data and more timely data will resolve energy market and security issues. Further, DOE is concerned that GAO has not captured the scope and strength of ongoing cooperation by the U.S. in international fora. Also, we are concerned that the role of the Energy Information Administration in international cooperation efforts seems mischaracterized.

The attached comments include further discussion of DOE concerns with the report and provides recommendations that GAO can use for a more accurate report. We believe that the clarification of the nature of energy data sharing would even more effectively illuminate the dynamics of international energy cooperation.

Sincerely,

Katharine A. Fredriksen
Principal Deputy Assistant Secretary
Office of Policy and International Affairs

U.S. Department of Energy:
Comments on Draft GAO Report "International Forums Contribute to Energy Cooperation Within Constraints"

1. Cover Page: We suggest updating the graphic at bottom based on suggested changes to Figure 3 below (refer to Comment 24).

See comment 3.

2. GAO Highlights page, "What GAO Recommends": In the Highlights section of the Draft Report, the GAO recommends that U.S. data submissions to the International Energy Agency (IEA) be made timelier. However, in the *Results in Brief* section (page 4, 1st Paragraph, Last Sentence), GAO correctly acknowledges that the reason for the delay in U.S. submissions is primarily due to differing data collection and reporting schedules. While EIA is trying to improve its timeliness, it is unlikely that EIA would ever be in a position to satisfy all of the IEA scheduled due dates because EIA's survey cycles (and the associated data releases) are not consistent with IEA's schedule. (Please see additional discussion of this point below.)

3. GAO Highlights page, paragraph 3, line 5: It is an over simplification to say that the groups only focus on non controversial issues like energy efficiency and technology sharing—a statement repeated throughout the document. The benefit of the groups is that all issues of concern are tabled and then areas of mutual interest are pursued. In the NAEWG there have been nine key areas of focus thus far identified as being of mutual interest for the three countries: natural gas, nuclear energy, hydrocarbons technologies (including oil and gas), oil sands technology, electricity, regulatory cooperation, energy data and modeling, energy efficiency standards and technologies, and science and technology development. This cooperative body of work has increased awareness of market opportunities, research, and technology gains as well as allowing for better understanding of regulations and data which encourage better planning and could lead to greater investment opportunities.

See comment 2.

4. Highlights page, paragraph 3, line 9: EIA has been consistently a part of international cooperation activities directed at data exchange. However, funding issues constrain their ability to assist other countries in collection and modeling efforts and this is an area where additional funding would be very useful and would be embraced by the countries involved.

See comment 2.

5. Page 4, 1st Paragraph, 2nd to Last sentence, and Page 30, 1st Paragraph, Last Sentence: *"EIA involvement in initiatives to improve international data has been indirect and ad hoc according to a senior EIA official."* This is not fully accurate and requires additional clarification or the readership will be misinformed. First, EIA's involvement in *bilateral data sharing agreements* has been indirect in the sense that data sharing agreements often arise out of policy dialogs not initiated by EIA, and until recently, EIA did not independently pursue bilateral data sharing agreements. For the record, EIA currently has two bilateral data sharing agreements; one with India and one with Russia. EIA notes that data sharing agreements, which are not discussed in detail in the GAO report, can suffer from the same constraints that affect multilateral efforts, which can limit their

effectiveness. For EIA, data sharing agreements have not been particularly effective, primarily because EIA's data are already publicly available and because countries are often unable to release collected data or do not have the data to share. EIA's focus for bilateral agreements will continue to be on: a) obtaining data collected but not publicly available; b) addressing best practices for statistical organizations; and c) encouraging adherence to international data standards. At times, EIA has found that countries are often more interested in creating the ability to produce forecasts, not collect and disseminate data.

Second, EIA is active in the four multilateral fora that are the focus of the GAO report. EIA is a member of the IEA Energy Statistics Workgroup, which develops the reporting standards for IEA data submissions. EIA is actively involved in the APEC Expert Group on Energy Data and Analysis, which provides energy information to APEC bodies and the wider community through collecting energy data. EIA has been an active member of the Joint Oil Data Initiative (JODI) since its inception. Finally, EIA has contributed significantly to the efforts of the North American Energy Working Group, in effect co-leading the effort that resulted in the two editions of *North America: the Energy Picture,* which provided detailed energy data and information for the three countries.

Certainly at issue for EIA is determining to what extent its resources can be most effectively used to foster the goal of increased data collection and dissemination and access to country-specific data whether through the bilateral or multilateral route. A better characterization for the GAO to use would be to say that *EIA's involvement in bilateral initiatives to improve international data has been limited and indirect.* If GAO wants to recommend that EIA needs to expand its multilateral role it could recommend that EIA consider leveraging its resources to expand its role in multilateral fora that are focused on data collection, dissemination, and transparency.

See comment 3.

See comment 4.

6. Page 4, 1st Paragraph, Last Sentence. *"Furthermore, due to differing reporting schedules, U.S. data submissions to the IEA have lacked timeliness and contributed to the 18-month lag for which published international data is available."* The lag in IEA published data is approximately 18 months for all countries, based on the release dates of the annual IEA fuel reports. The IEA deadline for submission of annual data is September 30 when countries submit data for the previous year. So, in 2005 countries submitted revised 2003 data and preliminary 2004 data that were published by the IEA in June 2006. This year countries submitted revised 2004 data, and preliminary 2005 data for publication in 2007. The U.S. is typically not in a position to report annual questionnaire data by the September 30 date because of differing reporting schedule constraints. [The IEA could consider using the data reported by EIA in the mini questionnaires, and the monthly electricity, natural gas, and oil survey submissions to generate the prior year preliminary annual data. The mini questionnaires are submitted to the IEA in May of each year, which is five months after the close of the prior reporting year.] For the 2005 data reporting cycle, EIA submitted 67 percent of our annual data four months later than requested, and the renewable and oil questionnaires were submitted in February and March respectively. But even if all countries met the September deadline, it is difficult to understand how IEA could release the annual data at

the same time the data is due from member countries. So additional explanation is needed to understand how the IEA plans to reduce the 18 month lag to a 9 month lag in the release of annual publications. Further, it is unclear how more timely responses to the IEA will address the GAO's concerns about tight markets and access to resources. (Please see additional discussion of this point below.)

We suggest that the recommendation on timeliness of U.S. data submissions be removed from the Highlights section, as this is, at most, a limited impediment to advancing energy security through international cooperation. Alternatively GAO might instead use language from page 44 (with additional wording, underlined), "*While the United States has provided important leadership in international emergency preparedness and the establishment of energy information systems, and with the increased importance of reliable energy market information in a tight market, a greater effort may be needed to improve more timely annual energy statistics.*

7. Page 5, Figure 1: We suggest GAO include historical data through 2005 and updated projections for 2010-2030 from the recently released *Annual Energy Outlook 2007* Reference Case, Table A11, available at: http://www.eia.doe.gov/oiaf/aeo/index.html

8. Page 6, Figure 2: Units are trillion cubic feet not billion cubic feet. We suggest that GAO include historical data through 2005 and updated projections for 2010-2030 from the recently released *Annual Energy Outlook 2007* Reference Case, Table A13, available at: http://www.eia.doe.gov/oiaf/aeo/index.html

9. Page 8, Table 1 under "Forum Objectives for the North American energy working Group": "harmonization" is incorrect. The three countries have agreed to "optimal integration" of the North American Energy market as a key forum objective.

10. Page 10, 5th line from bottom: could read "**such as Russia and Indonesia**".

11. Page 11, suggest: "Asia Pacific Energy Research Centre, an international organization based in Tokyo that receives the bulk of its financial support from the Japanese government." Reason: Australia also makes a small contribution, and some other economies are considering this.

12. Draft, page 12, first full paragraph under NAEWG, last line: This sentence unnecessarily simplifies the broad focus of NAEWG. Rather than examining only natural gas trade and interconnections the group has also explored electricity trade, as well as trade, markets and technologies to enhance all energy areas from hydrocarbons to nuclear energy. The group has also looked at standardizing and harmonizing standards and regulations where it benefits all three nations as well as exploring ways to enhance energy production and reduce energy consumption.

13. Draft, page 12 second full paragraph under NAEWG, first line: The group was inaugurated by the three energy ministers and is still led by them. Day to day leadership (line 4) is at the Assistant Secretary level but the group has only increased in importance

since its inauguration in 2001. This year its work has been raised to a presidential level with all three nations leaders identifying energy security as a key trilateral initiative for 2006-2007 and a meeting of the three ministers in May 2006.

14. Page 15, 1st Full Sentence: We suggest changing "almost tripling from about $29 a barrel at the start of 2004 to a peak of about $78 in July 2006." to "more than doubling from about $34 a barrel at the start of 2004 to a peak of about $77 in July 2006." (This is based on the NYMEX Light Sweet Crude, Contract 1 (or Near Month) settlement prices for January 5, 2004, and July 14, 2006, from: http://www.eia.doe.gov/emeu/international/crude2.html)

15. Page 15, 1st Full Paragraph, 3rd Sentence: We suggest that GAO change "consume about half of annual global oil output." to "account for about half of annual global oil consumption."

16. Page 15, 1st Full Paragraph, Last Sentence: We suggest that GAO change percent for OECD Europe from 3 to 2 based on our most recent data.

17. Page 16, Table 2: We suggest that GAO change data in Percent Change, 2000-04 column, as follows, based on our most recent data: Japan (-4); Canada (14), France (0.3), and Mexico (-2).

18. Page 16, Footnote 16: We suggest that GAO change 20.7 to 20.8 and 83.8 to 84.0, based on our most recent data.

19. Page 17, Full Paragraph, 1st Sentence: We suggest changing "almost 9" to "8.7" and "about 12" to "12.1".

20. Page 17, Full Paragraph, 2nd Sentence: We suggest changing "45" to"43" to match revised data for Figure 3.

21. Page 17, Full Paragraph, 4th Sentence: We suggest changing "10 to "9" to match revised number of countries shown in Figure 3.

22. Page 17, Full Paragraph, Last Sentence: Change the order of suppliers to the U.S. so the line reads: "The largest **net oil exporter** to the United States was Canada, followed by Mexico, Saudi Arabia and Venezuela."

23. Page 17, Footnote 17: We suggest adding a first sentence stating something like "Oil production is defined here as crude oil (including lease condensate), natural gas plant liquids, other liquids, and refinery processing gain." Also, EIA suggests changing "about 10" to "10.5" and "about 9" to "9.3".

24. Page 18, Figure 3: We suggest that GAO update the two charts with EIA's most recent data as provided below (Net Oil Imports, Net Oil Imports as Share of Total

Country Consumption). This eliminates Taiwan whose revised net oil imports are less than 1 million barrels per day.

- United States (12.097, 58); Japan (5.340, 101); China (2.765, 43); Germany (2.459, 92); South Korea (2.201, 102); France (1.906, 95); Italy (1.671, 93); India (1.606, 66); and Spain (1.537, 98).
- Also, in Note 2 change "using the extra oil in" to "adding the extra oil to".

25. Page 19, 2nd Paragraph, 1st Sentence: We suggest deleting "crude" and changing "about 84" to "84 to 85".

26. Page 19, 3rd Paragraph, 1st Sentence: We suggest adding "refinery capacity," before "pipelines".

27. Page 21, lines 15-18: Can the GAO cite its source for Secretary Bodman's statement (testimony, speech, press conference) or put it in quotes?

28. Page 25, 1st Paragraph, 2nd Sentence: We suggest changing "and a result can" to "and, as a result, there can".

29. Page 26, 1st bullet: We request removing "and India" from the end of both the first sentence and the fourth sentence. Second, we suggest rewording the first sentence to read something like "Uncertainty results from successive revisions of data; lack of timeliness in reporting; questionable reliability of data; and incomplete data (including the lack of inventory data), particularly from rapidly growing non-OECD countries." Third, we request that GAO remove the fourth sentence because the points are captured in the paragraph.

30. Page 27, 1st Bullet, 5th Sentence: We suggest changing sentence to "For Russia, it is difficult to accurately convert production from metric tons to barrels because the data are not broken out between crude oil and gas condensate."

31. Page 27, 1st Bullet, 6th Sentence: We suggest adding "changes in" before "oil stocks".

32. Page 28, Projections Bullet: While EIA does assume that OPEC is the swing supplier, we don't assume OPEC will increase production by over 50 percent in the IEO2006 projection. In fact, OPEC conventional production increases by 40 percent between 2003 and 2030 in our reference case. When unconventional OPEC production is added, we do show a 47 percent increase in production, so even total OPEC liquids supply growth doesn't exceed 50 percent (albeit, it's getting close). EIA is also concerned about the last sentence in the bullet point, which implies that EIA is not transparent on our assumptions regarding the impact of high oil prices on future production. EIA does run high and low world oil price scenarios, and we outline our assumptions, including publication of the price paths themselves.

33. Page 30, lines 10-14: Although the report contains comments on pg. 40 from an EIA office regarding EIA's involvement in international data sharing efforts, we may want to caveat the statement in this section, since EIA's participation in the NAEWG work was neither ad hoc nor indirect. They may want to edit line 12 as follows: "...standardization, and capacity building - through EIA involvement has, **for the most part**, been indirect..."

34. Page 32, last sentence in first paragraph: should refer to "DOE's policy and international affairs office and strategic reserve office also worked..." since it was the policy and international affairs office who organized the July 2005 workshop.

35. Page 32, last sentence: China is building petroleum reserve tanks and has begun filling some of them.

36. Page 33, paragraph 3 Typo: " ... the APEC Energy Technology" should be corrected to read the "APEC Energy Working Group."

37. Page 35, paragraphs 1 & 2: The report may consider providing the exact wording of the IEA's reserve requirement. This requirement is "the commitment to holding the stockpile equivalent to at least 90 days of net imports of the previous calendar year." This could be quite different from the simple "90 days of oil reserves", depending on one's degree of reliance on oil imports.

38. Draft, page 37, first line: This is incorrect and represents a mischaracterization of the support offered by the NAEWG to LNG development in Mexico. The line should read, "NAEWG efforts **to demonstrate the benefits of open markets and expose the tight nature of gas supplies in North America, limiting the amount and affecting the price of pipeline supplied gas that would be available to Mexico supported** the development of the LNG market, as a significant private investment opportunity...."

39. Page 39, 1st Line: We suggest adding "of" after "review".

See comment 2.

40. Page 40, 1st Full Paragraph: "*EIA has not been directly involved with international forum initiatives to improve international data.*" This is incorrect and we suggest GAO make the distinction between involvement in establishing standards and guidelines and reporting data from involvement in hands-on training. As stated above, EIA is involved in several international fora devoted to data and data transparency. EIA has been less involved in hands-on training activities such as the recent JODI training workshops, though over the years EIA has conducted workshops for those interested in EIA data and forecasting. It is unlikely that EIA will have the resources to take a lead in delivering hands-on training, something that international agencies are more in a position do to, though EIA experts could be a part of an international effort, pending resource availability.

GAO might mention that EIA's data, methods, documentation, survey forms, etc. are all in the public domain, which is unique among non-U.S. statistical agencies; EIA sets the international standard for transparency.

See comment 3.

See comment 4.

41. Page 41, 1st Paragraph, Fifth Sentence: *"For the 2004 annual data, for example the United States submitted its data to the IEA on March 17, 2006, although the data was requested by September 30, 2005."* The US (through EIA) submitted 67 percent of its data at the end of January 2006. The renewable and oil questionnaires and energy were submitted in February and March, respectively. The statement in the report is misleading, and should be addressed. Below is EIA's response to the IEA regarding the timeliness issue on the Report Card:

"IEA Concern: IEA gave the United States a poor rating for timeliness for its annual submission for all five 2004 questionnaires.

EIA Response: The United States could not meet the reporting date of September 30, due to various internal and external constraints:

- EIA normally releases annual data after the IEA questionnaire submission date of September 30, e.g., Natural Gas Annual, Electric Power Annual, Annual Energy Outlook, Fuel Oil and Kerosene report etc. EIA does not release data prior to the official release date.

- Release dates for external data needed for the questionnaires, for which EIA is not responsible, are not consistent with IEA deadlines. For example, the Federal Highway Administration's Highway Statistics, the National Petrochemical and Refiners Association lubricant data, and the American Petroleum Institute (API) NGL/LRG data are released after IEA deadlines.

The IEA is aware of the U.S. reporting schedules and constraints. During the IEA Energy Statistics Working Group Meeting, held during November 2004, EIA and IEA staff established a realistic date that EIA could meet to submit U.S. data. The date determined was January 2006 for reporting year 2004. EIA submitted four of six questionnaires by the end of January 2006; the renewable questionnaire was submitted February 7; the oil questionnaire was submitted March 17. EIA improved its reporting performance compared to previous years; however this was not reflected in the report card based on the IEA reporting criteria. Unfortunately, if we continue with our current process for reporting the U.S. annual data, EIA will not be able to improve the rating for timely submission on the IEA report card, because the IEA uses a benchmark that is not achievable by EIA. "

42. Page 41, 1st Paragraph, Last Sentence: GAO states that the IEA reported that EIA would submit the 2005 annual data by December 2006. This date is incorrect. EIA contacted IEA in August and established a goal of having its submission ready for delivery by February 2007.

43. Page 41, Footnote 32: The GAO comment on the natural gas inquiries needs further clarification. While the IEA Report Card gave the United States a poor timeliness rating for the natural gas survey, GAO did not mention that EIA took issue with this characterization in its response to IEA on the Report Card. EIA responded to

approximately 98 percent of the supplemental natural gas questionnaires within one week after receipt. Some questions required additional data generated by EIA staff outside the regular IEA-response team, or required inquiries to other agencies (such as the Census Bureau). During the period the supplemental questions were sent, EIA was in the process of performing annual calibration and updating the sample included in the Monthly Natural Gas Report. The responses to some of the IEA inquiries were delayed because of workload constraints. One IEA question ("Use of natural gas as feedstock in food production -Hydrolyzed protein") required research with the Census Bureau and natural gas manufacturers although EIA concluded there was insufficient information to make an assessment. EIA responded as such to IEA.

44. Page 41, Footnote 32, Second Sentence: The implication is that the U.S. received the lowest rating among all countries for timeliness. EIA cannot verify this as we have not seen other countries' report cards; none of the report cards have been published to our knowledge. We think the GAO meant to say "The United States was rated 'poor' for timeliness, the lowest rating achievable." The GAO might mention that the U.S. received high ratings in other areas.

US 2004 Reporting Cycle IEA Report Card						
Section		**Questionnaire and Rating**				
		Oil	**Natural Gas**	**Coal**	**Renewables**	**Electricity**
1.	*Timeliness*					
1.1	Submission Dates	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**
1.2	Average Response Time	Very Good	**Poor**	Very Good	Good	Very Good
2	*Completeness*					
2.1	Improvement in data coverage	Very Good	Very Good	Very Good	Very Good	Very Good
2.2	Share of non-specified in totals	**Fair**	Good	Good	Good	**Fair**
3	*Data Quality*					
3.1	Overall quality of the answers	Good	Good	Good	Good	Good
3.2	Size of the statistical differences	Very Good	Good	**Fair**	Good	**Fair**
3.3	Breaks in the time series	Good	Good	**Fair**	Good	Good
3.4	Internal consistency	**Fair**	Very Good	Good	Very Good	Good
3.5	Cross-questionnaire consistency	**Poor**	Very Good	**Poor**	Good	NA

EIA is not aware of pressure to publish data with a nine month lag and doing so does not seem possible under the deadlines established by the IEA.

See comment 1.

45. Draft, page 43, lines 1-6: International fora do more than provide a place to discuss "concerns". International fora provide a vehicle to identify areas of mutual interest, encourage better energy planning, share information on supply, demand, regulation, markets, and innovative technology gains and prevent misunderstandings that affect economic growth and energy security.

46. Draft, page 43, lines 7-9: Fora also provide technical advice on regulatory streamlining, data collection and implications for energy imports that are important to energy security and supply demand balance.

47. Draft, page 44, first full paragraph, last line: A greater effort to improve energy statistics is not something the US can do alone. The US can increase its support for the development of each country's individual independent (rather than politically driven) data collection modeling and dissemination efforts so that all nations have a more accurate picture of actual supply demand balances.

48. Page 46, 2nd Paragraph, 4th Sentence: We suggest changing "the bulk" to "about 60 percent"

49. Draft page 49, Bilateral Energy Cooperation Forums, listing of "main cooperation forums,": this does not represent an accurate accounting of our "main" bilaterals; bilaterals with key producers like Saudi Arabia, Kuwait, Nigeria, Norway, the United Kingdom, and Brazil among others should be accounted for.

50. Pages 49 (bullet paragraph) and 50 (footnote 1) "The U.S.-China Energy Policy Working Group": It should be corrected to read the U.S.-China Energy Policy Dialogue. This Dialogue does not have working groups underneath it (although this might change in the future). Also, this Dialogue is not subservient to other bilateral consultations.

51. Draft page 50, under "Bilateral Energy Cooperation Forums Allow Focused Attention on Issues of Interest," 2nd bullet point, last sentence: Last sentence should read "Negotiations on a memorandum of understanding on energy information exchange **began in 1996 and it was signed in February of 2006.**"

52. Appendix II, List of Bilaterals: the list is incomplete; DOE holds bilateral energy policy dialogues, information exchange efforts, or PASAs with Africa, Angola, Argentina, Australia, Azerbaijan, Bangladesh, Brazil, Canada, China, Equatorial Guinea, Kazakhstan, India, Indonesia, Italy, Iraq, Mexico, Norway, Pakistan, Peru, Russia, Saudi Arabia, the United Kingdom, Ukraine, Venezuela, and West Africa/Nigeria.

53. Page 52, 1st Paragraph, 4th Sentence: We suggest changing "its share in the country's energy market is rapidly increasing, almost doubling from 2000 to 2004" to "consumption increased by almost 50 percent from 2000 to 2004".

54. Page 52, 1st Paragraph, 5th Sentence: We suggest changing "this level is expected to increase significantly." to "this share is expected to increase."

55. Page 52, 3rd Paragraph, 1st Sentence: We suggest adding "in 2004" after "natural gas".

56. Page 53, Figure 6, Note 2: We suggest changing "2,000 billion" to "2 trillion" and "99,665 billion" to "99.665 trillion".

57. Page 54, Figure 7: We suggest that GAO revise this Figure to show **net** imports rather than gross imports because Russia is a net exporter and should not be included and because the net import position of Germany is less than its gross imports position. The natural gas net import data and net dry natural gas imports share of that country's dry natural gas demand are provided below (Natural Gas Net Imports, Net Dry Natural Gas Imports as Share of Dry Natural Gas Demand):

- United States (3.404, 15); Germany (2.871, 80); Japan (2.868, 97); Italy (2.384, 84); Ukraine (2.373, 78); France (1.554, 97); and South Korea (1.022, 104)

- Change title of Figure 7 to "Top Dry Natural Gas Net Importers, 2004". Change title of top chart to "Dry natural gas net imports (trillion cubic feet)". Change Note 2 to read "Figure 7 includes all countries whose net imports were more than 1 trillion cubic feet in 2004." Add "Note 3: South Korea's net imports were more than 100 percent of its natural gas demand because it was increasing its natural gas inventories."

58. Page 52, Full Paragraph: We suggest a change to read "However, as Figure 7 shows, Germany's net imports accounted for 80 percent of its natural gas demand in 2004, while this share was only 15 percent for the United States. Of the 7 top natural gas net importers, 6 depended on net imports for more than 75 percent of their demand - including Ukraine, which met about 78 percent of its natural gas demand through net imports."

59. Page 55, Figure 8: We suggest adding data for Turkmenistan (Production 2.068, Share 2%). Also, in Note 2 change "2,000 billion cubic feet" to "2 trillion cubic feet" and "98,620 billion cubic feet" to "98.620 trillion cubic feet".

60. Page 55, Full Paragraph, 2nd Sentence: We suggest changing "is shipped via tanks that can go anywhere in the world." to "can be shipped in LNG tankers that can go anywhere in the world where there is an LNG regasification terminal."

61. Page 56, 1st Sentence: We suggest adding "Brunei" after "Qatar".

62. Page 56, 2nd Sentence: We suggest changing "from many of the same suppliers" to "from some of the same suppliers and Oman".

See comment 1.

63. Appendix III, Figures 6, 7, and 8: Units in Figures 6, 7, and 8 are trillion cubic feet not billion cubic feet.

64. General Comment: GAO incorrectly asserts that more data and more timely data will solve a wide range of challenges in the policy arena, far beyond the data realm. The only two recommendations made by GAO focus on U.S. efforts to improve international data collection and dissemination, and the timeliness of U.S. data reporting to the International Energy Agency. While EIA agrees that participation in fora that focus on improved data collection and dissemination is important as is timely international data, more energy data *alone* will not resolve the energy market and security issues identified by GAO in the report. Addressing these two concerns will not result in significant progress in addressing our energy challenges.

The following are GAO's comments on DOE's letter dated December 12, 2006.

GAO Comments

DOE's cover letter and comments 2, 4 to 6, 40, 41, 47, and 64 generally addressed our key findings and recommendations. We considered the technical comments provided in comments 1, 3, 7 to 39, 42 to 46, and 48 to 63 and incorporated them where appropriate.

1. GAO does not assert that more data and more timely data will resolve energy market and security issues. Rather, our findings highlight the increased importance of reliable energy market information for mitigating market instability and facilitating investment and, therefore, we recommend that DOE give greater priority to improving energy information efforts within the international forums. We agree that achieving improved international energy statistics is not something the United States can do alone. However, we specifically recommend that DOE address two relevant areas in which we saw opportunities for U.S. improvement, by examining how EIA expertise can be better leveraged and by examining how U.S. data submissions to IEA can be made more timely. Improving energy statistics is one important way in which the international forums can enhance the impact of international cooperation.

2. We have clarified and modified language in the report to reflect EIA's support for international data exchange, particularly through efforts such as the Joint Oil Data Initiative (JODI) and the APEC Expert Group on Energy Data and Analysis. However, EIA expertise has not been consistently leveraged for efforts to improve the quality of international data through, for example, assisting other countries in data collection and modeling or training workshops. Consistent with DOE's comment emphasizing the role of funding constraints in EIA's ability to assist with such efforts, we acknowledged that EIA's participation has been dependent on staff availability. Further, while we acknowledge in our report that international cooperation is a small part of EIA's overall mission, we maintain that DOE should examine how EIA expertise can contribute to international forum data efforts.

3. GAO's recommendation states that DOE should examine how U.S. data submissions to the IEA can be made more timely. In our report, we acknowledge that the current EIA survey schedule does not correspond with IEA's current scheduled due dates. Nonetheless, we maintain that DOE should examine whether there are options for addressing the timeliness of U.S. data submissions to the IEA. One

consideration could include the suggestion provided in DOE's comments to this report that the IEA use EIA miniquestionnaires and monthly submissions to generate preliminary U.S. data.

4. In our report, we recognize that other IEA member countries also do not submit their data within the requested IEA time frames. We have modified language regarding U.S. data submissions to reflect additional information DOE has provided.

Appendix V: Comments from the Department of Commerce

THE DEPUTY SECRETARY OF COMMERCE
Washington, D.C. 20230

December 13, 2006

Mr. Loren Yager
Director
International Affairs and Trade
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Yager:

Thank you for the opportunity to review and comment on the U.S. Government Accountability Office's report, "International Energy: International Forums Contribute to Energy Cooperation Within Constraints." Ensuring access to reliable, affordable energy supplies for U.S. businesses and consumers is a high priority for the Commerce Department.

The Department of Commerce participates in many multilateral and bilateral forums that are designed to improve international energy cooperation, including the North American Energy Working Group, one of the forums studied in detail in the report. We also participate in some of the forums described in Appendix 2, including the U.S.-China Oil and Gas Industry Forum, the U.S.-India Energy Dialogue, and the U.S.-Russia Energy Working Group. We ask that the language on page 49 of the report be changed to reflect that.

We highly value the work of the U.S. Energy Information Administration (EIA). We believe that the recommendations that the report makes regarding the EIA's data collection and information reporting practices will enhance the ability of the United States to participate in international energy data collection efforts. The availability of good international data is important to U.S. energy companies in making investment decisions, and to governments working together to improve global energy security and stability.

Thank you again for the opportunity to review and comment on this important report.

Sincerely,

David A. Sampson

Appendix VI: Comments from the Department of State

United States Department of State

Assistant Secretary for Resource Manage and Chief Financial Officer

Washington, D.C. 20520

DEC 12 2006

Ms. Jacquelyn Williams-Bridgers
Managing Director
International Affairs and Trade
Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548-0001

Dear Ms. Williams-Bridgers:

We appreciate the opportunity to review your draft report, "INTERNATIONAL ENERGY: International Forums Contribute to Energy Cooperation Within Constraints," GAO Job Code 320397.

The enclosed Department of State comments are provided for incorporation with this letter as an appendix to the final report.

If you have any questions concerning this response, please contact Jeff Izzo, Economic Officer, Bureau of Economic, Energy and Business Affairs at (202) 647-1291.

Sincerely,

Bradford R. Higgins

cc: GAO – Virginia Hughes
EB – Elizabeth Dibble
State/OIG – Mark Duda

Department of State Comments on GAO Draft Report

INTERNATIONAL ENERGY: International Forums Contribute to Energy Cooperation Within Constraints (GAO-07-170, GAO Code 320397)

Thank you for the opportunity to comment on the draft report entitled, *INTERNATIONAL ENERGY: International Forums Contribute to Energy Cooperation within Constraints.* Secretary Rice believes that international cooperation on energy issues is vital to the United States' energy security goals. As your report shows, the Department of State, under Secretary Rice's leadership, has placed and will continue to place a high priority on securing U.S. energy security through mutually beneficial exchanges with key energy producing and consuming countries.

The State Department has made organizational changes to address the critical issue of global energy challenges. These changes are reflected in the Secretary's decision to change the title of the Under Secretary for Economic, Business and Agricultural Affairs to the Under Secretary for Economic, Energy and Agricultural Affairs and the title of the Assistant Secretary for Economic and Business Affairs to the Assistant Secretary for Economic, Energy and Business Affairs, to reflect the Department's increased attention to energy matters.

Additionally, Secretary Rice has appointed Gregory Manuel to serve as Special Advisor to the Secretary and International Energy Coordinator.

This new position, at the critical nexus of energy, diplomacy and national security, will enhance the State Department's ability to work in partnership with the Department of Energy and other agencies to address the many foreign policy-related energy challenges we face. It also will enhance our ability to help implement the President's Advanced Energy Initiative for a clean and secure energy future.

Reporting through the Under Secretary for Economic, Energy, and Agricultural Affairs to the Secretary, this new position will provide strategic oversight, develop new policy approaches and initiatives, and fully integrate energy issues into the decision-making process at senior

levels. Toward that end, the Special Advisor to the Secretary and International Energy Coordinator will work closely with the Department's regional and functional bureaus, and others responsible for energy issues.

Appendix VII: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the individual named above, Virginia Hughes, Assistant Director; Leyla Kazaz; Kendall Schaefer; Hugh Paquette; and Michelle Munn made key contributions to this report. Other contributors include Godwin Agbara, Karen Deans, Mark Dowling, Amanda Miller, and Anne Stevens.

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