

**Statement of David Pumphrey**  
**Deputy Assistant Secretary for International Energy Cooperation**  
**Office of Policy and International Affairs**  
**U.S. Department of Energy**  
**before the**  
**U.S. Senate Committee on Energy and Natural Resources**  
**United States Senate**  
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Mr. Chairman and Members of the Committee, I am pleased to appear before you this morning – the one-year anniversary of the Joint Statement concluded by President Bush and Prime Minister Singh – to discuss India’s expanding role in the global energy market and the important energy cooperation taking place between the U.S. and India.

President Bush placed energy security high on his agenda from the beginning of his first term and that commitment has only increased. The President’s policy recognizes the global nature of the energy markets, and that a nation’s energy security does not end at its national boundaries. Our overarching energy security objective is to promote adequate and reliable supplies of affordable energy, as well as the clean and efficient use of energy resources. As the world’s largest producer and consumer of energy resources, the U.S. must play a leading role in addressing the world’s energy challenges and ensuring a secure energy future. The world’s demand for energy is growing rapidly and the demand growth will be increasingly concentrated in the developing world.

We are working internationally to create expanded energy partnerships with major consuming and producing countries. These partnerships are designed to improve energy security globally through domestic energy resource development, increasing the use of clean fuels, improved legal and regulatory regimes, increasing private investment, diversifying resources to include alternative and renewable energy sources, and helping the developing countries and growing economies to be more efficient producers and consumers of energy.

**India’s Energy Outlook**

India -- a nation of over a billion people with an economy growing at approximately 8 percent per year -- has a massive and rapidly growing appetite for energy. Rapid population growth, expanding industrial production, economic development, urbanization, and increased motor vehicle ownership are all driving this energy demand. Between 1980 and 2004, energy demand increased by over 270 percent. In 1980, total primary energy demand was only 4.16 quadrillion BTUs but by 2004 demand had risen to over 15 quadrillion BTUs of commercial energy, thus making it the fifth largest consumer of

energy in the world behind only the United States, China, Russia, and Japan. This growth will continue at a rapid pace with total energy demand projected to be 25.7 quadrillion BTUs by 2020 and 32.5 quadrillion BTUs by 2030.

India is the world's third largest coal producer behind China and the U.S. Coal consumption was 478 million short tons (mst) in 2004, growing to 775 million mst by 2020. India's coal has twice the ash content of U.S. coal, resulting in serious environmental and health consequences for its population. Currently, about 53 percent of India's total energy (and 70 percent of India's electric power generation) is derived from coal.

Of the remaining sources:

- nearly 33 percent is derived from oil;
- 8 percent from natural gas;
- 5 percent from hydro-electric power;
- less than one percent from renewable (solar and wind) sources; and,
- the remaining 1 percent comes from nuclear energy.

India's current civilian nuclear program has an installed capacity of 3,850 megawatts electric (MWe), but, according to the Government of India, it is expected to reach 20,000 MWe by 2020.

India's demand for oil and natural gas is substantial, and will only increase as its economy grows and industrializes. Indian consumption of natural gas has risen faster than any other fossil fuel in recent years, from 63 trillion cubic feet per year (Tcf) in 1995 to 1.09 Tcf in 2004. Its use is projected to reach 1.5 Tcf by 2010 and 2.2 Tcf by 2020. Oil accounts for 33 percent of India's total energy consumption. India's average oil production level was 828,000 barrels per day in 2005. Future oil consumption is expected to grow from 2.6 million barrels per day (mmbd) in 2005 to 3.7 mmbd in 2020 and 4.5mmbd in 2030. In 2005, India imported (net) approximately 1.7 mmbd of oil. Based on conservative estimates, these imports will continue to grow as consumption needs will rapidly outpace growth in production capacity. Looking ahead, in 2020 India's production capacity will be 1.4 mmbd, leaving an estimated import demand of 2.3 mmbd. Likewise, by 2030 import demand will continue grow to 2.9 mmbd as production will only increase slightly between 2020 and 2030 (1.4 to 1.6 mmbd.)

## **U.S. Policy Responses**

The U.S. began engaging India on energy more than a decade ago. We realized the enormous growth potential in its economy and recognized the implications for our energy security and for the global environment. My colleague from the Department of State can elaborate on the Civil Nuclear Cooperation Initiative; I would like to discuss more fully the broad range of energy-related activities we have undertaken with India. Today, the Department of Energy leads a wide variety of joint activities with India designed to increase its energy security while building a lasting partnership and friendship between

our two nations. These partnerships include participation from several agencies, the Department of State, the Department of Commerce, the Agency for International Development, the Trade and Development Agency, and the Environmental Protection Agency.

Our efforts in 1994 focused on improving the efficiency of India's coal-fired power plants, promoting the use of clean fuels such as natural gas, wind and solar energy, helping establish public-private partnerships in industrial energy efficiency, and improving the investment climate for U.S. energy firms.

President Bush and Prime Minister Vajpayee bolstered our energy cooperation in November 2001, issuing a Joint Statement establishing energy as one of five pillars of the Indo-U.S. Economic Dialogue, with the other pillars being trade, investment, commerce and the environment. This enabled the implementation of the President's National Energy Policy Plan's recommendation that the Department of Energy work with India's Ministry of Petroleum and Natural Gas to enhance domestic oil and gas supply.

### **U.S.-India Energy Cooperation**

Growing concerns about energy security prompted the U.S. and India to launch a new energy dialogue in 2005 that reflects the transformed strategic relationship between the world's two largest democracies. The United States and India recognize their mutual interests are best served by working together in a collaborative fashion to ensure stability in global energy markets. Adequate and reliable supplies of clean energy at reasonable cost are essential to fuel India's rapidly growing economy. Both the U.S. and India are increasingly reliant upon global oil and natural gas markets to satisfy their energy needs. Both nations depend heavily upon domestic supplies of coal for electric power generation and seek to increase their utilization of natural gas, renewable energy and nuclear power, as well as pursue energy efficient practices to ensure a balanced and sustainable energy economy that helps preserve a clean environment.

In addition to our bilateral work, the United States and India joined with Australia, China, Japan, and South Korea to launch the Asia-Pacific Partnership on Clean Development and Climate in January. This results-oriented, pro-growth initiative will help Partner countries to focus on steps that will create new investment opportunities, build local capacity, and remove barriers to the introduction of clean, more efficient technologies. This partnership, pursued in close collaboration with the private sector, will help each member meet the challenges of improving energy security, reducing pollution, and addressing the long-term challenge of climate change. We look forward to India's active participation in this critical initiative.

### **U.S.-India Energy Dialogue**

President Bush has called for a transformed Indo-U.S. relationship premised upon a new strategic partnership under which energy security and energy cooperation are key factors. This relationship was reflected in the launch of the new U.S.-India Energy Dialogue on

May 31, 2005 chaired by Secretary Bodman and Deputy Chairman of India's Planning Commission Montek Singh Ahluwalia. It established five Working Groups along with a Steering Committee to provide oversight and direction. The goal of the Dialogue is to identify concrete actions that the two countries can take to help India address its energy challenges. The underlying strategy is to address these challenges through increased trade and investment in cleaner domestic energy production, energy efficiency and diversified imports of energy. Building upon the broad range of existing cooperation, this effort will help mobilize secure, clean, reliable, and affordable sources of energy.

The five Working Groups are: Oil and Gas, Coal, Power and Energy Efficiency, New Technologies and Renewable Energy, and Civil Nuclear. These Working Groups have launched activities designed to increase the development of domestic resources, promote the deployment of clean energy technologies and fuels, support reforms in the power sector, enhance India's awareness of steps it needs to take to attract foreign investment in the energy sector, and bolster India's energy security. The Department of Energy co-chairs each of these Working Groups with the appropriate Government of India counterparts and we convene experts from a variety of U.S. Government agencies to participate in the projects.

### **Developing India's Domestic Energy Resources**

The Department of Energy, in partnership with several other U.S. Government agencies, has been working with the Government of India on several projects that will increase the use of India's domestic resources.

#### *More Efficient Utilization of Coal Resources*

The Department of Energy is undertaking a number of steps to support the most efficient development of coal resources. In April 2006, India became a partner in the FutureGen international partnership which will work to create a zero-emissions coal-fired power plant that will produce hydrogen and sequester carbon dioxide underground, enabling greater use of coal in an environmentally sustainable way. Successfully demonstrating and adopting this technology will allow India to reduce the intensity of future greenhouse gas emissions from the burning of their abundant coal resources. India became the first country to join the United States on the FutureGen Government Steering Committee and plans to participate in the FutureGen Industry Alliance. The Government of India will contribute a total of \$10 million to the project to join the government steering committee, \$2.2 million of which has already been contributed.

The Coal Working Group has recently identified several high priority projects that will be pursued by our two countries over the next 2 years, including pursuing investment opportunities and information exchanges in the areas of coal mining and processing, coal mine safety, coal mine methane, and in situ coal gasification. The U.S. Trade and Development Agency has provided a \$360,000 for a feasibility study grant for the Neyveli coal mine expansion project. Technical exchanges and visits are underway between the U.S. and India to examine the potential for pilot projects in India in the areas of underground coal gasification and coal beneficiation/coal washeries.

Finally, a Memorandum of Understanding, or MOU, between the U.S. Minerals Management Service and India's Oil Industry Safety Directorate is expected to be signed in July 2006 in Washington, D.C. The MOU will deal primarily with operational safety, inspection issues and accident investigations of offshore oil and gas operations related to both drilling and production.

In the area of coal-based power generation, a proposed strategic partnership has been established between India's National Thermal Power Corporation and the U.S. Department of Energy's National Energy Technology Laboratory to collaborate on advanced research and development of clean and efficient power generation. A workshop is planned in India for September 2006 to discuss the results of a study on the feasibility of Integrated Gas Combined Cycle power plants in India.

#### *Promoting Natural Gas Development*

The promotion and development of clean coal technologies and carbon sequestration efforts associated with power generation remain a focus of current U.S. initiatives with India.

The Department of Energy has been working with India to help them develop their domestic natural gas resources that can offer near-term alternatives. India has discovered a significant reserve of natural gas off its east coast but lacks an adequate infrastructure to move this gas to major national markets. We recently held a joint conference on natural gas that included representatives from government and the private sector to review the potential for natural gas development and to assist the Government of India in shaping the regulatory environment necessary to attract the investment needed to move this gas to market.

Another important area for future domestic natural gas production is from coal bed methane (CBM). India is believed to have significant resources of CBM that could make important contributions to meeting future energy needs. This is an opportunity for the U.S. private sector, which has extensive experience in the area of CBM development, to engage in this key energy source. The Ministry of Coal and Ministry of Petroleum and Natural Gas with the U.S. Trade and Development Agency (USTDA) and the U.S. Environmental Protection Agency are working together to establish a CBM Clearinghouse Information Center, an initiative under the Methane to Markets Partnership. This Center would promote the development of CBM projects and CBM resources by collecting data, conducting training, facilitating technology transfer, and providing consulting services. USTDA plans to support a kickoff event such as a workshop or conference showcasing U.S. technologies, and the Environmental Protection Agency plans to provide financial assistance, technical training, and other support to the organization. In addition USTDA is providing a \$506,000 grant to Reliance Industries Limited to partially fund the cost of technical assistance to develop CBM resources at Reliance's Sohagpur field.

The U.S. Department of Energy is also working with India on ongoing research and development of the first hydrate drilling offshore India; this research is expected to accelerate efforts to develop methane production from hydrates in both countries, potentially providing a significant increase in the quantity of domestic natural gas available to the Indian market. The ocean research ship *Joides Resolution* is currently drilling and coring hydrate-bearing sediments offshore India. DOE has provided specialized equipment and research scientists to detect and evaluate gas hydrates in cores. DOE and the Directorate General for Hydrocarbons are in discussions to develop an MOU to exchange information and analyses, conduct joint studies and projects, and exchange scientific and technical personnel in order to increase understanding of the geologic occurrence and the potential for methane production from natural gas hydrates in both India and the United States.

### **Accelerating Energy Sector Regulatory Reform**

In order to meet India's growing demand for energy, significant new investment is needed and the necessary legal and regulatory framework must be in place to attract the needed capital. Recently, the two governments conducted a workshop on natural gas regulation held at the Ministry of Petroleum and Natural Gas. India has recently enacted a Petroleum and Natural Gas Regulatory Board Act which seeks to promote competition, open access and greater transparency in gas pipeline transportation. The meeting addressed a number of regulatory issues and processes that India will have to address to develop a regulatory scheme that will be attractive to potential investors. The meeting was attended by various U.S. Government officials (from the U.S. Department of Energy, U.S. Department of Commerce, U.S. Trade and Development Agency, and U.S. Embassy in India); and a senior official of New York State's regulatory body for natural gas who is an expert on both U.S. federal and state regulation. The Indian representatives at this meeting included the Ministry of Petroleum and Natural Gas, and its Petroleum Planning Analysis Cell, as well as the Gas Authority of India (GAIL). The effort to establish an appropriate regulatory regime is also being supported by a USTDA grant to the Government of India for a limited feasibility study of a national pipeline grid and to explore the possibility of providing further technical assistance in the area of gas sector regulation.

### **Data Collection and Information Exchange**

A key element of a fully functioning energy market is the availability of timely and accurate information. To help support India's efforts to develop much better data and information, the U.S. Energy Information Administration and India's Ministry of Petroleum and Natural Gas have initiated activities to help develop Indian data systems. The initial work has focused on techniques for collecting hydrocarbon data in India and the United States and methods to improve data collection in India.

### **Improving Energy Efficiency**

One of the most important areas of cooperation between the U.S. Government and the Government of India is improving energy efficiency. Energy efficiency investments could make a major contribution to shaping the future demand for energy in India. Much of the recent cooperation between DOE and India has focused on facilitating the development and deployment of energy efficient technologies and practices, including those directed at the industrial, residential, and transportation sector. Building on much of the work of the U.S. Agency for International Development mission in India, the Power and Energy Efficiency working group has engaged in several projects designed to decrease energy demand and improve power generation infrastructure in India.

A U.S.-India Energy Efficiency Technology Cooperation Conference, jointly organized by DOE and India's Ministry of Power, was held on May 2<sup>nd</sup> and 3<sup>rd</sup>, 2006 in New Delhi with technical support from USAID and sponsorship by several Indian and U.S. industry groups. The focus of the conference was on industrial and building energy efficiency. Among the key recommendations that came from the event was the establishment of five regional centers of excellence in energy efficiency in India as well as a collaborative program of assistance in developing macro-economic energy efficiency indicators. Following the conference, USAID in technical partnership with the State Government of Karnataka and the Ministry of Power, announced the establishment of a center of excellence for efficient lighting technologies and products, to be called the "Lights Museum and Energy Centre" in Bangalore. Cooperation is also continuing on energy efficient buildings and on the development of building codes, and a U.S. team conducted training in India in May 2006.

Major strides have been made towards rural electrification as well. USAID recently launched a public-private partnership with the General Electric Company to increase access to clean and affordable energy services in rural communities in India. The partnership will span a two-year period and provide up to four communities in India with access to clean energy. The Distribution Reform Upgrades and Management program under USAID has also completed detailed project reports on four model projects on efficient power distribution in the states of Karnataka, Maharashtra, Gujarat and Delhi.

### **Increase Use of Alternative and Renewable Energy Resources**

U.S.-India energy cooperation has also focused on the fostering of reliable sources of fuels, including development, deployment, and commercialization of technologies for sustainable, renewable fuels. This work includes creating public-private sector partnerships, as well as the promotion of investment, trade, and technology cooperation in the development of renewable resources such as solar, wind, hydro, and biomass. The Minister of Non-Conventional Energy Sources recently met with experts at DOE's National Renewable Energy Lab to discuss potential areas of collaboration in hydrogen and biofuels research.

### **Civil Nuclear Energy Cooperation**

Nuclear energy will also be an important part of India's energy future. To that end, the Department of Energy held a joint technical workshop earlier this year in Mumbai to advance dialogue and cooperation on technical issues associated with civilian nuclear energy use. Initial preparations are underway for a second workshop to take place this fall in the United States. However, any meaningful collaboration in this area is contingent on modification of our legal framework as proposed under the U.S. - India Civil Nuclear Cooperation Initiative.

Looking longer term, the U.S. and its ITER partners, the European Union, Russia, Japan, Republic of Korea and China, have invited India to participate as a full partner in the international research project which aims to demonstrate the feasibility of fusion power. U.S. support was instrumental in ensuring this final agreement. The partnership represents the first tangible and concrete step towards greater cooperation between the U.S. and India in the area of civil nuclear energy.

### **Improved Business Climate and Mobilize Private Investment**

Private sector investment in all parts of the energy supply chain is critical to fostering energy security. We have made it a priority to include the participation of U.S. business in aspects of all of the working groups under the U.S.-India Energy Dialogue, which we have encouraged on the Indian side as well, and we have consistently made an effort to encourage the Government of India to take the necessary steps to improve the investment climate and attract U.S. companies.

This past March, the Department of Energy, with the Department of Commerce and USTDA, organized a CEO-roundtable event for the Ministry of Petroleum and Natural Gas in Houston. This event was held in conjunction with the roadshow for the sixth round of New Exploration Licensing Program and third Coal Bed Methane bid round. The meeting was designed to be a forum for U.S. companies to discuss their potential investment and voice any concerns they may have about the oil and gas sector in India.

In addition, the Department of Energy and the U.S.-India Business Council jointly organized a meeting in January of this year with the purpose of soliciting industry views on key commercial issues and building private sector participation in the Energy Dialogue and to promote increased U.S. trade and investment in India's energy sector.

The Coal Working group is also establishing a Coal Business Council consisting of representatives from business, industry, academia and other non-governmental organizations to serve as a resource to the Working Group.

### **Developing Crisis Response Mechanisms**

The Department of Energy has been working closely with India for some time to help develop its emergency response capability and its strategic stocks. India is developing a 5 million ton (approximately 36.5 million barrels) strategic crude oil reserve, with several locations near Mangalore on the east coast being considered. The Department of Energy



has hosted study tours for Indian officials to visit U.S. Strategic Petroleum Reserve sites and speak with U.S. experts in these areas. Indian officials have also participated in international oil stockpile conferences we have held in the U.S. We have also invited Indian representatives to visit with the International Energy Agency (IEA) to better understand how the IEA members plan for and respond to a severe supply disruption.

As such, the Department of Energy has been actively improving relations with senior Indian officials in energy policy-making. In order to ensure a coordinated response in an emergency or crisis situation, we must continue to develop close relations at the highest levels of government. In recent months we have had several high level meetings and exchanges between senior Department of Energy and Indian government officials.

### **Conclusion**

Mr. Chairman and members of the Committee let me conclude by emphasizing that the economic growth that India is experiencing today will lift many people out of poverty and it is in our mutual interest to see that growth continue. Therefore, it is in our mutual interest to help India meet its energy needs and become a more efficient user of energy, both that which is available domestically and that which it imports.

The U.S. is leading by example and making needed investments in technologies that will fundamentally transform how we produce and consume energy in the future. We have embarked on an ambitious agenda through the President's Advanced Energy Initiative. We can share these bold ideas and our experiences with India. We are convinced that bilateral and multilateral energy cooperation maximizes everyone's energy security. Thank you, Mr. Chairman, for the opportunity to address the Committee on this important subject and I am happy to take any questions you or the Members may have.