THE DOMESTIC NATURAL GAS SUPPLY SHORTAGE

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

OF THE

COMMITTEE ON RESOURCES
U.S. HOUSE OF REPRESENTATIVES

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OVERSIGHT HEARING ON "THE DOMESTIC NATURAL GAS SUPPLY SHORTAGE"

Thursday, June 19, 2003
U.S. House of Representatives
Subcommittee on Energy and Mineral Resources
Committee on Resources
Washington, DC

The Subcommittee met, pursuant to call, at 10 a.m., in room 1324 Longworth House Office Building, Hon. Barbara Cubin [Chairman of the Subcommittee] presiding.

Present: Representatives Cubin, Kind, Faleomavaega, Gibbons, Souder, Napolitano, Tom Udall, Carson, Pearce, Bishop and Nunes.

Mrs. CUBIN. [presiding] The oversight hearing by the Subcommittee on Energy and Mineral Resources will come to order. I would like to apologize for being late. I generally try to start these right on time. I had a little trouble with traffic getting in here today.

The Subcommittee is meeting to hear testimony on the potential crisis stemming from the domestic natural gas supply shortage. Under Rule 4(g), the Chairman and the Ranking Minority Member can make opening statements. If any members have other statements, they can be included in the hearing under unanimous consent. And, certainly, we are just overcrowded up here with members, I think that any member that wants to give an opening statement is welcome to do so.

STATEMENT OF THE HON. BARBARA CUBIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WYOMING

Mrs. CUBIN. I will start if I can find my opening statement—it is not his fault, that was mine. The Subcommittee meets today to address an issue that could negatively impact all American families and the United States economy at large, which is the growing natural gas supply shortage and its effect on energy prices. Next Tuesday we will meet again to discuss assessments of our energy resources and impediments to developing those resources.

Last March, natural gas storage levels fell to their lowest levels since 1976 when accounting first began for gas shortage. Henry Hub prices reached $19 per million Btu last winter, which were the highest prices ever recorded. We are now in what is known as the shoulder season, that time of year when gas inventories are being

built and prices are traditionally low. However, shortage numbers are currently about 60 percent of where they were a year ago, and gas prices are three times their average over the past decade.

It appears that barring a miracle natural gas prices will be at record levels again this year or next winter. Next week, at the request of the Energy Secretary Abraham, the National Petroleum is holding an emergency meeting to discuss short-term options to heading off a major shortage, but there does not appear to be a short-term solution. So how did we get to this point?

Over the last 10 years our public policy has encouraged the use of natural gas because it is a clean domestic fuel. We have ample natural gas resources in this country, and we will have ample resources for decades to come. In fact, the USGS estimates that there are some 1,400 trillion cubic feet of technically recoverable natural gas resources in the U.S. and that over 60 percent of them are on Federal lands. A 1999 National Petroleum Council study estimates North American gas resources to be over 2,400 trillion cubic feet. At current consumption levels, that is enough gas to supply the Nation for 104 years.

While our policies have continued to encourage natural gas consumption for its environmentally friendly aspects, these same policies have discouraged domestic gas production. We continue to shoot ourselves in the foot when it comes to our energy policy. It is essential that we first reverse this trend and streamline the process while still extracting the resource in an environmentally sensitive manner. Anyone who has seen reclaimed land where a gas well was developed would be very, very surprised had they not seen it to know that the remaining footprint is a stick about this high, and you have to look real hard to find it. Reclamation and new technology truly enables us to produce the resource in an environmentally sensitive way and not only keep the land sensitive to wildlife and tourism but also beautiful to the eye.

Second, we need to reverse the costly trend toward increased litigation brought about by national environmental groups to delay and derail energy projects in virtually every part of the country. Finally, we need to increase pipeline capacity by streamlining the permitting process for pipelines. A lack of pipeline take-away capacity is currently keeping about 500 million cubic feet per day locked up in the Rockies, a figure that could rise to 2.5 billion cubic feet by 2010 according to FERC.

In addressing our national gas shortage, we also need to look at the contributions that other forms of energy can make in turning the wheels of our economy and diversifying our energy portfolio. We have tremendous coal resources in this country, a supply that will last 250 years at the present rate of consumption. We have untapped geothermal potential in the West, and we have vast wind potential, both onshore and offshore. In order to meet our energy demand and grow our economy, we must make use of all these forms of energy resources that we can with today's advanced technologies and be accessed in an environmentally responsible manner.

Over the past two decades, this Subcommittee has held numerous hearings where we discussed the growing natural gas supply and demand imbalance. Last July, prior to the conference on the

last energy bill, several witnesses testified before this Subcommittee about an impending gas study shortage. Of course, last winter, their predictions came true. Let's not repeat the mistakes that led us to the crisis we face today.

Today, I would especially like to welcome Cal Jones, the president and CEO of the Wyoming Sugar Company. I have read all of your testimony, and I have heard the remarks that Cal will make today, not only from him but from other producers around the country with relation to the problem that high energy prices cause for energy. Between Wyoming—or for sugar production and business, I mean. Between Wyoming Sugar and the Western Sugar Cooperative, our sugar beet producers in Wyoming, they generate well over $100 million of economic activity in Wyoming. Cal is a fine man and a great Wyoming citizen, and I am anxious for all of us to hear his testimony. I look forward to everyone's testimony today, and I welcome all our witnesses as we look for ways to develop a smarter and safer natural energy policy.

So I would like to ask the Ranking Member, Mr. Kind, for his opening remarks.

[The prepared statement of Mrs. Cubin follows:]

Statement of The Honorable Barbara Cubin, Chairman, Subcommittee on Energy and Mineral Resources

The Subcommittee meets today to address an issue that could negatively impact all American families and the U.S. economy at large—the growing natural gas supply shortage and its affect on energy prices. Next Tuesday we will meet again to discuss assessments of our energy resources and impediments to developing those resources. Last March natural gas storage levels fell to their lowest level since 1976, when accounting began for gas storage. Henry Hub prices reached $19.00 per million British thermal unit last winter—the highest prices ever recorded.

We are now in what is known as the shoulder season, that time of the year when gas inventories are being built and prices are traditionally low. However, storage numbers are currently about 60% of where they were a year ago and gas prices are three times their average over the past decade. It appears that, barring a miracle, natural gas prices will be at record levels again next winter. Next week, at the request of Energy Secretary Abraham, the National Petroleum Council is holding an emergency meeting to discuss short-term options to heading off a major shortage. But there does not appear to be a short-term solution.

How did we get to this point? Over the past 10 years our public policy has encouraged the use of natural gas because it is a clean domestic fuel. We have ample natural gas resources in this country, and will continue to for decades to come. In fact, the U.S. Geological Survey estimates that there are some 1,400 trillion cubic feet of technically recoverable natural gas resources in the U.S. and that over 60 percent of them are on Federal lands. A 1999 National Petroleum Council study estimates North American gas resources to be over 2,400 trillion cubic feet. At current consumption levels that is enough gas to supply the nation for 104 years. While our policies have encouraged natural gas consumption, for its environmentally friendly aspects, these same policies have discouraged domestic gas production. We continue to shoot ourselves in the foot.

It is essential that we first reverse this trend and streamline the process while still extracting the resource in an environmentally sensitive manner. Second, we need to reverse the costly trend toward increased litigation, brought about by national environmental groups to delay and derail energy projects in virtually every part of the country. Finally, we need to increase pipeline capacity by streamlining the permitting process for pipelines. A lack of pipeline takeaway capacity is currently keeping about 500 million cubic feet per day locked up in the Rockies, a figure that could rise to 2.5 billion cubic feet by 2010 according to FERC.

In addressing our natural gas shortage, we also need to look at the contributions that other forms of energy can make in turning the wheels of our economy and diversifying our energy portfolio. We have tremendous coal resources in this country—a supply to last 250 years at the present rate of use. We have untapped geothermal potential in the West and we have vast wind potential both onshore and offshore.

In order to meet our energy demand and grow our economy, we must make use of all forms of energy resources that can—with today's advanced technologies—be accessed in an environmentally responsible manner.

Over the past two and a half years, this Subcommittee has held numerous hearings where we discussed the growing natural gas supply and demand imbalance. Just last July, just prior to the conference on the last energy bill, several witnesses testified before this Subcommittee about an impeding gas supply shortage. Of course, last winter their predictions came true.

Let's not repeat the mistakes that led us to the crisis we face today.

Today I would like to especially welcome Cal Jones, President and CEO of Wyoming Sugar Company. Between Wyoming Sugar and Western Sugar Cooperative, our two sugar beet producers in Wyoming, they generate well over one hundred million dollars of economic activity in Wyoming. He is a fine man and great Wyoming citizen.

I look forward to today's testimony and welcome all our witnesses, as we look for ways to develop a smarter and safer national energy policy.

STATEMENT OF THE HON. RON KIND, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WISCONSIN

Mr. KIND. Thank you, Madam Chair, and I too want to thank the witnesses for your presence and your testimony here today. I want to also just quickly apologize to the Committee. I am in another markup in another Committee, so I might have to run in and out during the course of this hearing, so don't think we are not interested. In fact, this Subcommittee has been very interested. In fact, this is the eighth hearing over the last 3 years on the natural gas supply situation affecting our country. Last week, the Commerce Committee had a hearing; Chairman Greenspan testified. Next week, it is my understanding the Subcommittee will be holding a similar hearing on the natural gas supply. So to paraphrase former Committee Chairman, Mo Udall, everything that needs to be said about this issue has been said, it just hasn't been said by everyone, but we are going to find out today based on your testimony. And I have had a chance to review much of your written testimony you have already submitted.

To be sure, the current natural gas supply crunch with its resulting high prices is a serious issue affecting virtually all sectors of our economy, from chemical producers, to farmers, to homeowners. However, it is important to bear in mind that the natural gas supply issues didn't emerge overnight and will not disappear overnight. In fact, there are market forces, I think we can all acknowledge and recognize, that are at play right now with self-correcting mechanisms that are taking place that will hopefully result in some positive changes in regards to the price spikes that we have seen recently.

Chairman Greenspan noted during the Energy Committee hearing last week, and I quote, "Today's tight natural gas markets have been a long time in coming, and future prices suggest that we are not apt to return to earlier periods of relative abundance and low prices anytime soon."

To address the difficulties of the natural gas industry and consumers, the Energy Subcommittee has focused on the ability to grow our natural gas supply through identification and more production capability. But a senior economist from the Wall Street firm, Goldman Sachs, just noted last week, underlying infrastructure deficiencies are one of the primary constraints on both supply

and demand growth in the natural gas market. As he said last week, and I quote, "Due to the current infrastructure constraints, even if there were significant surplus domestic natural gas, the market doesn't possess the pipeline capacity to transport it," as Madam Chair just recognized. "And even if there were adequate pipeline capacity to transport the gas, which there isn't, the market lacks the capacity to store it."

This is why I believe development of alternative technologies and energy efficiency programs to address the short-term effects of price volatility in the natural gas market is very important. Adoption of a national renewable fuel standard can help reduce price volatility and our reliance on foreign oil. Likewise, we can reduce the adverse effects of high prices through a series of energy efficiency options, such as conserving power during peak use periods. I mean energy conservation naturally occurs when prices spike anyway. Just witness the reaction of consumers in California just a couple of short years ago and how quickly they reacted with increase energy efficiency and conservation practices practically overnight.

By reducing the amount of energy we use in diversifying our energy sources, we can help alleviate price volatility in the natural gas market. For example, the aluminum industry, one of the most energy-intensive industrial sectors, is already employing improved technology to increase the efficiency of production and on increasing the recycling of scrap and waste products. Both the chemical and agricultural industries are not only using more efficient industrial processes to cut down on their energy use, but the purpose of these industries has begun shifting toward creating products from renewable forms of energy, such as crops that can replace products traditionally made from petroleum.

Over the long term, our economic and environmental future lies with using our advanced technology to develop clean, renewable energy sources and becoming more energy efficient. In the short term, as I described, the market has a way of self-correcting, but it also, I think, speaks to the need for the Congress to be serious about appropriating funds for the LIHEAP program to provide some temporary assistance to low-income families who are increasing these price crunches today.

In closing, Madam Chair, we would also like to note with great sadness the recent passing of Republican Committee staff member, John Rishel. John was a dedicated public servant. He served the Committee well, he served all of us members well, he served our Nation very well, and he will be sorely missed. And with that, I yield back. I think I—do we have that letter. If I could just ask unanimous consent to—Madam Chair, we have also submitted a written statement by Paul Britton, Managing Director of EnerSea in regards to today's hearing, and I would ask unanimous consent that be included in today's record.

Mrs. CUBIN. Without objection, so ordered.

[The prepared statement of Mr. Kind follows:]

Statement of The Honorable Ron Kind, Ranking Democrat, Subcommittee on Energy and Mineral Resources

Today, the Subcommittee holds an oversight hearing on the domestic natural gas supply situation—- for the eighth time in the past 3 years. Last week, the

Committee on Energy and Commerce held a similar hearing and next week this Subcommittee is scheduled to meet again to discuss virtually the same topic.

To paraphrase our late colleague and Committee Chairman Mo Udall— "Everything that needs to be said about this issue has already been said. It just hasn't been said by everyone."

To be sure, the current natural gas supply crunch with its resulting high prices is a serious issue affecting various sectors of our economy from chemical producers to farmers to homeowners.

However, it is important to bear in mind that natural gas supply issues did not emerge overnight, and likewise, will not disappear overnight.

As Chairman of the Federal Reserve, Alan Greenspan, noted during the Energy Committee hearing last week, "Today's tight natural gas markets have been a long time in coming, and futures prices suggest that we are not apt to return to earlier periods of relative abundance and low prices anytime soon."

To address the difficulties of the natural gas industry and consumers, the Energy Subcommittee has focused on the ability to grow natural gas supply. However, as a senior economist from the Wall Street firm, Goldman, Sachs, noted last week, underlying infrastructure deficiencies are the primary constraints on both supply and demand growth in the natural gas market. As he said, "due to the current infrastructure constraints, even if there were significant surplus domestic natural gas (and there is in the Rockies), the market doesn't possess the pipeline capacity to transport it; and even if there were adequate pipeline capacity to transport this gas, which there is not, the market lacks the capacity to store it."

This is why development of alternative technologies and energy efficiency programs to address the short-term effects of price volatility in the natural gas market is important. Adoption of a national renewable fuel standard can help reduce price volatility and our reliance on foreign oil. Likewise we can reduce the adverse effects of high prices through a series of energy efficiency options, such as conserving power during peak-use periods. By reducing the amount of energy we use and diversifying our energy sources we can help alleviate price volatility in the natural gas market.

For example, the aluminum industry, one of the most energy-intensive industrial sectors, is employing improved technology to increase the efficiency of production, and on increasing the recycling of scrap and waste products. Both the chemical and agriculture industries are not only using more efficient industrial processes to cut down on their energy use, but the purpose of these industries has begun shifting toward creating products from renewable forms of energy, such as crops, that can replace products traditionally made from petroleum.

Over the long term, our economic and environmental future lies with using our advanced technology to develop clean, renewable energy sources and becoming more energy efficient.

In closing, we would like to note with sadness, the recent passing of Republican Committee staff member, John Rishel. John was a dedicated public servant and he will be missed.

[The statement of Paul Britton submitted for the record follows:]

JUNE 18, 2003

The Honorable Barbara Cubin
U.S. House of Representatives
Energy and Mineral Resources Subcommittee
1626 Longworth House Office Building
Washington, DC

Dear Chairman Cubin:

It is my understanding that you will be holding a hearing on the important issue of domestic natural gas supply and shortages on June 19, 2003. On behalf of EnerSea Transport, a Houston-based compressed natural gas (CNG) transportation and storage company, I would like to request the attached written testimony be submitted for the record. I believe it will help to expand the critical discussion of new gas sources and describe how CNG is now a viable option for transporting and delivering increased supplies of natural gas to the marketplace.

Thank you for your consideration on this matter. I look forward to working with you to find solutions to meet increasing natural gas demand in the U.S.

REGARDS,

PAUL BRITTON, MANAGING DIRECTOR

cc: Jack Belcher, Staff Director, Energy and Mineral Resources Subcommittee

STATEMENT OF PAUL S. BRITTON, MANAGING DIRECTOR, ENERSEA TRANSPORT LLC

On behalf of EnerSea Transport, a Houston-based compressed natural gas (CNG) transportation and storage company, I would like to submit the following written comments for the record. My comments will be focused on how large-scale marine transportation of CNG can make a significant contribution to the effort to meet future natural gas demand in the U.S.

In response to tight supplies, energy experts are relying on development of the deepwater Gulf of Mexico and unconventional onshore gas resources, the importation of liquefied natural gas (LNG) and the construction of an Alaskan pipeline to help meet our growing demand for natural gas. To complement these efforts, EnerSea Transport has developed a unique breakthrough in CNG technology that will unlock remote gas supplies, and provide transportation and storage, for this important resource in a cost effective, safe and secure manner.

Through the undertaking of a multi-year, multi-million dollar technology development program, EnerSea has been able to develop a total delivery solution for transporting large volumes of remote and stranded gas supplies to the marketplace. Specifically, this new CNG system, known as VOTRANS™ (Volume Optimized Transport and Storage) can best be described as a sea-going pipeline, comprised of a series of interconnected large-diameter pipes contained within an insulated structure, integrated into a ship. We have greatly advanced the technology of previous CNG concepts by combining optimal storage efficiency, a proprietary gas handling process, the ability to transport both lean and rich gas, and a highly secure process for offloading gas through offshore ports.

Using these special built vessels, our technology can transport natural gas and offload it through offshore buoy systems located up to twenty miles or more from population centers. These simple offshore gas ports will cost only a fraction of the cost of offshore LNG designs. The gas is then delivered using existing or new subsea gas transport infrastructure. Our recently patented CNG technology has the ability to transport as much as 2 billion cubic feet of gas per ship to markets up to 4000 miles away at substantially lower cost than other gas transportation alternatives across a wide range of applications.

In a recent natural gas hearing, Federal Reserve Board Chairman Alan Greenspan brought up the need to expand our ability to import natural gas to the U.S. He said, "A growing, disperse global natural gas marketplace as the best means to sustain the U.S. standard of living without exposing consumers to instability. EnerSea's system provides unprecedented flexibility and risk management capabilities to accommodate expanding production volumes and developing markets a value to consumers, producers and nations worldwide. We anticipate that CNG could provide up to 2 billion cubic feet of gas per day, or more, by 2014. EnerSea Transport believes this is an exciting opportunity to help meet our goals of energy independence.

To help meet increasing natural gas demand in the U.S., we are working to apply our CNG technology to stranded natural gas reserves in North and South America—specifically in places such as East Coast Canada, ultra-deepwater Gulf of Mexico, Alaska, Venezuela, Colombia and the Caribbean. Today, up to 80% of the natural gas fields worldwide are stranded and have yet to be developed—potentially a tremendous resource of clean energy.

As you are aware, these large gas reserves have been stranded because they are uneconomic to pursue due to technical, geographic or geopolitical constraints. Through EnerSea's technological innovation, VOTRANS™ will reduce the need for field processing facilities. The scalability of the VOTRANS™ technology also allows for phased development opportunities to match prospective fields with market demand centers. This provides the ability to pursue smaller and more remote gas reserves. In addition, fields can typically be brought on stream much earlier compared to more capital-intensive alternatives. CNG can also be seen as an enabling tool for helping develop large-scale LNG projects on a more timely and risk managed basis.

EnerSea has undertaken several key activities to date. EnerSea Canada was established to bring forward the development of Atlantic Canada offshore gas, specifically in the Grand Banks Region off the coast of Newfoundland, to supply Northeast U.S. markets. In this application, CNG is considered as the only viable means for

developing gas resources. To that end, we are helping to establish the world's first CNG Center of Excellence to promote and coordinate the participation of government, academia, the exploration and production industry and offshore service companies in the advancement of this emerging CNG industry for worldwide applications.

In continuing our efforts to employ our innovative CNG technology and execute world-scale projects, we have created partnerships with several key stakeholders. We have formed alliances with Hyundai Heavy Industries, the world's largest shipbuilder, and "K –Line, a leading LNG ship owner and operator. Both entities have been working with us to develop and commercialize the technology to provide highly qualified gas ship operations experience. In, addition EnerSea has been working with the American Bureau of Shipping (ABS) to achieve Class Approval in Principle of its designs, which was achieved in April of this year. EnerSea has also been engaged in a continuing dialogue with the U.S. Coast Guard to discuss the regulatory process for offloading natural gas onto offshore ports. And, we have contributed to the National Petroleum Council's ongoing Natural Gas Study by providing an industry perspective on the anticipated contributions of new CNG imports to the U.S. gas supply.

In addition, we have been working with all the major producers to educate them on the benefits of CNG and specifically the application of EnerSea's new CNG technology and services. Given these advances, we strongly believe that CNG is a viable option in the portfolio of technologies that will be needed to meet increasing natural gas demand. And, we are not alone in this belief. As you know Congress passed, and President Bush signed into law the Maritime Transportation Security Act of 2002 that expanded the Deepwater Ports Act to create a regulatory framework for permitting the safe and secure transport and delivery of natural gas in a compressed or liquefied form to offshore terminals in the United States. Given this, our plan is to have completed transportation agreements in 2004 with gas delivery services to follow within 30–36 months.

Our nation's growing appetite for natural gas is a great opportunity as well as a challenge. All options must be considered for meeting that demand. EnerSea's CNG technology is a safe, viable and cost-effective option. When shaping the regulatory framework for the future, I encourage policymakers, industry planners and decision makers to be certain to include the application of CNG technologies for delivering currently stranded natural gas to market.

Thank you for this opportunity to inform the Committee of the advances that our company is making and the promise of CNG transport for meeting our nation's growing demand for natural gas.

Mrs. CUBIN. Now I would like to introduce our first panel. Dr. Michelle Foss is the Director of the Energy Institute, the University of Houston, College of Business Administration; Mr. Steve Brown, Director of Energy Economics, Federal Reserve of Dallas, Texas; and Ed Kelly, North American Gas & Power Consulting, Wood Mackenzie Global Consultants. So I would invite Dr. Foss to begin her testimony.

STATEMENT OF DR. MICHELLE MICHOT FOSS, EXECUTIVE DIRECTOR, INSTITUTE FOR ENERGY, LAW & ENTERPRISE, UNIVERSITY OF HOUSTON LAW CENTER

Dr. FOSS. Thank you. Thank you for the invitation. For the record, I do need to correct my affiliation, if you don't mind. I am executive director of the Institute for Energy Law and Enterprise which is part of the Law Center now. We were in the College of Business. We were acquired by the lawyers in a rather exciting example of merger and acquisition activity in higher education. I also would like to—

Mrs. CUBIN. I am sorry, could I just—I am sorry, I need to interrupt you for a moment. The Chairman has instituted a policy that I wasn't used to doing last year, and that is swearing all the

witnesses in, and I think you were all notified that would happen, and so if you wouldn't mind standing and raising your right hand.

[Witnesses sworn.]

Mrs. CUBIN. Thank you. I knew it would be. Now please go ahead with the unfriendly takeover.

[Laughter.]

Dr. FOSS. All right. Thank you. It is a pleasure to be here and be able to present testimony to this Subcommittee on this very important topic. I do want to just mention a few highlights from the testimony I have submitted for consideration this morning. One is we do have a situation of a tight supply/demand balance in natural gas markets at the moment. We have had two recent price spike events, one in 2001 and one this year. These events occurred under completely different circumstances with regard to economic activity in the United States, weather conditions and so on. And looked at in that regard, it is clear that we have a different set of fundamentals today than we have had in recent years. These fundamentals have been a long time in coming, but they have been evident.

One of the points I would like to emphasize is that since 1992 we have actually had three distinct price cycles for natural gas. The price floor for each of those cycles has been higher than the previous price floor, with the price floor this year being the highest one of all. And when you look at the natural gas market this way, that is probably the clearest indication that things have changed and that circumstances are different.

Now, I think there are some reasons for why this has happened. One is a bit of a rebound from the gas bubble that we had in the 1990's and a bit of complacency in the United States with regard to available supplies, deliverable natural gas supplies and the amount of effort that it would take to deliver that and then the prices that we could expect to pay. And I think the second major reason is a function of investment in the upstream businesses, which, of course, have to adjust to changing business conditions and changing market conditions.

There are lots of drivers for expiration and production activity in the United States, not only expectations about natural gas prices but expectations for oil prices because a lot of our natural gas is produced with oil, and so even though we are in a time right now where crude oil and natural gas prices are not as closely correlated as they often are, it is very important to recognize that E&P activity is driven by both commodity markets. The second major factor is the maturity of our natural gas base in terms of our established fields, which means that there is an increased amount of pressure to find new resources and deliver those resources into the marketplace.

I want to also support the remark that was made with regard to self-correcting mechanisms because there is a lot of that going on at the moment. Gas drilling activity is on the rise, rig activity is higher. That will mean new supplies coming into the marketplace. We are having demand-side responses. Conservation and efficiency are important. It is important to let the market adjust in response to higher prices. This is uncomfortable for everyone. There is a phrase that we like at our institute: The political reality of volatility when it comes to natural gas prices, it is challenging for

everyone to deal with higher prices, but in fact this is the best correcting mechanism that we can have in open, competitive markets.

Most of the impact on prices has been felt in the industrial sector. One of the things I want to emphasize is the importance of funding and procuring timely transparent data and information on natural gas markets. I want to point out that if you look at the available data today from the U.S. Energy Information Administration on consumption and demand activity, you will find that the most recent annual data on consumption is for 2001, and we know that 2002 is going to represent an additional decline in terms of natural gas use in the industrial sector.

We are using natural gas for electric power generation. We do believe that there are price impacts that are affecting gas-fired power generation, but the data are very conflicted on this point, and, again, it is essential that we understand what is happening in the marketplace and that transparent, timely information are available to all customers and developers of this important resource.

I am an optimist in terms of the ability to deliver additional supplies into the marketplace. We have an abundant resource, both in the United States and worldwide. The scarce resources are time, talent, money. Capital availability for E&P is very constrained right now, partly because of the decline of the energy merchants who were providing a great deal of lending into the sector through both equity and mezzanine financing structures.

And I just want to close with a couple of remarks on LNG. We do have an LNG consortium that we have established at the University of Houston to look at safety and public education issues. This is a very broad-based consortium that includes industry and government representatives. The Department of Energy and the U.S. Coast Guard are participating in this. The goal is to be able to educate the public on the safe use of LNG and the importance of developing LNG facilities. We do think that LNG can be a safe alternative to supplement domestic resources, and we think that in fact we should explore all alternatives for the safe and wise use of natural gas. Thank you.

[The prepared statement of Dr. Foss follows:]

Statement of Dr. Michelle Michot Foss, Executive Director, Institute for Energy, Law & Enterprise, University of Houston Law Center

Members of the Subcommittee, I am Dr. Michelle Michot Foss, Executive Director of the Institute for Energy, Law & Enterprise and an Assistant Research Professor at the University of Houston. I am also current president of the International Association for Energy Economics (and past president of the U.S. Association). I have worked on natural gas industry, policy, and regulatory issues for about 20 years. I come at the invitation of the Subcommittee to provide input on the current and future prospects for natural gas in the U.S. and to comment on various policy and other issues that affect, and are affected by, this important natural resource. I come as an individual citizen, professional, and expert, and do not represent the viewpoints of any particular organization or institution.

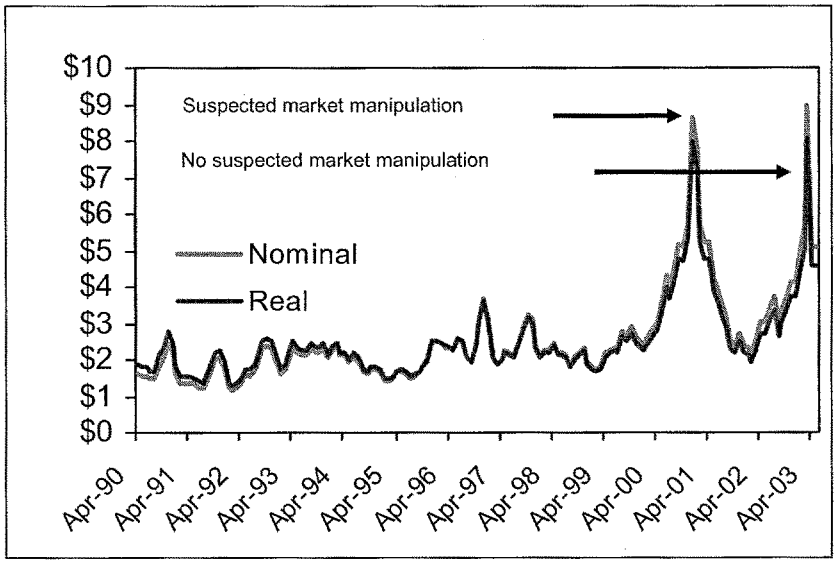
This Subcommittee and Hearing are concerned with the potential crisis stemming from the natural gas supply shortage which has brought about a doubling in the cost of natural gas in the last year alone. Focusing on domestic economic implications, from price fluctuations to national security, the hearing will analyze the factors that have restricted domestic natural gas production in a time when we need it most.

My testimony deals with several aspects of the situation for natural gas at the present time, as well prospects for the future and key policy considerations.

HISTORICAL PERSPECTIVE ON THE NATURAL GAS SUPPLY–DEMAND BALANCE

Natural gas supply, demand, and price today are a reflection of both past and present conditions in the industry and U.S. energy marketplace, as well as in the macro setting for natural gas—the U.S. economy and weather patterns (to which natural gas use is quite sensitive). Figure 1 below illustrates that since April 1999, the U.S. has experienced two sharp price spikes for natural gas. The first occurred during a period of strong economic growth and turmoil in energy markets in the western states. (The spot price for natural gas, essentially the "near month" of the Henry Hub contract, does not incorporate basis differentials for other locations, such as the disputed California border.) The second price spike occurred this past winter of 2003, during a period of slow economic growth and relatively calm energy market conditions (notably, following the demise of many large energy trading operations), but also with harsh weather conditions that supported a more "normal" winter heating season. Comparison of these price spike events, characterized by quite different conditions with regard to demand factors (U.S. economic activity and weather patterns) suggests that natural gas market fundamentals may have shifted significantly relative to recent history. Figure 1. Natural Gas Spot Prices Source: New York Mercantile Exchange (NYMEX)

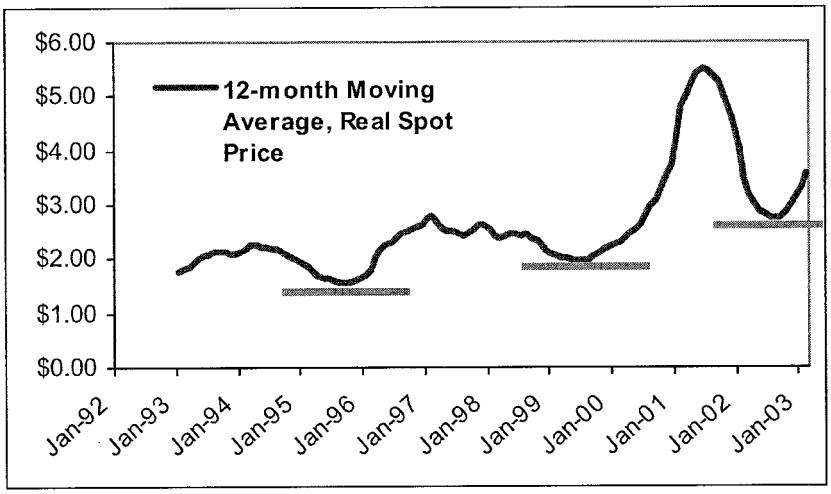
Figure 1. Natural Gas Spot Prices



Source: New York Mercantile Exchange (NYMEX)

The evidence for changing fundamentals is further supported if spot price data is smoothed using a 12-month moving average (MA), as shown in Figure 2 below. Smoothed data indicate that the trough of each price cycle since 1992 has edged upward, most strongly during 2003. That is, each price floor is higher than the floor of the preceding price cycle. Thus, even during relatively quiet periods with respect to natural gas demand (outside of winter heating, summer peak electric power generation, and summer storage refill), natural gas prices have been on an upward trend.

Figure 2. Natural Gas Spot Prices, Smoothed

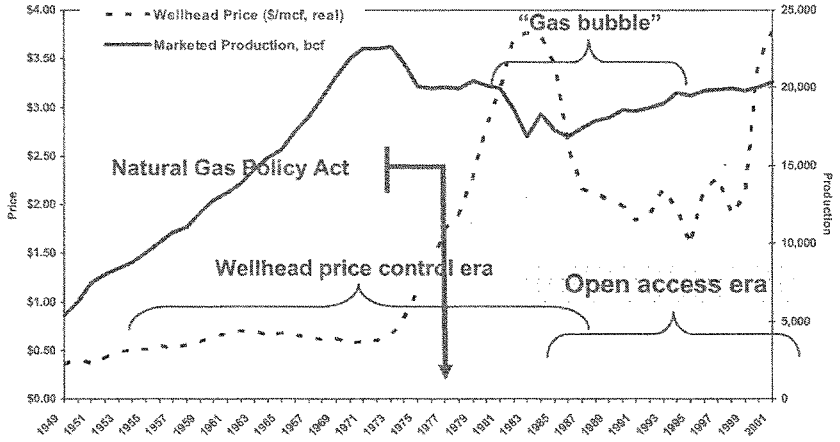


Source: NYMEX

Price data demonstrate that the U.S. is experiencing supply-demand tightness, and that this tightness could persist. Several factors are worth considering which both support a more bullish outlook on prices (from the producer perspective) but which also could dampen prices and contribute to surplus deliverability in the years ahead.

- Current high prices might reflect a "re-bound" from the prolonged effect of the "gas bubble." Figure 3 below highlights some key historical events for the natural gas industry. The gas bubble (or "sausage" as it came to be called) was a major driver for consolidation in the exploration and production segment for both operating and service companies. Surplus deliverability and low prices discouraged investment. Drilling activity languished. Introduction of open access helped to reduce the surplus deliverability, as did the expansion of gas-fired electric power generation capacity (encouraged by low natural gas prices). However, it is worth considering two things.
  1. The rapid build up of production deliverability during the 1970s and the surge in wellhead prices as pent-up demand was expressed in the marketplace and wellhead decontrol unfolded may have lulled the industry and customers into complacency with regard to availability of supplies and associated prices.
  2. The problem of complacency may be especially true because business conditions while the bubble/sausage was in effect were terrible. During the slump in wellhead prices, the Gulf of Mexico became known as the "Dead Sea" as rigs were pulled out of service for use elsewhere. It is quite likely that the constraints on natural gas supply today and through at least the mid-term are a result of inadequate investment upstream from the mid–1980s through the late 1990s.

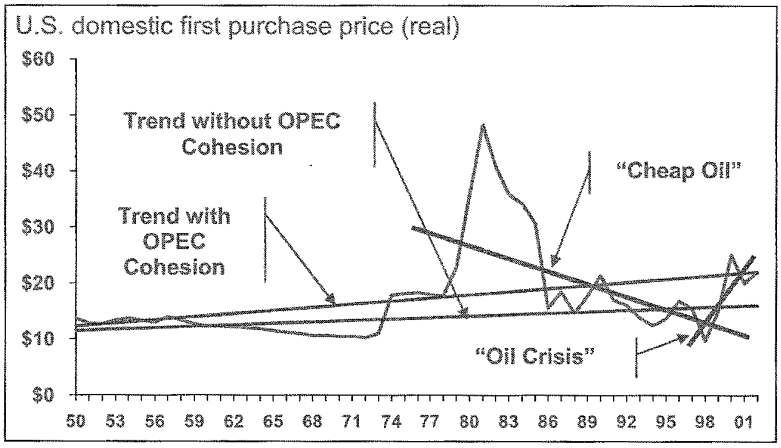
Figure 3. Long Term Wellhead Prices for Natural Gas and Production



Source: U.S. Energy Information Administration (U.S. EIA)

- E&P for natural gas is driven not only by expectations for natural gas prices, but also by oil prices, because natural gas is often associated with crude oil and therefore produced simultaneously, and also because natural gas competes with oil at the "burnertip." Many customers, such as industrial facilities and power generators, can switch between fuel oil and natural gas to take advantage of more favorable pricing on a Btu basis (British thermal unit, used to equate energy content of different fuels). Oil is a fungible, global commodity that has its own supply-demand interactions. The Organization of Petroleum Exporting Countries (OPEC) has a large impact on both current and expected future prices of oil, and therefore indirectly on natural gas prices in the U.S. As shown in Figure 4 below, when OPEC decision making is cohesive (i.e., there is little disagreement among members), the long term oil price trend is slightly higher. Natural gas prices tend to be higher during periods of oil price firmness. OPEC decision making is opaque, adding an element of uncertainty to expected oil prices and thus impacting drilling decisions and, indirectly, natural gas production. In addition, there are two, strong, competing viewpoints with regard to oil prices that have great consequences for natural gas: are we in an era of "cheap oil" in which there is always sufficient supply, in response to demand and price signals, to mitigate upward pressure on prices? Or, are we in an "oil crisis" in which demand growth in regions like Asia, capacity constraints in the Persian Gulf petroleum "breadbasket," conflict and political risk in key oil producing regions (Middle East and West Africa for instance), and uncertainty about non–OPEC production capacity and potential all combine to keep oil prices high? Both of these competing viewpoints bear important consequences for natural gas supply and pricing. Finally, the collapse and prolonged slump in oil prices from the mid–1980s until the most recent high price cycle aggravated (indeed, caused) E&P industry consolidation and hindered investment.

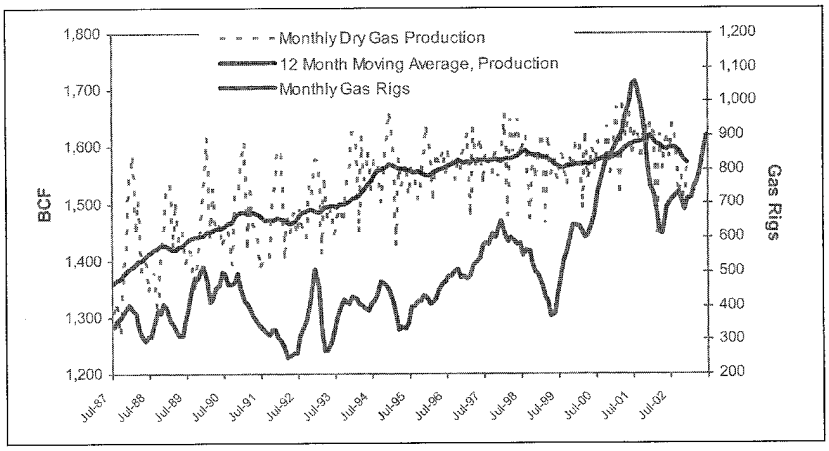
Figure 4. Long Term Oil Prices (Wellhead)



Source: U.S. EIA

- The U.S. is experiencing both depletion and steep decline curves in established fields, and also lower rates of productivity in new gas wells. Figure 5 below shows the E&P industry challenge. Given the maturity of U.S. basins, it is essential that gas drilling be maintained at a sufficient level to ensure deliverability. A central question is whether new drilling will yield gas production at rates equivalent to historical patterns. Indications are that well productivity onshore may not reflect past rates of production. The industry is also on a well known "treadmill" in which new drilling and production barely offsets natural depletion and declines (especially true for "fast gas" reservoirs, such as the shallow water, continental shelf of the U.S. Gulf of Mexico). A mitigating factor is deep water production—as sustained production flows are established, deep water plays will make a more substantial contribution to the U.S. supply base. However, importantly, upwards of 75 percent of domestic production comes from onshore fields (see comments on U.S. Gulf of Mexico resources below). Onshore, critical components of the resource base include non-conventional reservoirs (coal seams and tight sands and shales) that present unique risks and costs.

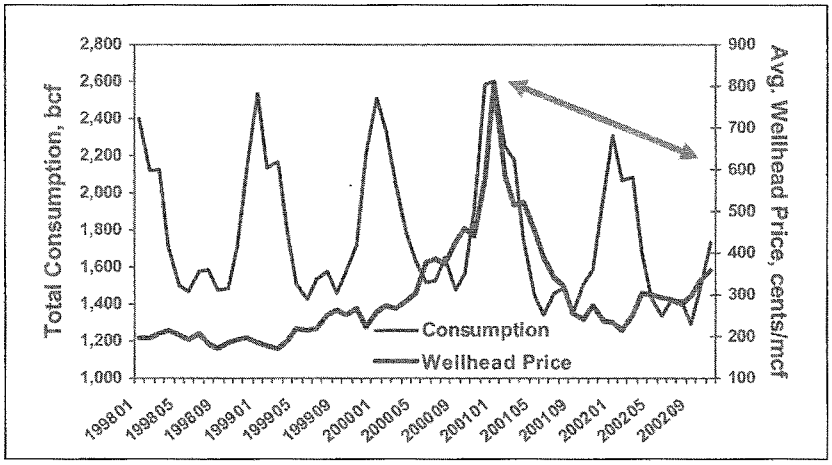
Figure 5. Natural Gas Resource Development



Sources: U.S. EIA and Baker Hughes

- Offsetting tension on the supply side are adjustments on the demand side. In any open, competitive market, consumers will adjust their demand for a good according to price (and their willingness to pay, subject to other factors like income, elasticity of demand, and so on). This is a normal, logical reaction and one that suppliers must deal with. To the extent that demand adjustments reflect more efficient use of a scarce resource like natural gas, we will be better off in the long run. Conservation and efficiency have important roles to play in the U.S. energy sector, and the best encouragement is via price signals. Figure 6 below illustrates the process of demand adjustment that has been taking place since the winter 2000- 2001 peak in natural gas consumption.

Figure 6. Demand Destruction for Natural Gas is Real

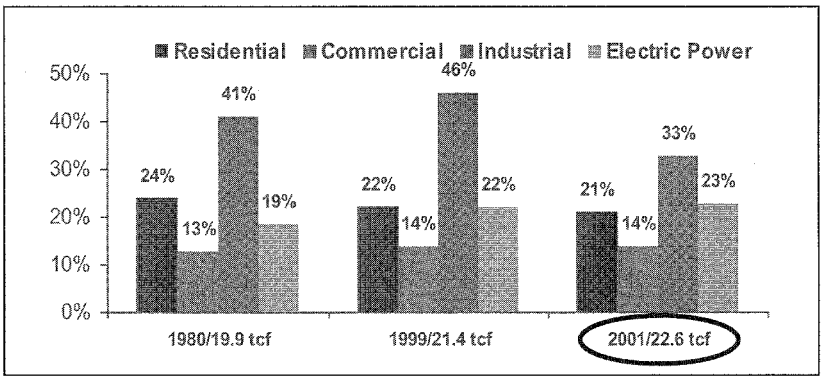


Source: U.S. EIA

- However, a certain amount of demand loss represents lost economic activity and capacity for the nation. It appears that most of the demand destruction taking place is in the industrial sector (Figure 7 below). Natural gas serves as feedstock for petrochemical applications—from which come all of the essential

materials we use in everyday life. Natural gas is also an important fuel for manufacturing and industries like steel are affected. Note that the most recent data available for natural gas consumption is 2001. Expectations are that 2002 data will indicate an even sharper decline in natural gas use for the industrial sector. Figure 7. Natural Gas Consumption by Sector

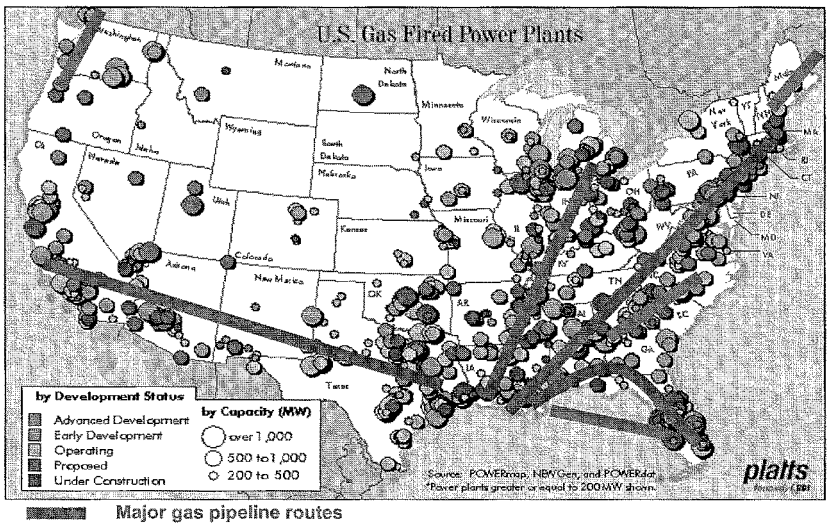
Figure 7. Natural Gas Consumption by Sector



Source: U.S. EIA

- Natural gas use for electric power generation has increased dramatically since the 1980s. This is a result of advances in natural gas turbine technologies as well as policy incentives through termination of prohibitions on natural gas use and creation of competitive wholesale markets for electric power (1993 Energy Policy Act). Projections of demand for electric power have been key to natural gas resource development. Most new gas-fired power generation is developed along major gas pipeline routes, as shown in Figure 8 below.

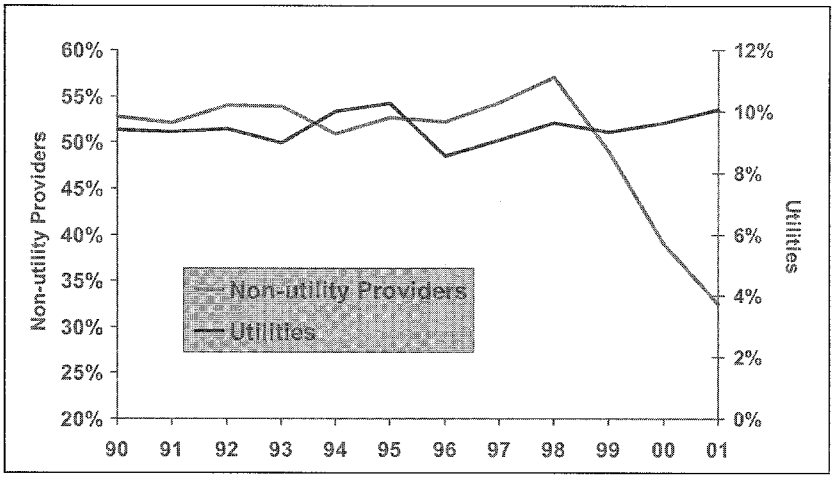
Figure 8. U.S. Gas Fired Power Plants and Major Pipeline Routes



Sources: Platts, UH IELE

- The impact of higher natural gas prices on electric power generation is controversial. Data on gas-fired power generation are not clear. At least one information source (Figure 9 below) suggests a sharp impact on gas-fired generation in the higher price environment. An important consideration for policy decisions is quality, reliability, and timeliness of information on the electric power component of the natural gas value chain. Major gas pipeline routes

Figure 9. Natural Gas Generation as A Percent of Total Net Generation



Source: BP 2002 Statistical Review

In summary, the picture for natural gas seems to be the following.

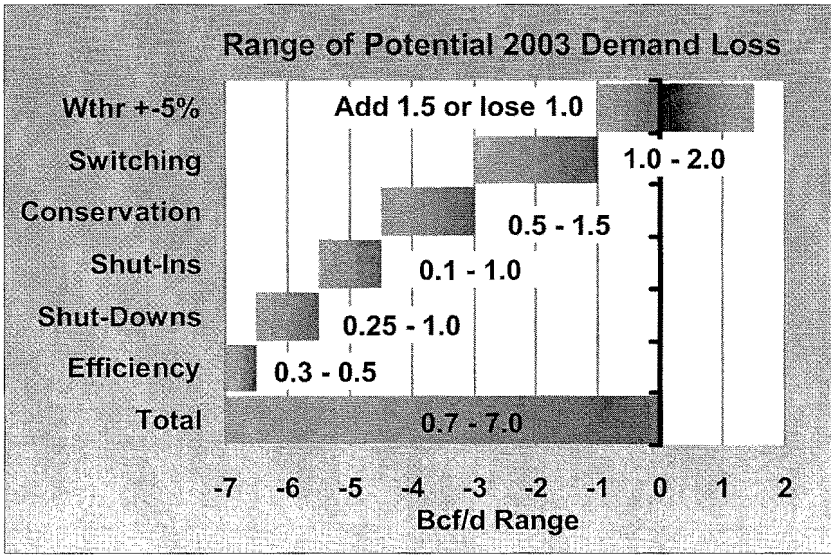
- Supply constraints exist, a function of age of producing fields and natural depletion and decline, the types of new reservoirs coming on stream, and constrained investment in the E&P sector (a result of both historical factors, including consolidation in the E&P segment, as well as more recent business turmoil among energy merchants).
- Demand destruction is a real and logical consequence of supply tightness and associated higher prices. Conservation and efficiency have important roles to play, but a considerable amount of demand destruction represents lost economic activity.
- Exogenous factors such as dynamics in the global oil market play a role.
- The current tight balance between supply and demand and resulting higher prices has been evolving for some time, but complacency hindered recognition of these dynamics.
- If economic recovery takes hold and normal or near normal winter weather patterns remain in effect, and if oil prices remain firm, upward pressure on natural gas prices could exist for some time.

ECONOMIC DEVELOPMENT CONSIDERATIONS OF HIGHER PRICES

As Figure 10 below illustrates, the range of potential demand loss for natural gas is 0.7 to 7.0 billion cubic feet per day (bcf/d). A number of variables will dictate the ultimate outcome. This range is an indication of the economic consequences of natural gas prices. Shut-ins, shut-downs, and switching reflect decisions mainly by industrial users about their fuel supply mix given relative fuel prices. Conservation and weather related impacts represent a new dynamic—that of price induced adjustments among residential and small commercial customers. Based on anecdotal information from large utilities, these adjustments are expected to be permanent. Energy efficiency programs by industrial and large commercial users are also expected to be permanent. Should prices drop substantially as supply-demand interactions balance the market, demand recovery would create new pressures on supply. Importantly, it is possible that a new market equilibrium will be reached far below previously expected levels of total annual consumption for the U.S., lending support to

the conclusion that a 30 trillion cubic feet (tcf) market will be achieved only if it can be supplied at a reasonable cost and price.

Figure 10. Extent of Demand Destruction (and Possible Recovery)

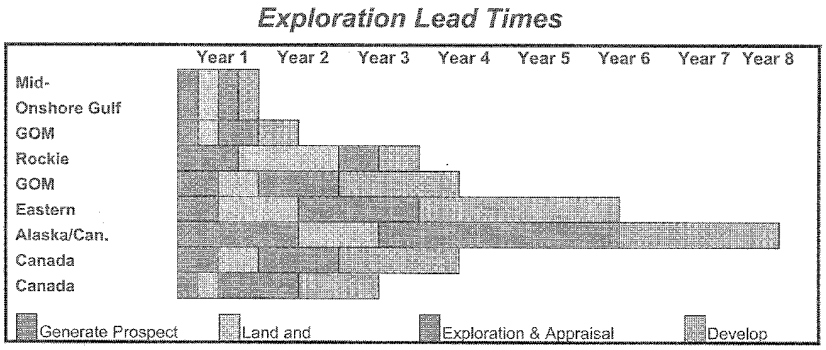


Source: Anadarko Petroleum Company

CONSIDERATIONS FOR THE DOMESTIC RESOURCE BASE

Important variables for the domestic resource base are capital availability and access to new reservoirs. With regard to capital outlays, E&P projects require lead times, some of which are lengthy (see Figure 11 below). The E&P industry has responded to sharp price cycles and price volatility for oil and gas by consolidating, reducing costs (including new technology applications and improved asset management practices), and employing risk management. A common form of risk management is a "natural hedge" in which capital budgets are reduced when prices are not favorable for E&P investment and targeted returns. This means constant pressure on E&P projects to compete with other opportunities. These are long term trends that have been in place since the oil and natural gas market disruptions of the 1970s. A new, critical variable is the loss of capital provided by energy merchants.

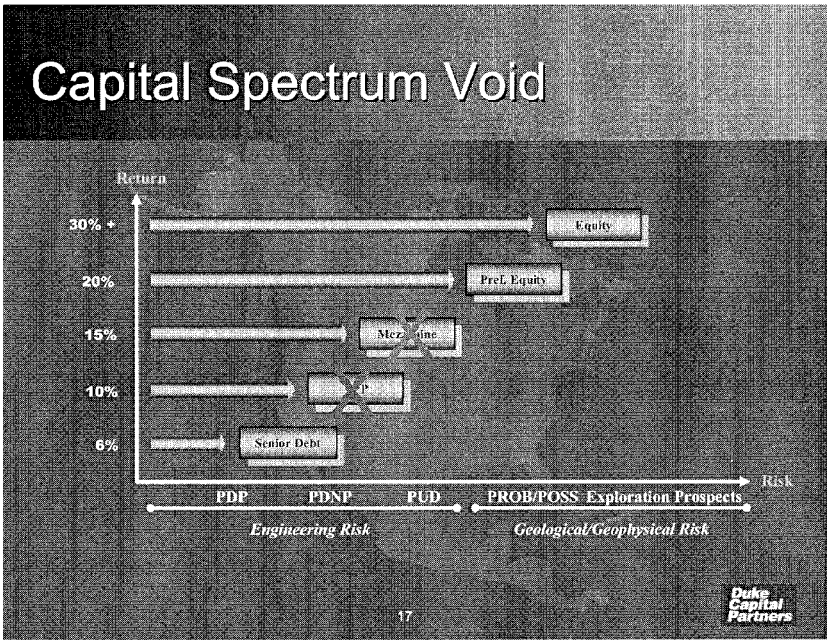
Figure 11. E&P Capital and Typical Lead Times



Source: Anadarko Petroleum Corp.

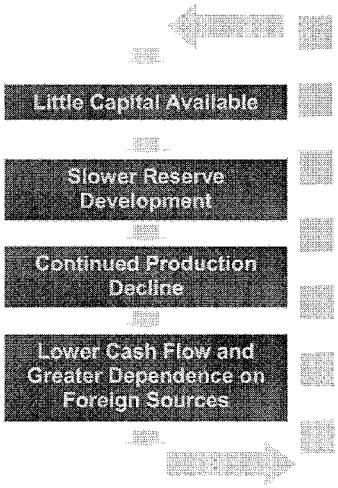
Energy merchants are the unregulated affiliates of pipelines and utilities that have been driving energy trading and risk management in the restructured U.S. (and Canadian) natural gas markets. Most of these enterprises established producer finance programs in order to diversify into upstream positions and to stimulate development of natural gas supplies in the U.S. Senior debt from commercial banks is most easily accessed for proved developed production (PDP). Producer finance played a key role for higher risk investments—proved developed but nonproducing (PDNP), proved but undeveloped (PDP), to some extent, the highest risk category of probable and possible exploration projects. Capital expenditures by energy merchants for volumetric production payments (VPP) and mezzanine lending have been removed from the producer capital marketplace as energy merchants responded to post–Enron credit downgrades, lost liquidity for trading and risk management, and focused efforts to restore profitability, improve balance sheets, and achieve recovery in credit ratings and share valuations. Companies that have exited or reduced their presence in the producer finance marketplace include El Paso, Mirant (Southern Companies), Aquila (Utilicorp), Enron, of course, Shell (for reasons other than the energy merchant collapse), and Duke Energy Capital Partners (which provided the information in Figure 12 and Figure 13). While private equity has stepped into the void, it is difficult for equity providers to leverage returns, limiting activity. One conclusion to be drawn is that with inadequate capital flows into E&P projects, the U.S. will face higher imports of both oil and natural gas (in the form of liquefied natural gas or LNG).

Figure 12. The State of Producer Finance



Source: Duke Capital Partners

Figure 13. Impact of Capital Constraints on U.S. Energy Supplies



- Oil - Foreign sources pick up slack, politically unstable.
- Gas - Higher prices = more LNG and other imports.

Source: Duke Capital Partners

ROLE OF FEDERAL LANDS AND MANAGEMENT OF THOSE LANDS

Because the U.S. still relies heavily on onshore fields for our natural gas supplies, Federal lands access and associated management issues are worth consideration. Significant problems exist with respect to data quality and availability associated with potential oil and gas leasing. The following case study illustrates a typical situation.

A Texas independent researches an area and determines it is a good place for new oil and gas leasing. He orders maps showing U.S. Forest Service lands administered by the Bureau of Land Management for oil and gas leasing. The maps do not show any restrictions for leasing. He determines that significant U.S. Forest Service acreage is prospective and nominates it for an upcoming oil and gas lease sale (oral auction).

During the next nine (9) months the acreage nominated for oil and gas leasing is reviewed by the U.S. Forest Service and all of the nominated acreage appears in an announcement for an upcoming sale.

The announcement comes out about six (6) weeks prior to the sale. On the lease announcement is mentioned several types of stipulations that would affect the development of oil and gas on the acreage. There is no indication of the significance of the stipulations (no maps, no geographic descriptions), but contact information is provided for the independent to make inquiry to the Forest Service regarding the degree to which development would be impacted by the restrictions.

The independent contacts the local forestry expert who describes the extent of a bird habitat that will affect 50–85 percent of the area. The "No Surface Occupancy" basically condemns the area for oil and gas leasing. The independent drops plans for the area and moves on to areas where minerals are in private hands.

The point of this story is that if the independent had been able to make an early assessment of the extent of "No Surface Occupancy" the acreage probably would have not been nominated in the first place, saving both the Forest Service–BLM and the independent time and money.

POLICY INITIATIVES FOR CONSIDERATION TO ENHANCE ONSHORE E&P

Tax Credits on Low Deliverability, Long Lived Unconventional Gas Resources/Reserves

- The maturity of the U.S. gas supply has been documented many places. Charts of decreasing well life and reserves per well are frequently shown. Most of this data deals with conventional gas supply that has been developed over the past 60-plus years since the construction of major interstate pipelines in the 1940's.
- Unconventional gas production from reservoirs such as coal seams (termed coalbed methane—CBM—or coal seam natural gas), shale gas, and tight gas sands has been developed later and until recently more slowly than conventional gas. The reason for this was the low deliverability from wells producing from these resources. Better technology, higher gas prices, and pipeline infrastructure caused some of these resources to be developed such as tight gas sands in the San Juan Basin in the 1950's.
- However it was not until the late 70's and especially the late 80's to early 90's timeframe when new basins and new resources began to be developed. This was a time of relatively low gas prices (certainly compared to today), and the availability of tax credits associated with production caused new sources of capital to come into the industry to speed development of these resources and prove up technologies. Examples are the Antrim Shale in Michigan, CBM in the Black Warrior Basin and San Juan Basins, and tight gas sands in the Rocky Mountains, especially in the Piceance and Denver–Julesburg Basins. Over the decade of the 90's over 25 trillion cubic feet of gas in long lived, proved reserves were developed. Over that time frame gas unconventional gas production increase from near nil to almost 10 percent of U.S. production today—and the percentage is increasing.
- While it is true that tax credits may not be as critical to the development of these resources in times of high gas prices, other factors are worth consideration.
  - * First, not all of the country's producing areas have experienced high wellhead prices over the past year. Basis differentials between Henry Hub and the Rocky Mountains resulted in wellhead prices of less than $1.00/mcf in the Rockies. At this price it is uneconomic to drill new wells and in some cases produce from existing ones. Gas prices are high now, but just a little over two (2) years ago the Henry Hub price was below $2.00/mcf.

* Second, while conventional wells produce at maximum rate on the first day, unconventional wells typically do not reach peak production for months or years. This dampens rates of returns associated with unconventional reserve development making it a less attractive investment. Tax credits have historically helped the discounted cash flow economics on unconventional gas to make this resource attractive enough for investment to go forward. In fact, during times of high gas prices the industry, fearing that high prices will not be sustained, is actually reluctant to invest in unconventional gas and favor the higher returns associated with conventional gas.
* Third, some of the best unconventional gas resource basins have been discovered and are on production. The risk associated with finding new ones is considerable. Attracting capital to defray the risks is a key to adding new reserves. There is a significant step-up in risk associated with developing new basins and new reserves.

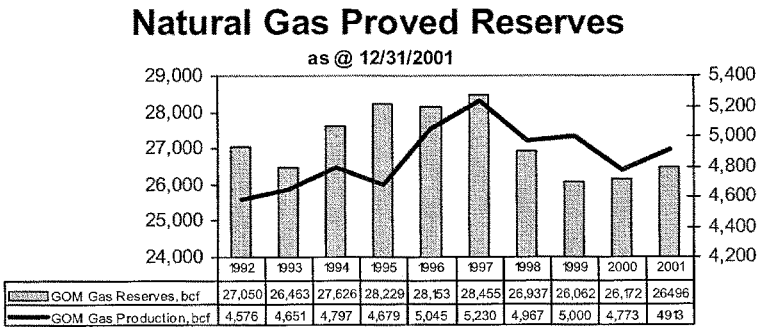
Tax credits which played an important role in the late 80's and early 90's could play a similar role again, done carefully and with attention to environmental protections.

ROLE OF OFFSHORE RESOURCES IN PARTICULAR AND MANAGEMENT OF THOSE RESOURCES

With respect to offshore natural gas resources, it is clear that the Gulf of Mexico remains a rich province, and that deep water exploration in particular offers good prospects for development.

Figure 14, Figure 15, and Figure 16 below shows the role of the U.S. GOM with respect to proved reserves and production in established areas, as well as the emerging role of deep water blocks. A critical issue for GOM supply deliverability is transportation, including new technologies (like compressed natural gas transport) to move gas from production location to onshore markets.

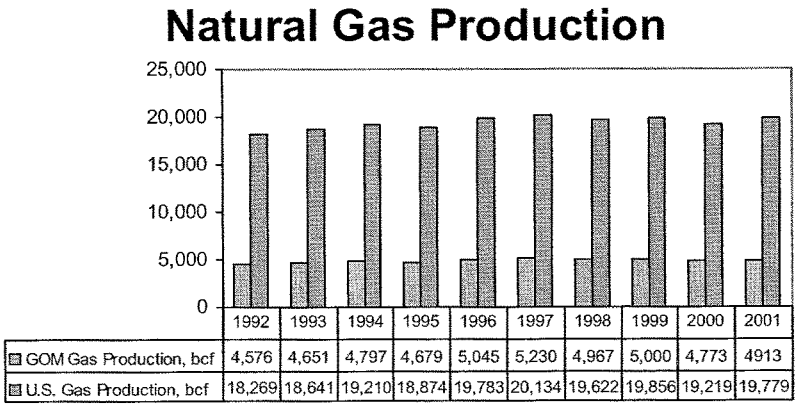
Figure 14. U.S. Gulf of Mexico Proved Reserves



Source: EIA

U.S. gas reserves increased 3% over 2000. 24% of the U.S. total discoveries in 2001 were in the GOM.

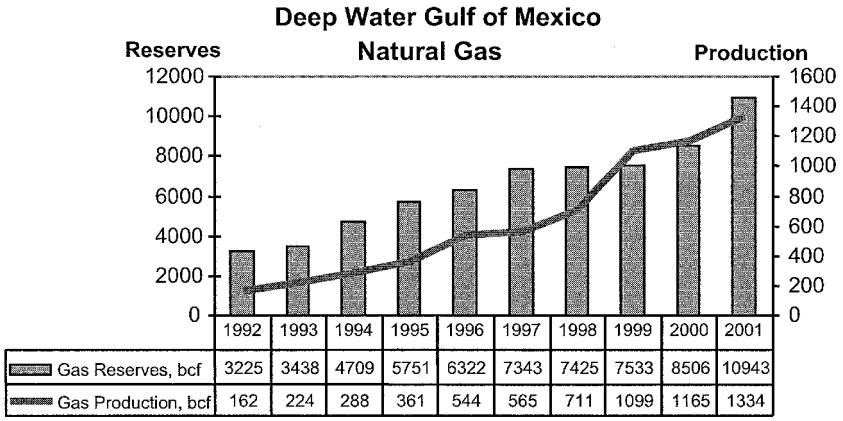
Figure 15. U.S. GOM Production



GOM produced 25% of U.S. dry gas in 2001.

Source: EIA

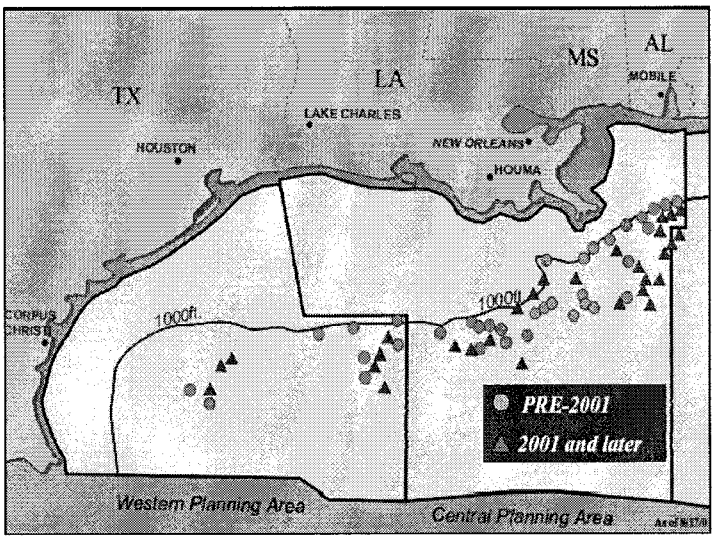
Figure 16. U.S. GOM Deep Water Potential



Source: U.S. EIA

The deep water areas represent considerably higher risks and new demands on technology and logistics. In spite of these constraints, the industry has achieved success and is now better able to move toward a lower cost structure for deep water exploitation.

Figure 17. Recent Successes in the U.S. GOM

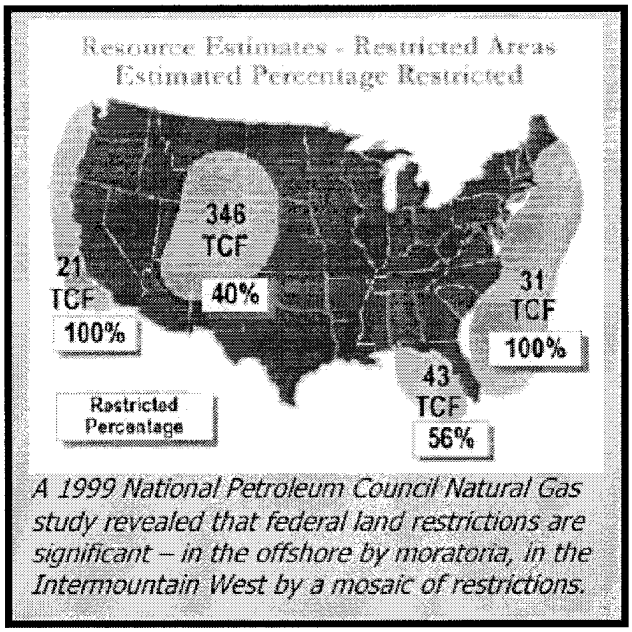


Source: U.S. Minerals Management Service

Success achieved thus far for the GOM deep water, and the ability for the industry to maintain operations in this demanding province overall, indicate that areas

currently blocked to access by moratoria deserve a second look. Figure 18 represents the most recent estimate of natural gas reserves that could be accessed both onshore and offshore with appropriate policy mechanisms, including environmental safety and protections.

Figure 18. Implications of Offshore Moratoria



Courtesy of Independent Petroleum Association of America

ROLE OF LNG

With constraints on capital and limits to access for drilling, LNG is a actively discussed option to meet U.S. natural gas supply requirements. Currently, LNG comprises only about one percent of U.S. natural gas consumption (Figure 19). The U.S. has a diversified supply base for LNG (see Figure 20 below). Of interest is that our LNG imports roughly offset natural gas exported to Mexico via pipeline.

Figure 19. Distribution of U.S. Gas Supplies

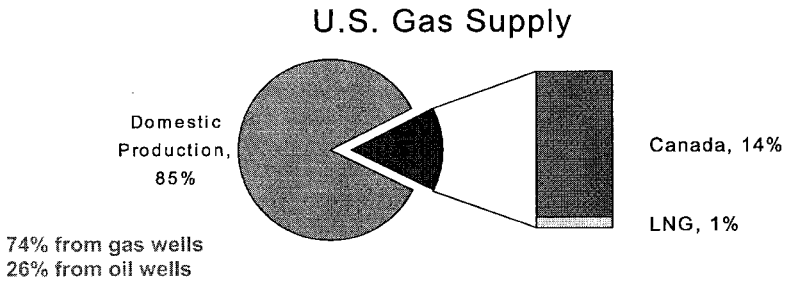
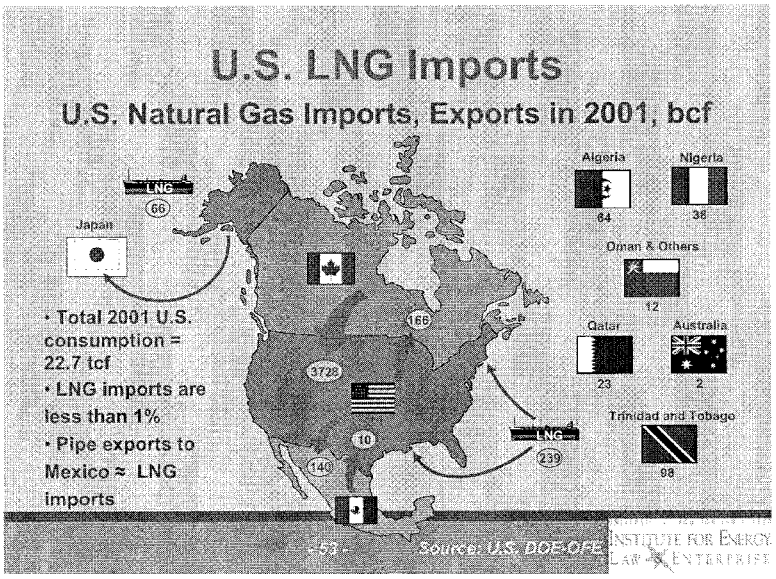
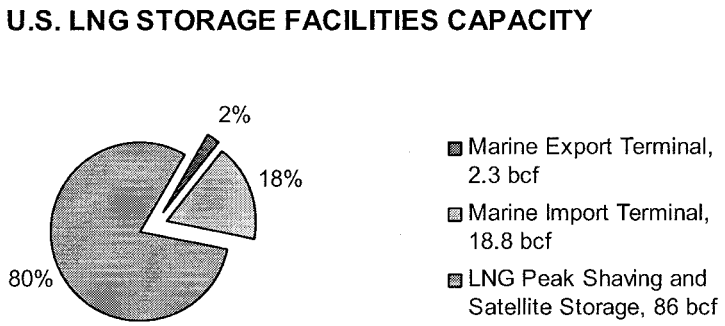


Figure 20. U.S. LMG Supply Sources



The U.S. also has the largest number of LNG facilities in the world, since much of the LNG we import is used for peak-shaving by utilitites.

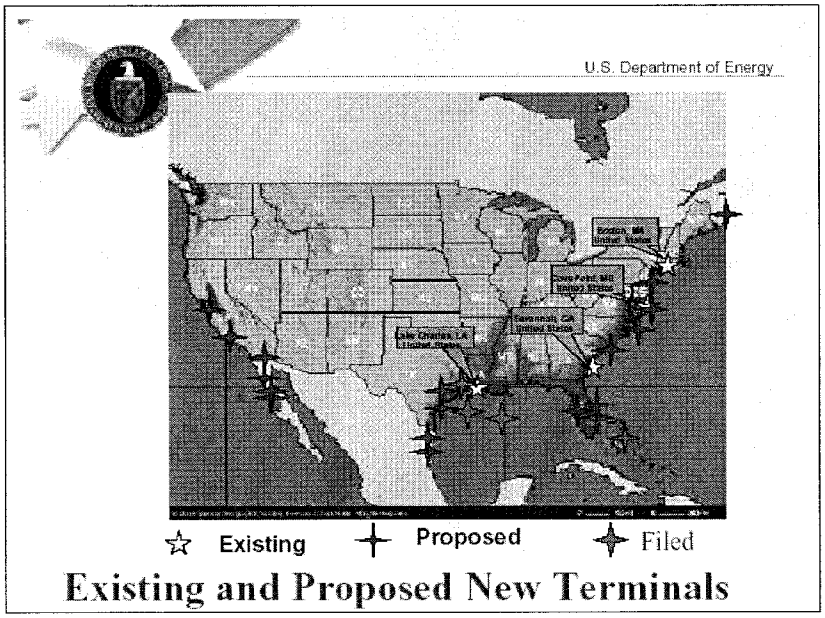
Figure 21. U.S. LNG Storage Facilities



Source: EIA

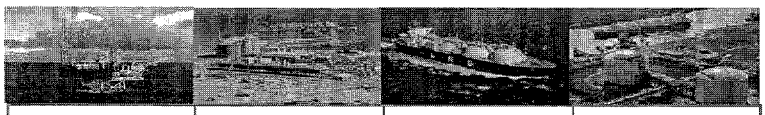
A number of new marine import terminals have been proposed to supplement our existing 19 bcf of capacity. Two essential questions for LNG are whether additional natural gas imports can enter the U.S. market on a cost and price competitive basis, and whether new LNG import facilities can be developed safely.

Figure 22. Existing and Proposed Import Terminals



On the question of cost and price, the LNG value chain represents substantial cost and risk to the industry. However, the costs estimates shown in Figure 23 are considerably less than when the LNG industry was launched roughly 40 years ago. Substantial savings have been achieved for both liquefaction and shipbuilding, and, importantly, the life spans of LNG tankers have been extended. The LNG value chain today encompasses significant technology improvements for both cost reductions and safety and environmental enhancements and protections.

Figure 23. The Current LNG Value Chain



EXPLORATION & PRODUCTION	LIQUEFACTION	SHIPPING	REGASIFICATION & STORAGE
$0.5-$1.0/MMBtu	$0.8-$1.20/MMBtu	$0.4-$1.0/MMBtu	$0.3-$0.5/MMBtu

The result of cost reductions across the LNG value chain is that, by U.S. Department of Energy estimates and based on industry reports, LNG cargos can enter the U.S. when Henry Hub prices are roughly $3.00 and provide sufficient returns on investment to support expansion of the industry. Indeed, LNG cargos were entering the U.S. market when Henry Hub prices were roughly $2.50, an indication of the tremendous progress made by the industry to manage its cost structure and build commercial expertise.

Figure 24. Natural Gas Prices, $/mmBtu (U.S. DOE – OFE)

	1998	1999	2000	2001
Canada	**$1.91**	**$2.18**	**$3.90**	**$4.36**
LNG Imports*	**$2.31 – $2.84**	**$2.15 – $2.69**	**$2.73 – $3.93**	**$3.29 – $5.00**
Domestic/Henry Hub**	**$2.08**	**$2.27**	**$4.32**	**$3.98**

* Includes both landed and tailgate prices; lower price is generally landed price

** Mean, daily spot prices

Regulations are designed to prevent incidents at LNG facilities from occurring and if they do occur, from human or other error, to protect the public from any impact. Generally, the commercial framework for LNG includes the following principles.

- Contain the product. This includes metallurgy for storage tanks; facilities design such as double hulled ships, the option to use full containment construction for land-based storage tanks, and so on.
- Prevent effects. This second layer of protections is designed to minimize spills and entails the deployment of gas detection systems, shut off valve systems and the like.
- Secondary containment. The third layer of protection applies to both ships and storage tanks (for example, dikes and berms surrounding tanks that can contain more than 100 percent of the product), with the objective of capturing product should a breach occur.
- Separation distances. Appropriate setbacks, operating distances for tankers, and overall siting requirements ensure protection for public areas that might be near LNG facilities. Dispersion models, thermal radiation zones, and other requirements are used to establish separation distances.

A comprehensive review of data and information reveals that:

- The LNG industry is not without incidents but it has maintained an enviable safety record over the last 40 years. Technological advances and regulatory oversight will ensure maintenance of that safety record going forward.
- The industry has continued to develop advanced technology and control systems to ensure safety and reliability.
- The experience of the LNG industry demonstrates that normal operating hazards are manageable, certainly so relative to other public risks and hazards.

Other critical considerations for LNG include the following.

- Public education is essential. An LNG consortium has been developed at the University of Houston to assist in this effort. The consortium includes industry, government, peer expertise in engineering and safety design, and outside peer review for environment and safety considerations. An overview briefing paper

is currently available, and a definitive briefing paper on safety should be in public distribution by mid-summer 2003. For information on the consortium, go to www.energy.uh.edu, LNG page.

- As the U.S. expands our imports of natural gas, our relationships with producing countries will become even more critical. The development of natural gas worldwide is not only beneficial to consuming countries, but also to producing ones. Development of LNG will help to reduce flaring. The LNG value chain will stimulate additional E&P investment for natural gas worldwide, and help to support development of domestic markets for natural gas, including gas-fired power generation, in producing and exporting countries. Training, education, and skills development in the international arena are essential to ensure safe, wise, and transparent development and utilization of the global natural gas resource base.

CONCLUSIONS

The natural gas industry and its customers are experiencing the price effects of a tight supplydemand balance. Our domestic resource base should be the first priority—it is our largest supply pool. LNG and other alternatives can be used to supplement our domestic base, and help to moderate high prices. Free and transparent markets, rational responses in conservation and efficient use, clear and timely data and information, access to locations for drilling, and safe development of LNG facilities can help to ensure our natural gas future.

Mrs. CUBIN. Thank you very much. And I would like to point out that timing lights are in front of you, so we would appreciate it if you could stay within that time. If you can't completely, that is fine, but your entire statement will be entered into the record.

So now I would like to ask Mr. Brown of the Federal Reserve in Dallas, Texas to begin his testimony.

STATEMENT OF STEVE BROWN, DIRECTOR, ENERGY ECONOMICS, FEDERAL RESERVE, DALLAS, TEXAS

Mr. BROWN. Thank you, Madam Chairman, members of the Subcommittee. It is my pleasure to be here today to talk about an important issue. Before I begin my remarks, I should point out that although my trip has been paid for by the Federal Reserve Bank of Dallas, that I am not an official spokesperson for the Federal Reserve Bank of Dallas or the Federal Reserve system. The remarks I will be giving are strictly my own.

Three things I am going to talk about today is why natural gas prices have risen, what the outlook is for natural gas prices and what the implications are for the U.S. economy. Sharply rising prices are always the consequence of demand expanding more than supply or supply contracting more than demand. Demand for natural gas is very seasonal, and inventories play an important role in balancing these markets. Swings in inventory are the key for understanding prices in the natural gas market.

During winter 2002-2003, rising oil prices, colder than normal winter weather and an economic recovery that is underway led to stronger than anticipated natural gas demand. At the same time, natural gas production fell below expectations. Inventories fell to 5-year lows and natural gas prices rose sharply. And the near-term outlook is such: While rising in 2002-2003, natural gas prices pulled away from their historical relationship with oil prices. Futures markets show that this—expectations of this continuing indefinitely, through the end of 2005 if you look at the Wall Street Journal, through 2009 if you look at data that is more difficult to find.

Inventories are being rebuilt but they are only keeping up with the normal seasonal growth, and inventories remain below the 5-year average for June. Drilling for natural gas is increasing but domestic production in imports are insufficient to rebuild inventories. Over the next few years, prospects for lower natural gas prices really depend upon luck: Colder than normal summer weather, warmer than normal winter weather or no outages of natural gas production in the Gulf of Mexico during the hurricane season.

Longer-term outlook, I am afraid, is a little bit more pessimistic. Natural gas demand, according to most forecasts, is going to grow more rapidly than demand for other fuels. Without adequate resource development and imports, high natural gas prices are likely to persist. Development may require greater access to public lands and will require new pipelines. Increased imports will require foreign resource development and increasing import facilities such as LNG at terminals. From some perspective, LNG terminals are only attractive at very high prices, so that is really not what I would consider an attractive alternative.

Developing domestic natural gas resources and expanding our ability to import natural gas raises environmental issues. Natural gas is an environmentally desirable source of fuel but additional development in imports may have environmental consequences. As for the economic consequences, sustained natural gas prices are a drag on the U.S. economy. They reduce GDP growth, boost real interest rates and increase measured inflation. Now, there is no peer-reviewed research on the impact of natural gas prices on economic activity, but a rough estimate adapted from the literature on looking at the impact of oil price shocks on the economy are that a doubling of natural gas prices, which is what we have seen, reduces real GDP by six-tenths to 2.1 percent below what it would otherwise be, and it would increase the GDP deflator by about the same amount. And if there weren't some anomalies in the CPI that have been discussed recently, we would probably have a little bit greater impact on the CPI.

The economic effects are particularly uneven across industries and regions with some major industries, such as the U.S. chemical industry being greatly impacted, aluminum producers and agriculture. Thank you very much.

[The prepared statement of Mr. Brown follows:]

Statement of Stephen P. A. Brown,* Director of Energy Economics and Microeconomic Policy Analysis, Federal Reserve Bank of Dallas

It is my distinct pleasure to be here today to address you on an important topic: the potential crisis stemming from a natural gas supply shortage which has more than doubled spot natural gas prices during the past year. In my comments, I will address why natural gas prices have risen sharply, the outlook for natural gas prices, and some of the implications for the U.S. economy.

Inventories: One Key to Understanding Natural Gas Prices

Sharply rising prices are always the consequence of demand expanding more than supply or supply contracting more than demand. In the case of natural gas, the analysis is complicated by strong seasonal patterns in consumption and a very mild seasonality in production. U.S. natural gas consumption is nearly double in January

*The views expressed are solely those of the author and do not necessarily represent those of the Federal Reserve Bank of Dallas or the Federal Reserve System.

what it is in May and June. Unusually cold winter weather or unusually warm summer weather can further accentuate seasonal patterns.

In a market with sharp swings in consumption, inventories play an important role. In an average year, natural gas consumption exceeds production and imports in November, December, January, February and March. During those months, both current production, imports and inventories are typically used to meet consumption. During the average year, inventories are built during the months of May, June, July, August, September and October, when natural gas production and imports typically exceed consumption.

Consequently, swings in inventories are one key to understanding movements in natural gas prices. When inventories fall below normal averages for a given month, natural gas is seen as relatively more scarce, and its price rises. When inventories rise above normal averages for a given month, natural gas is seen as relatively more plentiful, and its price falls.

Oil Prices: Another Factor in Natural Gas Prices

For some industries and electric utilities, natural gas and residual fuel oil (a petroleum product) are good substitutes. Although declining in number, these energy users are able to switch back and forth between these fuels quickly, depending upon which is cheaper. Rising oil prices push these energy users toward natural gas, and falling oil prices attracts them back to residual fuel oil. Consequently, economic research finds that oil and natural gas prices have tended to track each other over long periods of time.

Volatile Natural Gas Prices

In winter 2000–01, two factors contributed to sharply rising natural gas prices. In the West, there was a drought that reduced hydroelectric power. Other parts of the United States had colder than normal winter weather. Both contributed to a surge in natural gas demand. In many parts of the country, the additional natural gas was used to heat homes and businesses. In the West, it was used to generate electricity. The surge in natural gas demand led to a sharp reduction in natural gas inventories, and its price rose sharply—with the spot price averaging more than $8.50 per million Btu in January 2001.

In subsequent months, natural gas production was increased, mild weather and weakening economic activity contributed to falling natural gas demand, and inventories were swiftly rebuilt. By December 2001, inventories were at a five-year high.[1] The spot price of natural gas was just over $2 per million Btu. Throughout 2002, inventories varied seasonally but remained at the high end of their five-year average.

During 2002, oil prices began to rise. Oil production was disrupted in Venezuela. Tension in the Middle East began to escalate. Rising oil prices prompted some electric utilities and industrial energy users to switch from residual fuel oil to natural gas, which boosted natural gas consumption and pushed natural gas prices upward—even though natural gas inventories remained very high.[2]

During winter 2002–03, continued increases in oil prices, colder than normal weather and a recovering economy contributed to stronger than anticipated gains in natural gas demand. At about the same time, natural gas production slipped below expectations. Natural gas fields that were made economically feasible with newer technology proved to have sharper decline rates than had been expected. Although we had approached winter with high natural gas inventories, they were used quickly and fell to five-year lows by March 2003. Natural gas prices rose sharply.

The Near–Term Outlook for Natural Gas Prices

While rising in late 2002 and 2003 natural gas prices decoupled from oil prices. That is, natural gas prices pulled away from their historical relationship with oil prices. One old rule of thumb is that the spot price of natural gas at Henry Hub (a delivery point in Louisiana) is roughly $1 per million Btu for each $10 per barrel of oil for the spot price West Texas Intermediate crude oil (WTI). By this rule, the current price of about $30 per barrel for WTI would imply a price of about $3 per million Btu for natural gas at Henry Hub. The current spot price at Henry Hub is in excess of $6 per million Btu.

Although natural gas prices decoupled from oil prices for about a year during 2000–01, the current outlook is that natural gas prices will remain substantially high in comparison to oil prices. Futures markets for these two fuels show expectations of a continued decoupling of natural gas and oil prices through year end 2005. Inventories are being rebuilt, but they are only keeping pace with normal seasonal growth and remain below the five-year average for June.[3] Although drilling for natural gas is responding to higher prices, domestic production and imports have been insufficient to rebuild inventories to normal seasonal levels.

Over the next few years, the prospects for lower natural gas prices depend largely upon an unseasonably cool summer or unseasonably warm winter, but a lack of offshore production shutdowns in the Gulf of Mexico during the fall hurricane season also could soften price pressures. Although domestic drilling for natural gas has responded to higher prices, increases in domestic production are not expected to enable inventory rebuilding. Imports from Canada are constrained by the current extent of resource development in that country and pipeline capacity. Imports of Liquified Natural Gas (LNG) have risen sharply, but substantial growth is limited by a lack of U.S. LNG terminal facilities.

The Longer–Term Outlook for Natural Gas Prices

Over the longer-term, analysts expect natural gas demand to expand more rapidly than that for other fuel sources.[4] In comparison to other fuels, natural gas is seen as environmentally desirable because it burns more cleanly. Without adequate development of domestic natural gas resources and additional imports, rising demand for natural gas will continue to keep natural gas prices elevated relative to those for oil. Consequently, the decoupling of natural gas and petroleum prices could persist.[5]

Development of domestic resources may require better access to public lands and the development of new pipeline capacity from remote locations to markets. Increased natural gas imports from Canada will require the exploration and development of remote fields not yet in use and transportation through pipelines that are not yet constructed. Increased imports of LNG will require the development of additional terminal facilities beyond the current four (in Georgia, Louisiana, Massachusetts, and Maryland) that currently serve the entire United States.

Cheniere Energy, Inc. of Houston has announced plans to build two new LNG terminals in Texas and one new terminal in Louisiana. Imports at these Gulf Coast facilities will contribute to overall supply of natural gas in the United States, but will depend on existing pipelines to reach end use markets in other parts of the country. Some companies are also considering the development of an LNG terminal in Baja California, Mexico that could be used to import natural gas from South America into California. A terminal serving the West Coast could greatly relieve some of the pressure on natural gas prices in the California market.

In further developing our domestic natural gas resources and our ability to import additional natural gas supplies, we face important environmental issues. Natural gas is an environmentally desirable source of fuel, but additional development and imports may have some environmental consequences.

Economic Consequences of High Natural Gas Prices

Sustained high natural gas prices are likely a drag on U.S. economic activity. Higher energy prices are indicative of increased scarcity of natural gas which is a basic input to production.[6] As such, rising natural gas prices can result in a classic supply-side shock that reduces potential output. Consequently, output and productivity growth are slowed. The decline in productivity growth lessens real wage growth and increases the unemployment rate at which inflation accelerates.[7] If market participants expect the near-term effects on output to be greater than the long-term effects, they will attempt to smooth their consumption by saving less or borrowing more, which boosts the interest rate. With slowing output growth and an increase in the real interest rate, the demand for real cash balances falls, and for a given rate of growth in the monetary aggregate, the rate of inflation increases. Therefore, rising natural gas prices reduce GDP growth and boost real interest rates and the measured rate of inflation.[8]

To my knowledge, no research that has been through peer review has quantified the effects of rising natural gas prices on U.S. economic activity. A considerable body of research has addressed the economic effects of higher oil prices.[9] That research can be adapted to provide a rough approximation of the economic effects of rising natural gas prices.

During previous oil price shocks, natural gas and oil prices have generally moved together. Prices for other primary energy sources were relatively unchanged. Consequently, the measured effects of oil price shocks may represent the combined effects of both oil and natural gas price movements. Natural gas accounts for about 40 percent of total oil and natural gas consumption, so 40 percent of the measured effect of an oil price shock may be a rough approximation of the effect of a natural gas price shock by itself. On that basis, a rough estimate is that a sustained doubling of natural gas prices would reduce U.S. GDP by 0.6 to 2.1 percent below what it would otherwise be.[10] The increase in the GDP deflator would be about the same.

The economic effects of higher natural gas prices are likely to be uneven across industries and regions of the country.[11] States with extensive natural gas fields will

benefit from rising natural gas prices, while states with industries that use natural gas extensively will be hurt. Among the domestic industries most adversely affected by rising natural gas prices are fertilizer producers, the petrochemical industry, electric utilities, aluminum producers and the users of these goods and services.[12]

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NOTES:

[1] See the Energy Information Administration's "Weekly Natural Gas Storage Report."

[2] The ability to switch between natural gas and residual fuel oil is declining.

[3] Natural gas inventories have remained below the five-year seasonal average for each month since March 2003.

[4] For example, see the U.S. Energy Information Administration's Annual Energy Outlook 2003.

[5] Although the imposition of price controls for natural gas could keep natural gas prices in line with those of oil, such controls would exacerbate the shortage rather than alleviate it. See Brown 1985 and Brown and Yucel (1993).

[6] See Brown and Wolk (2000).

[7] Reduced productivity would reduce profits and expected future profits which will reduce stock prices and wealth.

[8] See Brown and Yucel (2002).

[9] For surveys on the research about the aggregate economic response to oil price shocks, see Brown and Yucel (2002) and Brown, Yucel and Thompson (forthcoming).

[10] A 1987 Energy Modeling Forum study (Hickman et al. 1987) estimated the elasticity of the response to the U.S. economy to an oil price shock as–0.02 to–0.076. Brown and Yucel (1995) find it likely that the elasticity of response to an oil price shock has declined since the 1980s. About 70 percent of petroleum is consumed in transportation, while 75 percent of natural gas is consumed directly by industry, electric utilities and commercial establishments, which has led some analysts to suggest that movements in natural gas prices could have greater economic effects than movements in oil prices alone. Rising oil prices result in substantial income transfers from the United States to oil-exporting nations, but rising natural gas prices do not result in similar transfers. To the extent that these transfers affect economic activity, the economic consequences of natural gas price shocks would be less than those from oil price shocks alone.

[11] See Brown and Yucel (1995).

[12] Natural gas is the principal feedstock for ammonium nitrate, a basic ingredient in fertilizer. Foreign producers with access to lower priced natural gas gain a competitive advantage when U.S. natural gas prices rise. Natural gas is also the principal feedstock for the U.S. petrochemical industry, while foreign competition primarily uses petroleum as its feedstock. When U.S. natural gas prices

rise relative to the oil price, domestic petrochemical producers are placed at a competitive disadvantage. Natural gas is one of many fuels that are used to generate electricity, but it is the fuel of choice for most peaking facilities—that is facilities that meet transitory spikes in electricity demand. Consequently, high natural gas prices can raise costs for an electric utility and its customers. Aluminum production uses considerable energy both directly and through the consumption of electricity. The industry generates some of its own electricity with natural gas. Combined, these factors make the aluminum industry relatively sensitive to natural gas and electricity prices.

Mrs. CUBIN. Thank you very much. Now, I would like to recognize Mr. Kelly for his testimony.

STATEMENT OF ED KELLY, NORTH AMERICAN GAS & POWER CONSULTING, WOOD MACKENZIE GLOBAL CONSULTING

Mr. KELLY. Thank you, Madam Chairman and other members of the Subcommittee, for this opportunity, even if I am toward the end of a long list of speakers, perhaps, over the last few years that have made it into this room. I appreciate the chance.

My name is Ed Kelly. I am head of North American Gas & Power Consulting for Wood Mackenzie Global Consultants. Who we are is a global energy firm, energy consulting firm based in Edinburgh, Scotland but with U.S. offices in Boston and Houston dealing with oil and gas property information worldwide but also energy markets more generally. This is a painful period of adjustment as the commodity moves from relative surplus to relative scarcity out there and the price responds accordingly. This period is here to stay for the remainder of this decade, perhaps even longer.

You know, natural gas consumption hit a peak in 1973 of around 23 trillion cubic feet. What a lot of people don't remember is it went down to 16 trillion cubic feet in 1986, creating the appearance of a surplus and the appearance of a systemic surplus in the system. Natural gas consumption is now back to approximately 24 trillion cubic feet based on the substitution of power generation markets for industrial markets largely is what has happened in that period. The result has been a more volatile consumption as well as a higher strain on production as we are moving forward.

What gets us out of it? Well, the resource base is mature, the decline rate is increasing in each given well. Each given well accesses a smaller amount of reserves so that you have to drill faster. And, by the way, anything that stops drilling results in a more immediate and sharper decline in production as you go forward. So any policy that delays drilling or any policy that delays imports results mathematically in a more immediate and sharper decline in production; therefore, a more immediate and sharper increase in price to end-use consumers and others, including those residential consumers, approximately 90 percent of which in the Midwest depend upon natural gas for home heating. So as was mentioned by Representative Kind, the LIHEAP is important in this adjustment to many of those end users as well.

What can get us out of this? The self-corrective mechanisms are already coming. Drilling is up but it is not up that much, and it has been painfully slow to come up. We had about 37 weeks of drilling, using over 900 active rigs drilling in 2001. We increased supply as a result of that by about 4 percent. Supply has already

declined below the level previous to that level of drilling. We are now back up. We had our first week of more than 900 active gas-directed rigs last week. So we have gone down to about 550; we are back up to above 900. I hope we are on our way up, I hope that the supply effort will be more successful this time around. But the solutions simply take time and capital, and in the meantime there will be this painful period of adjustment. So, point two, active drilling is very critically important, and anything that delays that, again, or slows it down will result in a sharper and immediate decline in production and a sharper and more immediate increase in price to all consumers for natural gas.

LNG is coming, the market is attracting it, but it is years away. Another point I want to make is that LNG is probably 10 years away from representing 10 percent of U.S. supplies. Right now it represents something between—well, approximately 2 percent of U.S. supplies. So we are talking about a five to six times increase over the next decade in LNG imports, but it simply takes time and capital to get liquefaction on the producing end somewhere in the world up and running, shipping up and running and import regasification facilities up and running. And the producers that invest in the liquefaction on the upstream end do so in a global market context. So a high U.S. price is simply one among hundreds of factors that go into investment decision for LNG facilities worldwide. A high U.S. price is attracting LNG investment into the U.S. It is happening, it just happens slower than you might think. It is not an immediate response, and it will be long-term buildup.

Arctic supplies are on the horizon; they are important next decade. So in terms of the current kind of supply response that we can get, arctic supplies are important in terms of ensuring a long-term moderate supply of natural gas. For this decade, what is on the margin is conservation, is demand efficiency and is that U.S.-based and Canadian-based—thank goodness for the Canadians—gas drilling, onshore and offshore U.S. And with that I will conclude my remarks. Thank you very much.

[The prepared statement of Mr. Kelly follows:]

Statement of Edward M. Kelly, Head of North American Gas and Power Consulting, Wood Mackenzie Global Consultants

Good morning. My name is Ed Kelly, and my position is head of North American gas and power consulting for Wood Mackenzie Global Consultants. Wood Mackenzie is a worldwide energy consulting firm based in Edinburgh, Scotland (with U.S. offices in Houston and Boston) focusing on oil and gas producing information, as well as energy markets more generally, including natural gas. While Wood Mackenzie serves the energy industry, we are an independent firm with clients in all sectors of the industry itself as well as outside investors, and are independent of any particular sector of the energy industry.

Before Wood Mackenzie I worked for over 10 years in the natural gas practice at Cambridge Energy Research Associates or CERA, the last three as director of research for North American Gas. Prior to that I held a variety of strategic planning and analysis positions in the natural gas pipeline industry. I very much appreciate the opportunity to speak with you today about a crisis that is painful to energy consumers to be sure, but also for many sectors of the gas industry.

What is occurring now can be characterized as a painful period of adjustment as a commodity moves from relative abundance to relative scarcity. While this pain is felt by many, especially low income individuals and families dependent upon gas for heat, as well as industrial end users dependent upon natural gas to create their products, adjustments are occurring in a number of ways. Drilling activity has increased and is likely to continue to do so, and a number of new import facilities are

in various stages of the investment and planning process, and conservation is occurring. None of these activities will alleviate the shortfall immediately or even within the next 3–5 years, but all are necessary and should be encouraged.

I would like to use my brief time to make a few points regarding this crisis.

I. High Prices Are Here to Stay—For This Decade and Perhaps Even Longer

The first point I would like to make is that this is not a simple commodity cycle. High prices are likely to endure, and imports will continue to increase in share of the overall North American supply for natural gas. While a large resource base—by some estimates approximately 50 years worth of current consumption—is estimated to exist underground, the difficulty of finding and developing this resource base is increasing. In addition, production in many major basins is already in decline, and the deep water Gulf of Mexico, one basin still increasing, will enter decline within the next 3 years. That leaves the Rockies as the only onshore U.S. basin not in decline, and production increases there will not fully offset decline elsewhere.

These declines in production have occurred even as the U.S. has already built the next generation of power plants—nearly all fueled by natural gas. As the economy grows, power demand grows, and with it gas consumption as more power generation facilities are dispatched. Under normal economic growth or approximately 3 percent gas demand would grow by approximately .75 to 1.0 billion cubic feet per day on average in the US. The average price of natural gas has therefore increased from the $1.50 - $2.50 per Mcf (or 1,000 cubic feet) level, in place for most of the 1980s and 1990s, to the $3.50 - $5.50 per Mcf level that Wood Mackenzie expects for the remainder of this decade, at least.

These higher prices are here to stay until——

(a) an import system can be developed that is capable of transporting large quantities of gas to the US, and

(b) major new native sources of supply can be brought to market. However, both imports and new domestic supply sources—likely from the arctic—will require both time and capital.

Demand pressures are here and now, while supplies declined this year and may struggle to increase through 2005, declining thereafter. New imports and arctic supplies, however, are 5–10 years away, meaning that gas is likely to remain expensive for at least the remainder of this decade. During this time, price—willingness to pay—will remain the efficient and best means of determining who chooses to burn gas and who does not.

II. Active Drilling in the U.S. is Still Critically Important.

My second point is that, despite the inevitability of increasing imports, consistent and higher levels of drilling in the U.S. are critical to minimize the pain that high prices will bring. The difference in pain between a $3.50 average price and a $5.50 price is large, and represents many thousands of jobs and between $20–$25 billion in disposable income to residences and small businesses. Before imports can increase substantially (the end of this decade), and before arctic gas can reach the market in large quantities (after 2010), U.S. and Canadian drilling levels will largely determine supply on the margin, or whether the gas price is closer to $3.50 or $5.50 in wholesale markets.

The market has gained some valuable and hard-won information over the past 3 years as drilling has moved up and down in response to volatile prices. It is now clear that drilling activity of 550–700 rigs searching for gas will not support U.S. production, and a steep decline in production will develop within a year if drilling activity stays that low. Drilling activity represented by 800 or more active rigs in use, however, will at least arrest the pace of decline in production, buying end users valuable time. Rig activity of 900 or more rigs may, for a while, actually increase productive capability in the US, but not likely by much. Two years ago for example the industry employed between 1000 and 1100 rigs actively searching for gas for a 15 week period (and employed more than 900 rigs for an additional 22 weeks). However, the result was an increase in U.S. productive capability of less than 4 percent the following year, followed by decline later as activity dropped off. I hope that a more sustained level of greater activity as high prices endure will do more, but so far there remains a long way to go. Gas-directed rig activity just broached the 900 level again last week, for the first time since 2001.

III. Anything that Impedes Drilling Activity will Result in a Quick Supply Decline

For two decades technology advances and imports enabled energy costs to decline even as greater regulatory and environmental scrutiny was placed on U.S. drilling activity. A technological revolution in drilling in the early 1990s enabled U.S. natural gas productive capability to increase even as natural gas prices held at very

low levels. However, this trend no longer holds. Production from existing wells is declining at a faster rate, as new discoveries become smaller, and the same new drilling and development techniques allow quicker emptying of reservoirs.

The major significance, however, is that greater levels of drilling activity are required to sustain production, and any decline in drilling will be accompanied by an increasingly sharp and immediate decline in productive capability. Further restrictions on drilling activity will be accompanied increasingly quickly by higher real energy costs, and increasing pain in consumers' pocketbooks. While I will not attempt to judge the proper tradeoff between drilling and the environment, policymakers should be aware of this new mathematic reality. However noble the purposes, increased restrictions on drilling activity have undoubtedly already played some role in the higher energy costs now facing consumers. Added regulation and restrictions no longer come for free.

Will another technology advance at some point allow both environmentally pure and cheap energy? No one can say for sure, but I am not aware of any on the horizon, yet. Is there some technology in energy supply or power generation that may eventually make the competition among fossil fuel sources moot? Again, no one can say with certainty—I hope so. The greatest progress at the moment appears to be occurring in end use efficiency—with investment encouraged by price—and in transport systems.

On the supply side, perhaps the greatest recent shift has occurred in the cost of LNG (liquefied natural gas) transport and delivery, with the import costs having declined by approximately 40 percent over the past 2 decades.

IV. LNG is Still Years Away from Alleviating the Supply Shortfall in the US

It is absolutely correct to say that LNG is increasing in importance in the U.S. natural gas supply mix, and that it is a critical piece of our supply future. However, it is important to keep in mind that the U.S. faces years of supply challenge before either LNG or arctic supplies can come to the rescue for natural gas consumers. As I've said, demand pressure will remain high as economic growth drives increased demand for electricity, and natural gas supplies the vast majority of that power demand growth. Even as this demand pressure grows, U.S. productive capability that will begin to decline within three to four years.

Meanwhile, LNG development decisions occur in an international market. The U.S. must compete with other markets for LNG supplies, and each producer decides whether or not to liquefy natural gas reserves in the context of returns available to investment in a global energy market. For example, investing in liquefying gas reserves to ship to the U.S. or elsewhere competes with global drilling opportunities as well as with pipelines or any other method of monetizing the gas reserves. Under the most favorable circumstances, the LNG value chain—from liquefaction of remote reserves to shipping to regasification—usually takes 5–7 years to develop.

Even though U.S. prices are now well above the approximately $3.50 per Mcf that LNG costs to deliver into the U.S. from many sources (depending upon shipping distances, real estate costs, royalty regimes, and other factors), investment in LNG delivery into the U.S. is not guaranteed. A fragile chain of investments must occur, with delay possible at any point. While increasing LNG imports are a near certainty, this growth should be put into perspective. Wood Mackenzie believes that it will be 10 years or more before LNG represents even 10 percent of U.S. supplies on an annual basis. By 2010, LNG imports will be approaching 6 billion cubic feet (Bcf) per day—more than five times their current level (expected average of 1.1 Bcf per day for 2003)—but representing less than 10 percent of U.S. supply in a market of near 25.0 trillion cubic feet (Tcf) in size.

Reaching even this level of imports will require timely permitting and regulatory approvals, as well as consistent decisions by major producers and end users to move forward with several billions of dollars of capital investment in and near the US. As in U.S. drilling, anything that slows this process, whether from regulators or market participants themselves, will prolong the period of high and volatile natural gas prices in the U.S.

Natural gas supplies from the Arctic are also Important—for the Next Decade

Supplies from Alaska and arctic Canada are likely to play a critical role in balancing the continental natural gas market, but will do little to alleviate the current crisis. Alaskan supplies pose an especially challenging dilemma for producers, requiring huge investments (estimates range from $15 - $20 billion) based upon the current situation in a notoriously fickle and volatile market. As such, periods of low prices, such as occurred in 2002, will delay these development efforts, as will the availability of attractive alternative investments. In my experience Alaskan gas has been expected to enter the market between 7 and 20 + years in the future—and now

the figure is around 10–15 years, depending on the source. Alaskan gas would represent an immediate infusion of supply covering approximately 3–4 years of demand growth in the U.S. market. LNG imports, on the other hand, can be phased in, and require smaller increments of investment. Ultimately, however, both growing LNG imports and Alaskan gas are likely to be required, as is increased drilling. All forms of potential supply are necessary.

VI. In the Meantime, Demand Efficiency and Conservation will be Important on the Margin

With increasing demand, declining U.S. supply, and a necessary delay before LNG imports and arctic gas can help fill the supply gap, the U.S. natural gas market needs both sustained high levels of drilling in the U.S. and increases in end use efficiency to keep itself in balance. Conservation is occurring as more and more consumers become aware of the higher real costs of energy, and efficiency is increasing as newer appliances replace old and as more advanced materials are used in construction and industrial applications. California power demand during that crisis, for example, dropped by 3 percent based on voluntary conservation, and by another 7 percent as a result of high prices. This conservation was a critical component of the easing of the power crisis in that state.

Natural gas prices are likely to remain high enough to encourage conservation for the foreseeable future. For some types of end use—primarily industrial and power generation—conservation and the burning of alternate fuels already has an important influence on price.

VII. What Government Can Do—Avoid Harm

To make this adjustment from relative surplus to scarcity in the natural gas market as easy as possible for as many as possible, government can:

(1) As much as possible, at least avoid increasing the regulatory/permitting burdens on producers. Again, that which either delays or restricts drilling will quickly increase the pain felt by natural gas consumers, and this increasingly includes those paying electricity bills. Producers and others in the natural gas industry are keenly aware than markets are being lost to alternative fuels, to conservation, and even to industrial closings and relocations. As such, there is an industry-wide effort underway to attempt to build supplies in North America. The proper level of environmental and regulatory oversight will always be in dispute, and this dispute is legitimate and healthy. However, the need for sustained and timely efforts to increase supply, and the quick drop in supply that will occur if these efforts falter, should be taken into account by regulatory/political decision-makers.

(2) Clarify the responsibility for supply planning. Largely a function of the states, supply planning is a critical role in the natural gas and power markets, and especially for infrastructure development. Under a purely market system supply would be allocated by price, planning would be done individually based upon expectations for price, and price volatility would be an allowed and expected part of the market landscape. However, the U.S. system is now far from this. Many utilities are caught in an ambiguous position—regulators like greater competition but also like someone in the end to be responsible for energy supply. Utilities in the future may or may not be responsible for ensuring that energy infrastructure, whether gas pipelines or power generation and transmission, is adequate within their service territories. In addition, utilities are being exposed to a greater degree of political risk than ever before in the U.S. as energy purchasing decisions, even honest ones, are constantly second guessed. This challenging environment makes the signing of long-term contracts, critical for the development of gas pipelines, power generation, and especially LNG import facilities, more difficult.

(3) Help lead a reasoned debate on the environment/energy cost tradeoff. Society may in fact desire higher real energy costs in return for greater environmental purity, but such decisions should occur in a reasoned atmosphere with as many facts on the table as possible. Technology has lowered the costs of environmental cleanliness for several fossil fuels, but there has been limited acknowledgement of this fact. For example, coal generation can be made much cleaner than it has been, at lower overall cost than gas-fired generation, and nuclear generation and clean liquid fuels are an increasingly important and clean options in the future energy mix. However, many opinions appear fixed based upon outdated impressions of environmental costs associated with these energy forms.

(4) Aid low-income end users that have little alternative for heating. Funding for the LIHEAP program has been increased in recent years, and the need for programs such as this should be continually monitored.

(5) Avoid price controls. Price controls would prove harmful to producers and consumers alike, would place huge burdens on regulators themselves, and, if they had any effect, would result in an immediate drop in supply. This would lead to a chain of unintended consequences, likely including crude centrally directed rationing schemes, as painful to most a the current price-based rationing.

The U.S. has grown accustomed to relatively abundant, domestic and Canadian natural gas supplies, at relatively low cost. However, the reliance upon natural gas for the next generation of power plants, just as natural gas supplies in the U.S. are hitting a peak and entering a decline, has shifted this commodity from surplus to scarcity. This situation is unlikely to reverse. A certain amount of pain during this adjustment period is unavoidable, but, contrary to many reports, in some important ways the market is working. Drilling has increased and is likely to continue to do so, and investments in import facilities are ramping up. In the meantime, voluntary willingness to pay is determining who buys gas and who does not, and end use conservation and efficiency are increasing.

High prices are already doing as much as any law or regulation could to make this painful adjustment period as short as possible, and to encourage investments in new technologies for both supply and demand. Ultimately, these prices even hasten economic alternatives to fossil fuels.

I appreciate the opportunity to appear today, and thank you for your time.

Mrs. CUBIN. Thank you very much. I would like to begin the questioning. I couldn't help but notice in the testimony from each one of you there was not a particularly emphatic point that there is a lot of gas, actually about 50 years of gas, in the lower 48, and what your statements all talked about in stronger terms than it did the gas that we have in the lower 48 was arctic, LNG, conservation and all those sort of things. And so I would just like each one of you to respond, if you would, about how important you think the reserves in the Rocky Mountains are. Just start with you, Dr. Foss.

Dr. FOSS. Oh, I think they are critical, and in fact in my testimony, as I mentioned, I said our domestic resource base should be the first priority. And that means looking at all of the things that need to be done to provide access, data management for leasing and other information. I provided a case study. It happened to be one that was based in Texas, but you could take the case study in my testimony of a particular issue in getting sufficient information from a Federal agency in order to be able to go forward leasing Federal acreage and apply that to the Rocky Mountains, because the situation is much worse there in terms of land management, data records, ability to facilitate E&P activity and so on.

I think Rockies are clearly important. They are a bit disadvantaged. One of the issues for the Rockies, in fact, right now is that as we have been looking at natural gas prices in the United States, Rockies' producers haven't been enjoying as much of the price increase as other producers in other parts of the United States, and that is an issue of transportation, remoteness from markets and so on.

Mrs. CUBIN. More than just that, there is—

Dr. FOSS. And more than just that.

Mrs. CUBIN. —differential there that we are going to investigate and see exactly why—

Dr. FOSS. OK. Well, we will look forward to information coming out of the Subcommittee on that.

Mrs. CUBIN. Well, thank you. And I do have to apologize to you, because I didn't get your statement as of midnight last night, so I didn't get yours read, but I did read all the other panelists'. So I thank you that you did mention that in your remarks. Mr. Brown?

Mr. BROWN. I think production in the lower 48 is important, particularly for the near future. Unfortunately, I think for the Rockies, the opening of a recent pipeline into southern Wyoming indicates how important transportation is to providing better access to the gas locked up in the Rockies, and programs to provide better access to public lands are important for the development of those resources.

A lot of the forecasts that I have seen kind of bypass the Rockies because they are assuming that the regulatory constraints are going to prevent access to that gas, and most analysts have to sort of look at what they consider not only technologically feasible but what they consider to be financially and politically feasible.

Mrs. CUBIN. You mentioned just one sentence in your testimony that production in the Rocky Mountains—or you didn't say Rocky Mountains but you said in the United States was possible but there may be environmental complications—you didn't use the word, "complication." But—

Mr. BROWN. Well, there is environmental concerns.

Mrs. CUBIN. What are those environmental concerns that you have?

Mr. BROWN. Personally, I don't have environmental concerns about the development of oil and natural gas, but there are people who do have those concerns—

Mrs. CUBIN. Right. Right.

Mr. BROWN. —and I think those people have a voice, and I wanted to recognize that in my remarks.

Mrs. CUBIN. Good. I appreciate that. And I think those people definitely have a voice too. Sometimes I question, though, whether their voice really is about protecting the environment or if their voice is really about stopping any activity on the public lands, because that seems to be what I observe as we go along when there is an amendment on the energy bill to wipe out all incentives for oil and gas. I mean it just confuses me that we want to deal with this gas supply problem, and people think we have too many hearings on it to get too much information on it, I guess. But we have to expose the fact that oil and gas exploration is technologically able to protect the environment and still produce the resource. And I would just like to make that very clear today.

So, Mr. Kelly, I didn't notice much about Rocky Mountains in your testimony at all.

Mr. KELLY. It is on pen, added informally, I am on page 2.

Mrs. CUBIN. OK.

Mr. KELLY. Quantitatively, just to put some numbers around it, we expect as an organization, Wood Mackenzie does, for the Rockies production to increase by 4.5 billion cubic feet per day, by 20 tons. Despite that increase by 4.5 billion cubic feet per day, overall lower 48 productive capability still goes down by 20 ton. So that tells you how critical the Rockies are in a demand increase environment. Increased drilling is critical to allow that productive capacity

to be reached. If, for instance, only half of that productive capability increase is reached, if Rockies production increases by two, to 2.5 billion cubic feet per day, that is at least $1 to $1.50 added on to the price of natural gas. That is $7 to $10 billion taken out of the pockets of residential consumers in order to get natural gas into their homes. So this is a very critical amount of productive capability for the Nation as a whole. It is the only onshore or offshore basin in the U.S. itself that is likely to increase.

Mrs. CUBIN. And when we look at the places where we could be importing, or from which we could be importing gas, we are looking at Angola and other countries—Nigeria, countries that really probably aren't real wise for investment either. And your point that the transportation and getting the product to market is just as big as having the resource available. And I think laying pipelines runs right into the same environmental problems that drilling and exploration run into: They don't want to disturb the land at all. And I think we have to reach a balance, and I think that is something that we have to continue having these hearings so that the public can know what the problem is. The public can identify and bring pressure on those people who would like to lock up all of the resources that we have and import those resources. I can't imagine being dependent on imported oil and dependent on imported gas what kind of a situation, a perilous situation that puts us in. So thank you.

And now I would like to recognize Mr. Bishop for any comments or questions.

Mr. BISHOP. Thank you, I appreciate that. Mr. Kelly—I have got a couple if it is possible, Madam Chairman. You mentioned the amount of drilling was up to 900 drilling activities. What would be the ideal? Is there an ideal number? Is that number just always higher?

Mr. KELLY. Ideal in the sense of increasing U.S. productive capability is—there is no scientific answer to that, but evidence in recent years is that it is a consistent level of drilling, somewhat north of 900 rigs. So we need to see at least a continuous and consistent level of 900 plus to result in an increase in U.S. productive capability. That is also in the context of deep water development going on. We expect an increase in U.S. productive capability to show up late this year; in other words, the decline will be stopped and productive capability will be on an increasing path late this year, both as a result of having reached 900 rigs and other developments going on offshore, largely. We expect that to hit a peak by 2005 and a longer term systemic decline to result after 2005-2006 and then the level required to maintain production may actually increase above 900 to 1,000 to 1,200 rigs.

Mr. BISHOP. Is there a number that you are looking at that would give you satisfaction and happiness and security?

[Laughter.]

Mr. BISHOP. Never mind. The answer is no, right?

Mr. KELLY. Looking with unease at beyond 2005-2006 when the deep water developments hit their peak and begin a long-term decline, at that point we have approximately 1,600 rigs that are available out there, and this is based on 2001 construction data. Beyond that point, I would want to see 1,100 or 1,200 active rigs

searching for gas to maintain productive capability as best as can be maintained in a mature resource base.

Mr. BISHOP. Let me ask two others if I could. The first one is if you could comment in some simply of how Great Britain, the United Kingdom, has benefited from its offshore gas production activities, vis-a-vis the United States and the difference it would be there. And the second one is like the Chairwoman I am also from the Rocky Mountain region, and it is going to be counted on for increasing percentage of energy production over the next 20 years. Could you or anyone else on the panel just help us, with me at least, with some specifics of what has to happen in Federal or State policy to encourage that kind of development, either the comparison with what has happened offshore drilling with the United Kingdom to benefit them compared to what we are doing and then any specifics that you think might need to be impacted that could help the production level in the Rocky Mountain region.

Mr. KELLY. I am not sure that you had in mind vis-a-vis Great Britain. They are actually—the North Sea is more mature in terms of gas production as well, so they are going through a separate cycle. They will probably become a net importer or begin to become a net importer of natural gas within the several years if they aren't already. They are sort of at that tipping point. I think it has obviously benefited them in a number of ways to have the North Sea reserves developed there. So I am not exactly sure where you are going with that.

Mr. BISHOP. And that is OK. You are not taking me there anyway, so we are OK.

Mr. KELLY. OK. Good.

Mr. BISHOP. It is working.

Mr. KELLY. I think from a Federal perspective, one of the things—two things that I think are important for the Rocky Mountains are, one, is that the development of interstate pipelines to transport that gas to markets is something that requires a confluence of activities. There has to be an investor, there has to be permits, and these pipelines are going to cross State lines, and every State gets involved in these permits. And so you have kind of the permitting process in the pipeline construction, and you have to have an investor who is attracted to that. Unfortunately, some of the instability in the natural gas industry caused by the Enron debacle has made a little bit shallower pockets among investors these days. The other thing that I think is necessary is looking at the kinds of regulations that impact the ability for people to get in and drill and get production going.

Dr. FOSS. I would like to add some comments, if I may?

Mr. BISHOP. Please.

Dr. FOSS. First of all, on your question about rig activity, I think there is an important point that the Subcommittee needs to recognize, and that is that our reservoirs are changing. As the maturity increases of U.S. fields and basins, you can't expect the same results from drilling activity today that we have achieved historically. That is why there is so much uncertainty. So when that question gets raised about what kind of drilling activity do we need, what level of activity and so on, it is a very complicated question because

we don't know what really to expect in terms of well productivity once wells are completed.

With regard to the question about offshore UK-Norway, I would like to just suggest that in my opinion the United States has a superior system. I think what needs to be revisited are the moratoria and especially an understanding of the resources that are available in offshore regions here. And I think that actually certain things could be looked at, for example, royalty structures and other arrangements that apply to the U.S. offshore regions, and I think there are some constructive Federal policy initiatives that could be accomplished there.

With regard to the Rockies, I agree—

Mr. BISHOP. Doctor, could I—

Dr. FOSS. Yes.

Mr. BISHOP. —interrupt just a second? And I think where I was trying to go on Great Britain is when we were talking about offshore drilling in the last bill, the energy bill that came through here, the entire concern seemed to be dealing with environmental issues. And since that is an area that has a mature field, they have gone through that process. Were those environmental negatives that they faced, vis-a-vis what they were able to produce as far as the self-sufficiency coming out of that? Are there lessons that we can learn either from our fears being substantiated or exaggerated in that realm based on what their experience was?

Dr. FOSS. I think absolutely. I think there is a set of best practices emerging for offshore exploration and production right now, and it is not just the North Sea but it is also Gulf of Mexico and other areas. I think there have been some incredible advances in the ability to manage offshore activities in a way that is environmentally responsible, and I think that needs to be recognized, and that it suggests, in fact, given success in the North Sea and the Gulf of Mexico that it is worth it to revisit moratoria issues for other offshore areas in the United States. I think that you have a case there to make in terms of the ability for the industry to operate in an environmentally sound way that can meet expectations, satisfy resource requirements and have it be part of the investment structure and something that the industry can handle. I mean I think we are at that point with regard to offshore—

Mr. BISHOP. That will help. And I am sorry to interrupt you. If you would go onto the Rocky Mountain, that is my area.

Dr. FOSS. Right. And then to the Rockies. I agree on the pipeline transport. I did want to mention that when we look offshore we have a transportation issue there too. I think it is important, and the Committee has probably heard this before, we aren't able to pull all of the natural gas especially from our deep water blocks into the marketplace right now. We don't have adequate transportation conduits, whether pipeline or other alternatives, technical alternatives. We are reinjecting gas in our deep water blocks, in many of them. So there are solutions that are needed offshore, there are solutions that are needed for the Rockies.

I would suggest that when you look at the Rockies resource base one of the things I think everybody knows is that a large portion of that resource base is non-conventional gas from other kinds of reservoirs, coal bed methane, tight sands and shales. These are

very demanding investments. They require additional scrutiny in terms of environmental practices, but they can be developed safely and soundly. There have been varying viewpoints with regard to reinstatement of incentives for the industry to develop those reservoirs. I happen to think that in fact you can look at creative incentives, especially for coal bed methane because it is such a different kind of a reservoir and requires a different production scheme as a way of helping to provide the right kind of business environment for the Rockies and again have it be done in the right way in terms of environmental practices and meeting all of the, as Dr. Brown pointed out, the expectations of certain parts of the public with regard to the environmental responsibility that the industry needs to maintain.

Mr. BISHOP. Thank you.

Mrs. CUBIN. Before I recognize the next questioner, I would wonder if each of you would respond very briefly to other energy sources and how they play into our portfolio? Obviously, this hearing is about gas, but just if you could briefly talk about the other energy sources.

Mr. KELLY. Thank you. I think there are a host of sort of outdated assumptions regarding the environmental cost of differing forms of energy, coal chief among them. The reality, for instance, is coal can be made clean other than carbon, depending on what your view is about carbon emissions. For the 75 or 80 percent least efficient plants can be made very clean for much less cost overall than gas, at $3 to $3.50, and we are looking at gas at $5 to $6 at this point. So coal has a necessary role to play in this in terms of dispatch of the existing coal units, perhaps expanding that and allowing that kind of retrofitting to occur. That is very important for the future energy mix.

Also, clean liquid fuels. A lot of advances are going on in terms of clean liquid fuels in terms of those kinds of emissions that result. Advances are going on in the transportation systems end as well. So we need all hands on deck, to some extent, if economic growth is to be consistent and job growth is to be consistent moving forward as far as energy supplies goes.

Mrs. CUBIN. Mr. Brown?

Mr. BROWN. The energy sources that I want to comment on are the so-called alternative energy sources. First of all, from a visual point of view, many of these things have a much higher environmental cost than is typically accounted for in most analyses. And, second, these resources are very small, and although they may play a role in the future, they are currently dependent upon subsidies to be economically viable, special regulations or legislation that requires them to be part of the mix. So these are things that may be attractive in the future if new technology are developed, but they are really not an important part of the mix now, and they are not something that we can count on in the near future.

Dr. FOSS. I want to echo what Ed Kelly mentioned on coal. Before I started working on natural gas, I spent a fair amount of time in the Rockies on coal issues. This is an important resource. I don't think we can ignore it. I think we have to meet the challenges of using it cleanly and wisely. I want to suggest that conservation and efficiency should be counted as an energy alternative. I do want to

reiterate that I think the best way to get there is by letting the market work and letting the price signals flow through to customers no matter how uncomfortable it may be, but I think that is the best way to inspire innovation and creativity.

And I wanted to just mention, because it gets so much air time, no pun intended, wind power. There is a great deal of discussion about this. As many people know, in Texas we are experimenting with renewable energy quite actively as part of our electric power restructuring effort, and I would like to suggest that in fact some of the thinking on wind is not quite right. There is a great deal of effort to think of it as a grid-based energy source. I think people need to think about it differently and a little more creatively and think about distributed wind resources and how those can come into the marketplace to satisfy certain needs and certain requirements. And there are plenty of experts that the Committee could visit with on that point.

Mrs. CUBIN. Can we get out of this supply and demand imbalance by only conservation and efficiencies? Just yes or no.

Dr. FOSS. No.

Mr. BROWN. No.

Mr. KELLY. No.

Mrs. CUBIN. Thank you. Ms. Napolitano.

Mrs. NAPOLITANO. Thank you, Madam Chair. Even I would say no to that, Barbara.

[Laughter.]

Mrs. NAPOLITANO. And coming from California, which we use a tremendous amount of energy and we were more or less the largest target of the Enron debacle. And, Dr. Foss, I kind of have to ask a few questions in regard to your organization. I take it you studied the whole energy issue for the whole United States.

Dr. FOSS. And internationally as well, yes.

Mrs. NAPOLITANO. OK. Well, I am more concerned about the U.S. at this point. There were reports not too—well, I would say maybe 10 years ago that I had been briefed on when I was in the State house that indicated that we had more than ample gas sites, reserves, that would last us for—the same thing was said of gasoline or petroleum or the gas itself or—you know what I am talking about. And I am wondering what happened in between or what has made this different, because I can remember thinking, well, there is the alternative method of being able to substitute, if you will, or find alternative methods to use both. And now I am beginning to wonder what has caused that to change or why we are now saying we will be facing a shortage. I am sure there are, and I would like to know how we can get this Committee to have reports on the actual sites, the current operating sites, if you will, the possible sites or the ones that are underdeveloped or not developed yet that we may—and you say it is speculative because you don't know what is going to come out until you tap into them; is that correct?

Dr. FOSS. Yes. You are talking about gas reservoirs—

Mrs. NAPOLITANO. Yes.

Dr. FOSS. —and the distribution of natural gas resources—

Mrs. NAPOLITANO. Correct.

Dr. FOSS. —in the United States? Well, natural gas reservoirs are different than oil reservoirs—

Mrs. NAPOLITANO. Right.

Dr. FOSS. —in many respects, in terms of the engineering that needs to be done with them. I understand that natural gas can come into the market in two different ways. When you produce oil from an oil well, you can also produce gas. You can also produce what we call dry gas. In essence, you are drilling a well into our reservoir and producing methane, which—or some combination of gas molecules that can be used in different way.

Many dry gas reservoirs pose technical challenges. They may not have much in the way or porosity or permeability; in other words, the conduit itself is a complicated thing. So evaluating the gas resource base, understanding it, understanding what it will take to extract natural gas from the kinds of reservoirs that we will be dealing with, especially as we go forward into the future and especially offshore because we are now in terrain offshore that is still something that we have to understand in a geological sense. That creates a fair amount of uncertainty about what we actually have in the resource base and what it will require in terms of price and an incentive in the marketplace to develop it.

And I think that is why you have seen so much variability in all of the studies that have been done. I think the general scientific conclusion is that we have an abundant resource base. But there will be technical challenges, and the technical challenges have commercial requirements in terms of price and the inducement that price provides to companies to explore a technically challenging resource, the money available to deal with that resource and so on. I hope that sort of answers the question a little bit. And of course there are—there are efforts right now to get a better handle on it. The National Petroleum Council study is an attempt to try to update on that.

Mrs. NAPOLITANO. OK. Now, I am looking at a Calpine, Incorporation June 2003 report that indicates the U.S. has approximately 70 years of domestic supply based on known economic recoverable reserves not including potential additional import capability.

Dr. FOSS. Remember that, and I wanted to suggest this to the Chairman of the Subcommittee as well, when we use numbers like 50 years of supply or 70 years of supply, there are a great number of assumptions that go into that, assumptions with regard to the price. We have many more years of supply at higher prices than we do at lower prices. I mean that is the commercial reality for both the oil and gas industries. It depends on the kind of reservoir and what we can assume about how quickly we will extract the natural gas from that reservoir. It depends on demand, which of course depends on price, so it is—

Mrs. NAPOLITANO. But, Doctor, then is it fair to assume, or I am gathering from your testimony that it is going to be cheaper to purchase it, to import it, than it will be to develop it.

Dr. FOSS. Not necessarily, no. Because any gas that is imported into the United States has to compete in our marketplace. And so to the extent that we are in a higher price environment, then certainly, as Ed and Steve pointed out, that makes imported gas attractive. When we are in a lower price environment, that puts pressure on exporters just as it puts pressure on domestic producers.

Mrs. NAPOLITANO. Do you feel this might become another Enron issue, another Enron type problem?

Dr. FOSS. No, not at all. I think that was a completely different situation and is not related to—

Mrs. NAPOLITANO. I am sorry, not Enron. I am talking about the Texas monopoly on the energy that affected California and other States.

Dr. FOSS. I am unsure that I understand your question.

Mrs. NAPOLITANO. Would you—

Dr. FOSS. I think what we have is a cyclical, periodic situation. Another thing that I think is important to understand is that investments in something like producing natural gas are very lumpy. It takes a long time to launch an exploration effort. It takes a long time to bring a major new project on-stream. This is true whether it is a new gas-producing basin or an LNG project or some other project that brings natural gas into the United States from outside. So we are in a period in which certain investments need to be made, and it will take some time to get them made. The consequences of those investments, however, will be pretty significant in terms of the additional supplies.

Mrs. NAPOLITANO. Thank you. Thank you. I would like the other two gentlemen just to briefly say whether they agree or disagree. You don't have to go into great detail.

Mr. BROWN. Michelle said so many things I am not sure whether to say whether I agree or I disagree. I do agree that significant investment is required to make domestic natural gas production or to boost natural gas production. And I am hoping that we are not really looking at natural gas prices in the future that make imports extremely attractive. LNG looks attractive at over $4 per 1,000 cubic feet or million Btu. Somewhere between four and five it becomes attractive. That is pretty darn high prices, because that is going to translate after transportation into $10 to $12 gas at a residence in California.

As for the question as to whether there may be some exercise of monopoly power in the natural gas markets, I don't currently see any evidence of that. There are a lot of small independent producers in Texas and throughout the Rockies and Louisiana that are producing natural gas. If there is a monopolist, it is the government.

Mrs. NAPOLITANO. Thank you.

Mr. KELLY. Now I have heard something I disagree with. I think LNG, depending on the producing government, flexibility can be delivered at somewhat lower cost than that, probably 325 to 375 per million Btu, still higher than historic prices from a long-term perspective, not something that should give us a great deal of comfort but somewhat lower, and that will happen over the coming years but not immediately.

Secondly, I think there is an important distinction to be made between this what is ultimately recoverable and what can be produced in current economics, and I would like to reemphasize that point, that what is recoverable at current economics—and supply investment does occur slowly and demand can shift by day by day. Demand shifts day by day, cold winter is immediate here and now,

hot summer is immediate here and now, and supply investment takes a long time and a long lead time.

Thirdly, no producer produces 5 percent of the U.S. market, so the concentration in the producing end is really not that much. What happened in Enron, I think, was fair to say some concentration at specific locations in the midstream, in the wholesale trading of natural gas. So that was a different business.

Mrs. NAPOLITANO. Thank you so much. Thank you, Madam Chair.

Mrs. CUBIN. Would you think it is fair to include in your answer to Ms. Napolitano's question that part of those resources that she is talking about that we can't use are locked up in the Rocky Mountains due to expensive red tape, expensive permitting, long-term processes in getting permitting and so on? Yes or no across the panel.

Dr. FOSS. Yes. And may I just quickly add on the LNG front one more step and point out that we were receiving information and news of LNG cargos coming into the United States at $2.50 to $3 Henry Hub prices, and emphasize that the cost structure of the LNG value chain has changed considerably because of technology advances, the abundance of supplies overseas. This is not a $4 commodity.

Mr. BROWN. Yes.

Mr. KELLY. Yes. Anything that affects the timing.

Mrs. CUBIN. Mr. Nunes is recognized for questioning.

Mr. NUNES. Thank you, Ms. Chairman. There have been some reports in the news recently about looking for natural gas and that it is kind of a silver bullet answer to our natural gas shortage. I would like to ask across the panel what you think of that statement and if that perception is actually the reality.

Mr. KELLY. It is an extremely slow-moving bullet. It takes time and capital to develop. I think it is something that—you know, it is an important marginal source of supply that will develop and will come over the course of years and the next decade or two, but, again, it maybe 10 years before it is 10 percent of our supplies.

Mr. NUNES. Do you think it will raise the floor price of natural gas?

Mr. KELLY. Probably. A certain portion—LNG will behave differently from our current well-head supply. Wells produce now. In general, LNG, a certain amount of it, will shift. The ships can shift destination depending on relative prices in one market versus the other. So in that sense it will be responsive to U.S. supply of prices in relationship to Europe, for instance, especially. So, yes, I think it will be a very elastic and flexible form of supply.

Mr. NUNES. And what do you think is a reasonable price for LNG, $3.50, 4? I've heard all these numbers so I am just wondering.

Mr. KELLY. Well, I will say that host governments, in other words, the producing governments, are becoming more sophisticated and wanting to grab a portion of that downstream value, so Angola and Trinidad are becoming more sophisticated and wanting to grab the downstream value. There is a lot of methane worldwide. But, yes, $3.50 to $4.50 I think gets you the LNG Over the years.

Mr. NUNES. Thank you, Mr. Kelly. Mr. Brown?

Mr. BROWN. I think LNG will be slow to develop. First of all, you have to have the investment in the facilities to produce natural gas elsewhere. It is true that natural gas in some markets has a negative value, some overseas markets' natural gas has a negative value, but those markets are pretty far away, and the process of converting natural gas to a liquified natural gas, finding a terminal in the United States and then off-loading it and regasifying it is a complicated and expensive process. And in fact all of our terminals are likely to be pushed to very close to full capacity with any concerted effort to import natural gas. There are three terminals that are underway, under construction in the Gulf part of the United States, but those aren't close to the market; those are close to other producing regions.

What in fact would really be necessary if you look at one of the primary shortage areas of natural gas in the United States is to have some sort of LNG terminal in or near southern California. There are people who are talking about building one in Baja, but Baja, California is trying to decide its own trying, it is trying to decide whether it is going to be industrial based, in which case an LNG facility makes sense to them, or whether it wants to be tourist based, in which case they don't want anything that reminds somebody of something dangerous. So there are a lot of issues there that I think have to be dealt with before LNG really becomes attractive. And I think that in addition to moving the political and economic—moving both the economic and political realities is going to require prolonged prices in the neighborhood of 4 or higher to really get LNG moving, even though it may be technically feasible at 2.50.

Mr. NUNES. Thank you, Mr. Brown. Dr. Foss?

Dr. FOSS. I think LNG will take time to develop largely because of siting issues, pubic acceptance and other things, which is why public education is so important with regard to what this industry is really all about. Most commercial strategies that we see companies developing are peak-shaving strategies. In other words, LNG will be attracted to the U.S. market when prices are higher, but it will shave the peak off of natural gas prices and act to dampen prices in the marketplace.

And then the third question as to price, it really depends on the operator and the cost structure of the operator, the value chain that operator faces, where the source of upstream supply is, how—

Mr. NUNES. What range would you put the price in?

Dr. FOSS. I would put it anywhere from 2.50 to 4. I think it really depends on where natural gas is coming from and who is bringing cargo into the United States.

Mr. NUNES. Thank you, Dr. Foss. Thank you, Ms. Chairman.

Mrs. CUBIN. I would like to advise the Committee we have two votes coming. I would like to finish the questioning. Mr. Faleomavaega?

Mr. FALEOMAVAEGA. Thank you, Ms. Chairman. Madam Chairman, I apologize for my being a little late; it is very difficult having three meetings at the same time. But, Madam Chairman, I would be the last person to claim expertise in the subject that we are discussing this morning, but at the same time I don't think one has

to be a rocket scientist to ask some of the basic questions that I assume our distinguished panel have already answered, questions concerning the current status of the natural gas that we have in our own country. The question is how long is the supply going to last? The question is, what kind of a competition are we having within the natural gas industry within our country, and what kind of a foreign competition are we getting from other countries?

My recent visit to Bolivia tells me that they recently found a deposit, or whatever you want to call it in natural gas, supposedly the biggest in the Western Hemisphere. There were findings also in Kazakhstan and Russia. One of the questions always raised in this industry is that of environmental concerns. It seems to me—the thing that I am concerned about, is that we put a very high premium on the standards we put on our industries, but I don't think the foreign competition has that same standard. I think this is something that we need to work out in a better way.

Of course, the industry, I hope, is not involved in an Enron type of a situation where those poor workers are being taken out of their livelihood because of the dishonesty of some of the executives within the energy industry, and I hope that this is not the matter. Now that I know that you have answered all my questions, distinguished members of the panel, I am going to be quiet. Thank you very much, Madam Chairman.

Mrs. CUBIN. Thank you. I would like one brief answer from everyone an estimate of—we all agree that conservation and efficiency is a source of energy in today's environment. Can you estimate a percentage of our supply that could realistically be attributed to those? Because another witness that is coming on has some estimates that I have trouble believing that they could produce as much energy.

Mr. BROWN. Historically, we have had conservation in the United States. Typically, it has been on the order of about a half percentage point gain in energy efficiency in our economy over the last 50 years. It is particularly strong during episodes of sharply rising prices. There is considerable evidence that the market does respond and produce energy efficiency in response to higher prices. The potential for producing energy conservation without economic incentives is practically nil. There are numerous studies that have purported to show that there is a 25 percent conservation that can be had. That number is the same as it was 20 years ago when I was doing this kind of work with another organization. Those were the numbers that were thrown around. Lee Shipper, who left the Lawrence Berkeley Laboratory and is now with the International Energy Agency in Paris, has said all of the cheap, free conservation has been had. Now we are looking at tough, costly conservation. So I would say the answer is half a percentage point a year over the next few years.

Mr. KELLY. I wouldn't dispute that estimate. I mean there is an evolutionary decline in energy use per unit of GDP that goes on, and it increases in periods of high prices and it slows in periods of low prices.

Mrs. CUBIN. I am sorry to interrupt. We have to go vote.

Mr. KELLY. OK.

Mrs. CUBIN. If you could just make it as quick as possible. Do you have an estimate of an percentage?

Mr. KELLY. Three to 10 BcF per day, some of which is industrial shutdowns—

Mrs. CUBIN. Right.

Mr. KELLY. —in a market of 65 billion cubic feet per day.

Mrs. CUBIN. Thank you.

Dr. FOSS. Yes. I would agree with Mr. Kelly, and this is in my testimony. It is anywhere from about 0.8 to about three BcF per day.

Mrs. CUBIN. Thank you for your testimony. The Committee will be gone probably 10 or 15 minutes, and we will recess now and then reconvene in 10, 15 minutes. Yes. I would like to excuse the panel and have the next panel ready to come forward when we come back. Thank you.

[Recess.]

Mrs. CUBIN. The Subcommittee will now come to order. Now I would like to introduce panel two: Al Christopherson who is the President of the Minnesota Farm Bureau Federation; Calvin "Cal" Jones, President and CEO of Wyoming Sugar Company; Mr. Bill Jewell, Vice President of Energy, the Dow Chemical Company at the Houston Dow Center; Mr. Keith Rattie, Chairman, President and CEO of Questar Corporation; and William R. Prindle, Deputy Director of the American Council for Energy-Efficient Economy. I would like to welcome all of you and remind you that signal lights are on, that they will be lit, and if you could confine your testimony to 5 minutes, fine. I don't mind if you go over a little bit, but I assure you that your entire statement will be entered into the record. So with that, I would like to recognize to present his statement, Al Christopherson.

STATEMENT OF AL CHRISTOPHERSON, PRESIDENT, MINNESOTA FARM BUREAU FEDERATION

Mr. CHRISTOPHERSON. Thank you. Chairman Cubin, members of the Subcommittee, my name is Al Christopherson, and I am a farmer, raise corn and soybeans and finish out hogs in south central Minnesota. I am also president of the Minnesota Farm Bureau, and I am here today representing the American Farm Bureau Federation and appreciate the opportunity to express how vitally important reliable and affordable energy is to my industry, that of agriculture, and to share our concerns about the looming natural gas prices, the impact the crisis is having on U.S. farmers and ranchers, the need to have accurate inventory data and the need to fully utilize our country's energy resources.

A key energy feedstock of vital importance to agriculture and associated industries is natural gas. The price spikes seen in natural gas futures this past winter would equate to paying over $12 for a single gallon of milk and over $9 for a single loaf of bread. While prices have moderated somewhat—virtually all commercial nitrogen fertilizers in the United States. The planting season of 2000 saw fertilizer at a cost of around $100 per ton. During this spring, farmers faced prices of $350 or more per ton, and the impact on the farmer will mean that the American farmer will pay an extra $10 to $15 per acre more than last year's already high fertilizer

prices. Overall, the U.S. agricultural sector estimates the added expense at $1 billion to $2 billion more than last year just to get the crops put in this spring.

In addition to extremely high fertilizer prices, diesel fuel prices are 40 percent higher than historical averages and electrical prices threatening to skyrocket as the summer heat begins in earnest. All of these energy factors add up to much higher production costs for American agriculture. Now, we face some razor thin margins and the prospects of higher energy prices for the foreseeable future. This added expense cannot be passed on in the price of agricultural commodities.

The current natural gas crisis is a prime example of the failure of today's U.S. energy policy. On one hand, Congress, along with several Federal agencies and programs, have rightfully encouraged the use of natural gas as the environmentally friendly feedstock for electrical generation, home heating and industrial manufacturing. At the same time, the Federal Government has increased the regulatory burden on domestic natural gas exploration, drilling and production and placed moratoriums on many energy-rich areas, such as the Outer Continental Shelf, the Gulf of Mexico and other Federal lands. The energy price instabilities being experienced today do not need to become serious energy crisis in the year to come nor does America need to become dependent on foreign sources when it comes to natural gas than what we currently are with crude oil. Energy-rich repositories such as the Outer Continental Shelf on the Federal lands must be reconsidered for environmentally safe oil and gas exploration and production immediately. The advances made in oil and gas drilling technology will make such an effort the most environmentally sound and responsible capturing of energy feedstocks ever conducted.

Overall, we feel—the American Farm Bureau feels very strongly that America must develop a diversified energy strategy that lowers our dependence on foreign energy sources through improving our domestic supply, including increasing environmentally safe domestic production on our Federally owned lands and resources, along with a strong emphasis on renewable sources.

While there is no single solution to solving the current natural gas crisis, Congress must take steps to add balance to the U.S. energy equation. By acting, the 108th Congress can strike a balance by increasing the domestic production of energy sources on private and Federal lands along with developing renewable energy sources. This will reduce our reliance on foreign sources for our energy needs today and reassert America's energy independence for future generations. Thank you.

[The prepared statement of Mr. Christopherson follows:]

Statement of Al Christopherson, President, Minnesota Farm Bureau, on behalf of the American Farm Bureau Federation

Chairman Cubin, members of the Subcommittee, my name is Al Christopherson, I farm near Pennock, Minnesota and am president of the Minnesota Farm Bureau Federation. I am representing the American Farm Bureau Federation (AFBF) and appreciate this opportunity to express how vitally important reliable and affordable energy is to American agriculture. AFBF also appreciates the opportunity to share our concerns about America's looming natural gas crisis, the impact the crisis is having on U.S. farmers and ranchers, the need to have accurate inventory data and the need to fully utilize our country's energy resources.

Agriculture is more energy efficient than ever before. From the tractors used to work the fields and raise the crops to the industries responsible for refining raw commodities into the final products consumed by the public, energy use has decreased dramatically in agriculture. More than ever before, America's agricultural engine is producing more and more economic benefit with less and less energy. While these energy savings have been realized a growing U.S. economy and population will need more energy security in the future.

A key energy feedstock of vital importance to agriculture and associated industries is natural gas. According to the American Chemistry Council the price spike seen in natural gas futures this past winter equates to paying over $12 for a single gallon of milk and over $9 for a single loaf of bread. While prices have moderated somewhat following the price spike, the current price of $6 per million Btu for natural gas is nearly three times the historical cost average of $2. The negative economic impact of a three-fold increase in the price of natural gas is dramatic.

Federal Reserve Chairman Alan Greenspan, in testifying to the House Energy and Commerce Committee, stated that high natural gas prices "have put significant segments of the North American gas-using industry in a weakened competitive position against industries overseas." Mr. Greenspan went on to say that the current crisis in the availability and price of natural gas could have a significant negative impact on the current U.S. economic recovery. Natural gas is the primary feedstock in the production of virtually all commercial nitrogen fertilizers in the United States. According to The Fertilizer Institute, the planting season of 2000 saw fertilizer at a cost of around $100 per ton. During this spring, farmers faced prices of $350 or more per ton. According to the USDA the impact on the farm will mean that the American farmer will pay an extra $10 to $15 per acre more than last year's already high fertilizer prices. Overall, the U.S. agricultural sector estimates the added expense at $1 billion to $2 billion more than last year just to get the crops planted this spring. Unfortunately, high natural gas prices are threatening the existence of what remains of the fertilizer industry in this country and may further exacerbate America's dependence on foreign sources for not only our energy but also our food and fiber needs.

In addition to extremely high fertilizer prices, diesel fuel prices are 40 percent higher than historical averages and electrical prices threatening to sky-rocket as the summer heat begins in earnest. All these energy factors add up to much higher production costs for American agriculture. With the razor thin margins already being experienced in agriculture and the prospects of high energy prices for the foreseeable future, this added expense cannot be passed on in the price of agricultural commodities.

The current natural gas crisis is a prime example of the failure of today's U.S. energy policy. On one hand, Congress, along with several Federal agencies and programs have rightfully encouraged, via incentives, expanding the use of natural gas as the environmentally friendly alternative feedstock for electrical generation, home heating and industrial manufacturing. At the same time, the Federal Government has increased the regulatory burden on domestic natural gas exploration, drilling and production and placed moratoriums on many energy-rich areas such as the Outer Continental Shelf (OCS), the Gulf of Mexico and Federal lands. If left unchanged, the U.S. energy policy toward natural gas today will certainly result in the loss of even more of our energy independence tomorrow.

The energy price instabilities being experienced today do not need to become a more serious energy crisis in the years to come. Nor does America need to become so dependent on foreign sources when it comes to natural gas than what we are currently on crude oil. Energy rich repositories such as the OCS and Federal lands must be reconsidered for environmentally safe oil and gas exploration and production immediately. The advancements made in oil and gas-drilling technology will make such an effort the most environmentally sound and responsible capturing of energy feedstocks ever conducted.

Renewable energy sources must also play a vital role in America's future energy strategy. Overall, AFBF believes very strongly that America must develop a diversified energy strategy that lowers our dependence on foreign energy sources and improves our domestic supply, including increasing environmentally safe, domestic production on our Federally owned lands and resources.

While there is no single solution to secure America's energy future, Congress must take steps to add balance to the U.S. energy equation. By acting, the 108th Congress can strike a balance by increasing the domestic production of conventional energy sources and developing renewable energy sources. This will reduce our reliance on foreign sources for our energy needs today and reassert America's energy independence for future generations.

Mrs. CUBIN. Thank you, Mr. Christopherson. And, once again, I failed to recognize the new policy by the Chairman. Would you mind standing and be sworn in with your testimony.

[Witnesses sworn.]

Mrs. CUBIN. Thank you. Now, I would like to recognize Mr. Jones for his statement.

STATEMENT OF CALVIN JONES, PRESIDENT AND CEO, WYOMING SUGAR COMPANY, LLC

Mr. JONES. Good morning and thank you, Chairman, and thank you also for the kind words in your opening remarks. It is a pleasure for me to address this Committee this morning.

Mrs. CUBIN. Could you pull the microphone up closer so that it is easier for the stenographer to get—thank you.

Mr. JONES. It is important for me this morning to testify about the supply and demand of natural gas, as it is a very important cost driver in our business. And I want to share with you the importance and the demand destruction that is and may continue to plague our industry. I am here today representing the State of Wyoming and our company, Wyoming Sugar Company, LLC. You see, Wyoming Sugar Company is the smallest independent public company in the beet sugar industry.

The State of Wyoming has three beet sugar factories currently operated by two companies, Wyoming Sugar Company and the Western Sugar Cooperative. The beet sugar factories in Wyoming create 684 jobs. This industry generates over $1 million in economic activity in Wyoming. The beet sugar industry is part of the larger U.S. sweetener industry, which consists of sugar beets, sugarcane and corn. This creates $21.1 billion in economic activity in 42 States each year.

The industry provides American consumers high-quality sweeteners, and these same consumers pay 22 percent less than their counterparts in other developed countries. Over 1,4000,000 acres of sugar beets are grown in 12 States with processing done by 27 different independent sugar beet factories. This industry creates over 372,000 full-time direct and indirect jobs for people across this Nation.

The history of the Wyoming Sugar Company is short, as we began business 1 year ago. Although the Wyoming Sugar Company is new, the factory has been in Orland, Wyoming and operated continuously since 1916. I mention this because Wyoming is at risk of losing a business that has provided jobs and economic activity in the Big Horn Basin region, Freemont and Hot Springs Counties for 87 years. The culprit is costs, which I want to address this morning.

First of all, the drought, which we have experienced the past 4 years, and which is well documented, is a factor and must not be overlooked. Our focus and goal has been to address the costs we have control over. There is little we can do with the drought situation until weather returns to more normal patterns. I want to share with you today our major cost drivers, one being jobs or labor and then products and supplies or the purchases we do. First, in labor, our one factory provides employment for 54 full-time and 125 seasonal employees, along with another 49 contracted laborers. An

annual payroll in excess of $4 million including benefits and workman's compensation is paid.

A reminder not included in these figures is the growers hired labor. You see, sugar beet agronomy is very labor intense when compared with other rotational crops, and additional field hands to plant, irrigate, spray and harvest are needed. Rotational crops are needed to be good stewards of the soil, and sugar beet is a good rotational crop in the central part of Wyoming. Our employees at Wyoming Sugar have bought into our business by electing to take 21 days off last year to show their commitment with an in-kind contribution to the business.

Now to speak a little bit about purchases. We at our factory purchased nearly $17 million worth of goods, mostly from within the State of Wyoming. The greatest single cost in this category of costs of course is raw product sugar beets. However, followed closely is the purchase of products and supplies to process the sugar beets into finished goods. Our natural gas cost is the greatest process cost we encounter. Last year, we spent over $1.2 million for natural gas for 90 days of processing. This year, we are looking at double or two and a half times this cost, a cost that will cause red ink to flow in our business. This has been referred to as demand destruction in the natural gas business. It is real destruction of a business, and it is related to economic activity.

We have reduced our energy needs over the years and continue to look for opportunities to become more efficient. Wyoming Sugar Company completed the first year without hurting our financial position. There were sacrifices, though. Our employees have had their wages held at previous year's rates, our shareholders did not receive a return on their investment, and our profit picture for this year is very dismal. The culprit is natural gas costs.

Last year's results were influenced by three items: Our incumbent's financial instability, second one was the drought, which I previously mentioned and the effect on sugar beet planting, and the third was the cost of energy. This year, our budget is influenced by the ongoing drought that I have mentioned and the projected cost of natural gas. As Federal Reserve Chairman Greenspan stated last Tuesday, "High natural gas prices could weaken some key American industry's abilities to compete. I am here today to inform you that, grassroots America, this is happening.

Natural gas producers also face a dilemma. The permitting process on Federal lands has increased from 45 days a year ago to what I am told to be 175 days currently in Wyoming. Reducing this time lag would allow more drilling and increased production. Unlike the power industry, the sugar industry cannot pass onto consumers the added costs through rate Adjustments. Our industry just simply doesn't have the mechanism.

In closing, the beet sugar industry has since 1996 seen the closure of eight processing factories. More recently, in February of this year, the Western Sugar Cooperative suspended its Greeley, Colorado factory operations due to costs. The main issue is cost of production. Whether from the agronomic cost of the grower or the production cost at the factory, both are related to energy costs and availability. It is a shame my company's business, located in the second largest producing State, is at this kind of risk because of

high commodity and transport costs for our major cost driver, natural gas. I thank you for this opportunity.

[The prepared statement of Mr. Jones follows:]

Statement of Calvin Jones, President & CEO, Wyoming Sugar Company, LLC

Good Morning, and thank you Chairwoman Cubin and committee members for allowing me this time to testify before you.

I am here representing the Beet Sugar Industry as part of a much larger "Sweetener Industry" that consists of sugarbeet, sugar cane and corn. This industry annually creates $21.1 billion of economic activity in 42 states. The industry provides American consumers with high quality sweeteners for various applications. American consumers pay 22 percent less than their counterparts in other developed countries. (Chart 1).

The beet sugar segment of this industry plants over 1,400,000 acres of sugar beets in 12 states that are processed by 27 beet sugar factories. The industry creates 88,200 full time direct and indirect jobs for people across the nation.

Wyoming is one of the 12 sugar beet producing states where over 400 growers produce about 56,000 acres of sugar beets. Those beets are then processed by three factories operated by two companies, Wyoming Sugar Company, LLC and Western Sugar Cooperative. The economic activity generated in the state of Wyoming each year by the Sweetener Industry is $159,600,000.

The U.S. Sweetener Industry is integral to the national economy, as a well as each state where sweeteners are grown and processed. Current United States sugar policy allows efficient U.S. beet, cane and corn growers and processors to compete against unfair foreign subsidies and trade practices. The program provides reliable supplies of sugar at fair and stable prices. Moreover, it operates at a minimal cost to the taxpayer.

Sugar is the only major commodity program in the 2002 Farm Bill that is designed to operate at no cost to the U.S. taxpayers. Most years, in fact, U.S. sugar policy has been a revenue raiser for the U.S. government. (Chart 2).

To cope with the declining real prices for their product, (Chart 3) American sugar farmers and processors have made extraordinary adjustments. Since 1996, 19 sugar beet factories or cane processing mills have closed. That accounts for more than one-fourth of all the factories and mills operating in 1996. (Chart 4). Some geographic regions, including portions of Hawaii sugar cane, Northern California beets, and all of Texas beets have exited the sugar business altogether. Equally upsetting, other areas, such as Louisiana cane, have been forced to concentrate their production at the most efficient mills.

The combination of a decline in sugar prices and higher cost of production is directly responsible for a number of plant closures. As a case in point, the Texas beet operations that I managed for several years were negatively impacted by high energy costs. Texas Panhandle sugar beet growers use natural gas powered water irrigation pumps to irrigate their crops. The high cost of natural gas negatively impacted the economics involved in crop irrigation. Similarly, the sugar beet processing factories were directly affected by high energy costs due to their reliance upon natural gas as a fuel source for processing the raw sugar beet. Both partners, the sugar beet growers and the factory, were unable to continue in the business. The natural gas industry calls that type of plant closure "demand destruction."

On February 10, 2003, the Western Sugar Cooperative announced that it was suspending maintenance operations at its Greeley, Colorado facility. Due to the drought, thousands of acres of beets will not be planted in the Greeley "growing area."

The beets that are being grown in the Greeley factory area will be transported to Fort Morgan, Colorado for processing. The Fort Morgan plant has a higher "beet slicing capacity" and is coal fired, where Greeley is gas fired. The additional freight costs are more then offset by the differential in fuel costs.

The sugar beet industry has also been faced with another unexpected "commodity challenge." That commodity is water, or the lack thereof. Sugar beet crops will not grow without water. In order to sustain and grow crops, the 21 states of beet sugar production require water either from reservoir systems (Irrigation projects) or natural precipitation during the growing season (Dry land production). Drought has affected both these areas from time to time. Currently, Wyoming production is "ground zero" relative to the existing drought cycle. Over the past three years, acreage planted in sugar beets and the resulting crop yields (2003 should be considered the fourth year) have been severely depressed due to the ongoing drought situation.

(Chart 5). Please note that the states most affected by the ongoing drought are indicated in red. Both "Area Harvested" and "Yield" of the 2001/2002 crops have been negatively affected. To better depict this crises, the U.S. Drought Monitor illustrates the current situation! (Chart 6).

The sweetener business is driven by three main costs. Of course, the growing and harvesting of the raw product accounts for the greatest cost, which, in our case, is the sugarbeet. Our growers are our partners in this business since the sugar price influences the compensation the grower receives for the crop they have invested in throughout the growing season. This concept, which is unique to the sugarbeet industry, is defined as a "participating contract." The Wyoming Sugar Company's contracted growers made a financial commitment to our company through the purchase of stock shares in the company. However, an investment is not required by our company by growers to contract and grow sugar beets for processing.

The other major costs driving the sweetener business are labor and process purchases. Labor refers to the jobs and associated economic activity within the local communities. Our labor force at Wyoming Sugar Co. bought into the business with an "in kind" contribution of 21 days without pay last year. These are family "bread winners" who risked their family budgets to see this industry succeed. Worland's labor force has also agreed to a wage freeze for the next two years, another indication of their commitment to our business.

"Process purchases" refers to process supplies and energy needs. The greatest single cost in this category is energy. I am mainly referring to Natural Gas since this is the fuel of choice for our company. Recently, the NYMEX prices for natural gas (Chart 7) have dramatically risen. In contrast, sugar prices have been plummeting (refer to chart 3). Because of these opposing price trends, one can see the squeeze sugar companies are facing!

The beet sugar business is very labor and energy intensive. We are one of the few industries within the United States that processes a raw product into a consumer available finished product all within close proximity (80 miles) to the factory. Our effort is an example of a value added effort in the conversion of a raw product to a finished product!

Sugar is more affordable in the United States than virtually anywhere else in the world. In terms of "minutes of work" to purchase a pound of sugar, the United States is the third lowest of the 49 countries that LMC International LTD (LMC) studied, both developed and developing. (Chart 8). The "1.9 minute" U.S. figure is below the "free Market" Australia and Canada numbers, less than half the developed-country average, only a third of the work average, and 70% below Brazil.

In terms of sugar expenditures as a percent of per capita income, the United States is the lowest in the world. (Chart 9). American consumers also benefit from the availability of low-priced, U.S. made corn sweetener.

Beet sugar economics also directly impact the value of farmland. Sugar beet production affects irrigated farmland prices even in counties that do not produce sugar beets. A significant reduction in Montana irrigated farmland prices (19 percent to 35 percent) can be expected in the absence of sugarbeet production. The same affect can be expected in other sugar beet producing states that utilize similar rotational crop choices.

That is the industry I am representing, more pointed I am representing my company, Wyoming Sugar Company, LLC, and the beet sugar industry of Wyoming. Wyoming is the second highest ranking state in natural gas production. It is ironic and alarming that industries within the state of Wyoming are at risk of closing due to high natural gas prices. Perhaps even more ironic, natural gas producers in Wyoming currently receive the lowest price for their commodity as compared to any other natural gas producing region in North America. Despite the relative "price lag" relationship for Wyoming gas producers, the Wyoming Beet Sugar factories will see their cost of gas increase nearly 2.5 times last year's actual price paid.

Wyoming Sugar Company, having been a part of the state's economy for 97 years, is at risk of closing as a result of high natural gas prices. Unlike natural gas utilities that purchase and supply natural gas to residential and commercial customers, the beet industry cannot simply vote to immediately "pass through" its higher cost of gas to its customers.

As the Federal Reserve Chairman, Alan Greenspan, stated on Tuesday, June 10, 2003, high natural gas prices could weaken some key American Industries' ability to compete. I am here today to inform you from grass roots America that this is, in fact, happening!

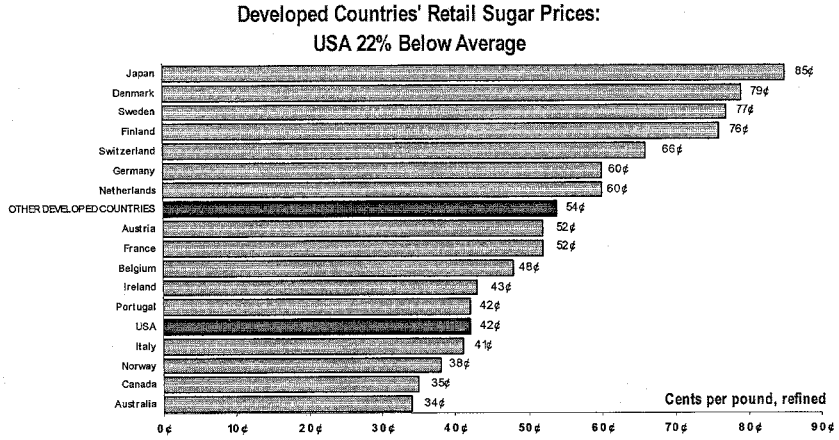
We feel these price increases may be temporary. However, temporary or not, our company and industry cannot survive long term with these cost increases.

Natural gas producers face a dilemma as well. The approval and issuance of permits to drill following an application has increased three fold in the past year. I am

told that in one particular Wyoming BLM office, what in the past took 45 days for Federal land permitting, is now, taking approximately 175 days. If this process were streamlined, more natural gas production, or at least the potential for more production, might be available. Additionally, the Federal Government should consider some method of encouraging marginal natural gas wells to become more productive or brought back into production. Such an effort would increase supplies or at least have the potential to do so.

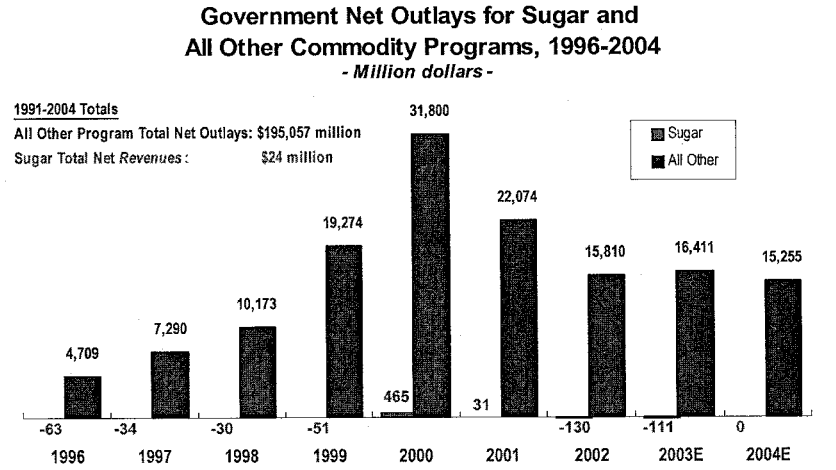
We can manage with the non-controllable factors such as the drought and weather related issues. The controllable items are the ones we all have to address to continue our way into the future. As I have explained today, one of these items is the burner tip cost of natural gas at our processing factory.

Chart # 1



Source: LMC International Ltd., Oxford, England, February 2003; 2002 prices.
"Other Developed Countries" represents the weighted average of 21 foreign developed countries.

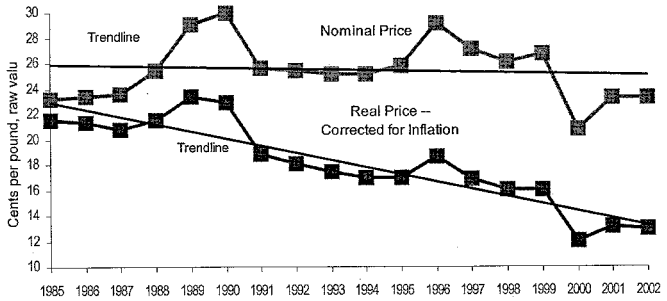
Chart # 2



Data source: USDA/FSA, 2/3/03; All commodities net outlays 1991-95: $52.2 billion. Sugar: 1991-99 -- revenues from sugar marketing assessment tax (1991-95
2000-01-- value of sugar forfeited to, or purchased by, government, plus storage costs; 2002-03 -- revenues from sale of CCC sugar onto market at a profit.

Chart # 3

U.S Wholesale Refined Sugar Prices, Nominal and Real, 1985-2002



Data sources: USDA, BLS. Wholesale refined beet sugar, Midwest markets. Annual averages, 1985-2002, adjustec

Chart # 4

19 PERMANENT SUGAR MILL CLOSURES SINCE 1996

BEET CLOSURES

Spreckels Sugar, Manteca
California, 1996

Holly Sugar, Hamilton City
California, 1996

Western Sugar, Mitchell
Nebraska, 1996

Great Lakes Sugar, Fremont
Ohio, 1996

Holly Sugar, Hereford
Texas, 1998

Holly Sugar, Tracy
California, 2000

Holly Sugar, Woodland
California, 2000

Western Sugar, Bayard
Nebraska, 2002

CANE CLOSURES

Ka'u Agribusiness
Hawaii, 1996

Waialua Sugar
Hawaii, 1996

McBryde Sugar
Hawaii, 1996

Breaux Bridge Sugar
Louisiana, 1998

Pioneer Mill Company
Hawaii, 1999

Talisman Sugar Company
Florida, 1999

Amfac Sugar, Kekaha
Hawaii, 2000

Amfac Sugar, Lihue
Hawaii, 2000

Hawaiian Commercial & Sugar, Paia
Hawaii, 2000

Evan Hall Sugar Cooperative
Louisiana, 2001

Caldwell Sugars Cooperative
Louisiana, 2001

***In 2003, 27 beet and 25 cane mills ren**

Chart # 5

Crop Production Report
U.S. Department of Agriculture, National Agricultural Statistics Service
Released June 11, 2003

Sugarbeets: Area Planted and Harvested, Yield, Production, Price, and Value by State and United States, 2001-2002 1/

State	Area Planted 2001	Area Planted 2002 2/	Area Harvested 2001	Area Harvested 2002 2/	Yield 2001	Yield 2002 2/
	1,000 Acres				Tons	
CA	46.6	50.2	44.7	49.9	35.7	39.5
CO	41.5	43.9	36.8	39.5	22.4	20.1
ID	199.0	212.0	179.0	210.0	25.9	24.3
MI	180.0	179.0	166.0	177.0	19.4	18.1
MN	468.0	505.0	426.0	476.0	18.3	18.6
MT	57.4	58.0	53.5	55.9	21.5	19.6
NE	48.6	57.0	41.4	42.0	20.3	18.1
ND	261.0	265.0	237.0	258.0	18.1	18.6
OH	0.8	1.9	0.6	1.8	20.0	20.6
OR	11.9	11.3	9.7	11.0	29.9	27.4
WA	7.2	4.0	7.1	4.0	35.6	35.0
WY	48.5	40.0	41.6	36.0	20.6	18.3
US	1,370.5	1,427.3	1,243.4	1,361.1	20.7	20.4

Chart # 6

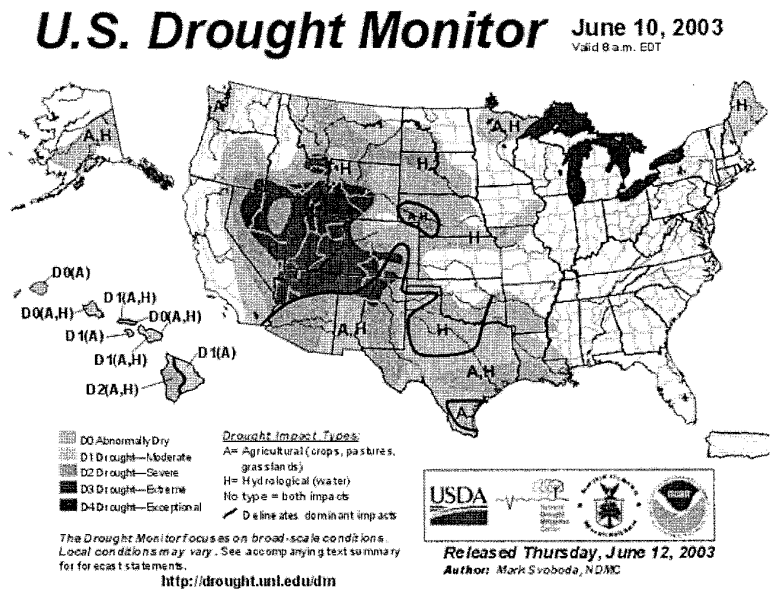


Chart # 7

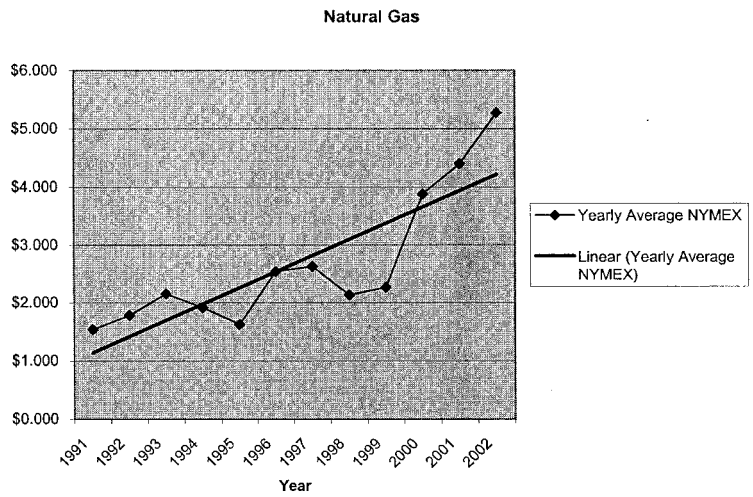
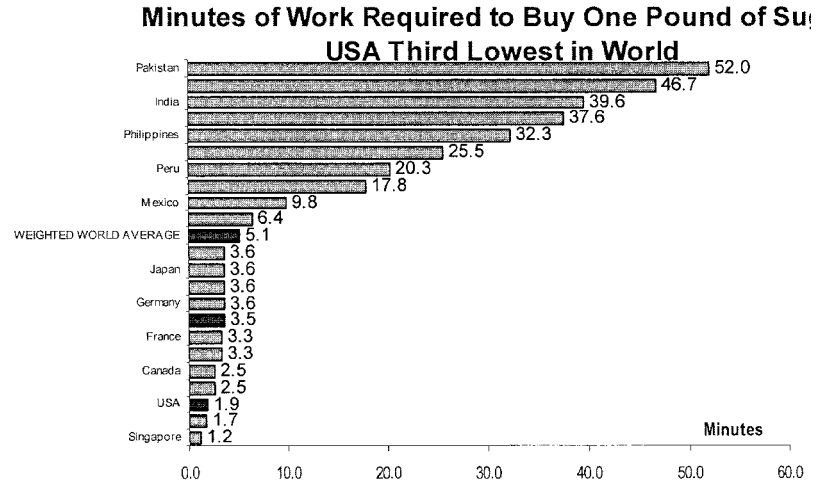
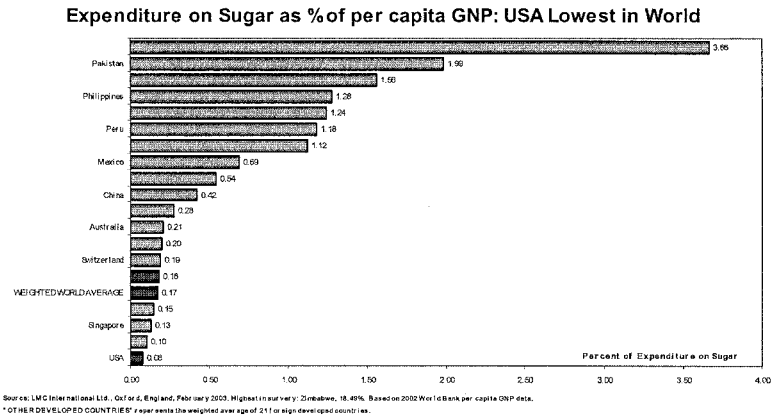


Chart # 8



Source: LMC International Ltd., Oxford, England, February 2003. Study of 49 countries, accounting for approximately 80%of global sugar consumption, 200
502 minutes. Based on 2002 World Bank per capita GNP data. "OTHER DEVELOPED COUNTRIES" represents the weighted average of 21 foreign develope

Chart # 9



Mrs. CUBIN. Thank you. Now I would like to recognize Mr. Jewell who has testified in front of this Committee before, I think, or at least talked about—

STATEMENT OF BILL JEWELL, VICE PRESIDENT, ENERGY, DOW CHEMICAL COMPANY, THE HOUSTON DOW CENTER

Mr. JEWELL. Not on energy but I am glad to have the opportunity this time.

Mrs. CUBIN. Well, I am glad too. I am a chemist by training, and I am very interested in your testimony.

Mr. JEWELL. Well, good morning, Madam Chairman. I am Bill Jewell, vice president of Energy for Dow Chemical Company, speaking on behalf of Dow and the American Chemistry Council.

Like agriculture, the chemical industry competes globally. Consumers will pay $70 billion more for gas in 2003 than 2002—$70 billion. Supply and demand for natural gas are basically out of balance resulting from policies that promote demand overlaid with policy that restricts supply. Natural gas storage levels are low, and it will take a cold, rainy summer to get us to the level needed for this winter. Praying for rain is not a substitute for rational energy policy. This shortfall developed while the economy was weak. Industrial production peaked back in 2000 ending with a $10 gas spike and has not recovered.

Now that is a valid question as to whether we can supply enough natural gas to have a strong economy. The gas production has been stagnant since 1994 and actually declined in 2002. In the past, high prices brought a production response but that no longer seems to be true. The natural gas industry has tripled the number of rigs drilling new wells over 15 years and the number of producing gas wells has also tripled and production is declining. With gas production having peaked in the U.S. in 1971 it could not be more clear that the industry needs access to new areas.

Demand for natural gas by residential and commercial users has barely grown over 30 years with better insulation. Industry's use

of gas hasn't grown either, but demand for gas and power is booming—up almost 40 percent in 5 years as almost all new power plants have been based on gas. This over-reliance on gas as a growth fuel for power generation is why we are having this crisis. Chairman Greenspan was asked if Congress could do anything short term to deal with this shortage and he said, no. There are some things that government can do.

Conservation will reduce demand and the price. The Nation makes 20 percent of its electricity from gas, and that 20 percent is the high cost increment. In general, any electricity supplied would come out of—any electricity would come out of this high-cost increment. Five percent savings in power use would cut the gas going into power by 25 percent. No other short-term remedy can free up as much gas. We recommend the President set an aggressive goal to reduce electricity and gas consumption by Federal agencies immediately. The President should also call upon the public to conserve. And for its part, at Dow, we have made a public commitment to improve energy efficiency by 20 percent through 2005, and we are also engaged in some interesting renewable projects, small but interesting.

Another way to reduce gas demand would be to promote switching to distillate fuels. Many of the new power plants are equipped to burn distillate but are limited by a permit to a few days a year. This would not be a permanent answer but could temporarily balance demand and prevent price spikes. For the medium term, Congress, with the aid of this Committee, should make all reasonable efforts to increase domestic natural gas production. Congress should end the moratoria on exploration and production for gas on Federal lands on and offshore and direct the Department of Interior to proceed with leases in those areas. Permitting and production facilities and pipelines to access new gas supply should be streamlined, and other incentives should be developed.

All this should be done while taking care on the environmental footprint, and at that time we must also consider the environmental consequences of not increasing domestic gas supply. Responsibly produced natural gas is key to improving air quality and reducing greenhouse gas emissions in all States. Other nations with strong environmental beliefs know the link between their environmental goals and natural gas, and they are pushing its production on and offshore. Norway, Great Britain, Canada are all producing gas off their shores. The point here is that gas is being produced responsibly in environmentally aware countries. Congress should encourage States to support natural gas production off their shores.

Long term, we must recognize how the U.S. consumes its energy. The largest sector of use is electric power at 40 percent of our energy. It is larger than transportation. It is also the fastest growing sector. Oil, coal and nuclear provide 70 percent of our Nation's fuel mix. Natural gas is only able to provide a declining 23 percent. We are trying to fuel practically every new kilowatt of electricity with gas, a fuel source that has been in steady decline. It won't work. Electricity must come from a diverse mix of nuclear, cleaner coal, renewables and new natural gas production.

I am hopeful that Congress and the Administration can address these challenges. People speak easily of a self-correcting mechanism. What they are really saying, what they really mean by that are job losses. The Nation must either stretch its gas supply or destroy jobs. Thank you.

[The prepared statement of Mr. Jewell follows:]

Statement of Bill Jewell, Vice President, Energy, The Dow Chemical Company, on behalf of The American Chemistry Council

Dow is a leading science and technology company that provides innovative chemical, plastic and agricultural products and services to many essential consumer markets. With annual sales of $28 billion, Dow serves customers in more than 170 countries and a wide range of markets that are vital to human progress, including food, transportation, health and medicine, personal and home care, and building and construction, among others. Committed to the principles of Sustainable Development, Dow and its approximately 50,000 employees provide significant positive contributions that improve not only the global economic condition but also the environment around us.

Dow people around the world develop solutions for society based on Dow's inherent strength in science and technology. For over a decade, we have embraced and advocated Responsible Care—a voluntary industry-wide commitment to safely handle our chemicals from inception in the laboratory to ultimate disposal. This worldwide commitment helps consumers lead better lives, customers succeed, stockholders prosper, employees achieve and communities thrive.

For Dow as for the Chemical Industry in general, natural gas is an essential fuel and raw material. Natural gas is used to generate electricity and steam using highly efficient and environmentally sound Combined Heat and Power (CHP). Other components of natural gas, such as ethane, propane, butane, pentane, and natural gasoline are major raw material "feedstocks" used to make the basic building blocks of organic chemistry. This dual importance of natural gas makes efficient use of this resource an imperative for Dow and the industry. For example, Dow working to achieve its publicly stated goal of reducing the amount of energy needed to produce a pound of product by 2 percent per year from 1995–2005. This is in addition to a 20 percent improvement from 1990–1994.

In response to challenging business conditions brought about partly from the rising cost of energy, Dow is dedicating additional resources and programs to reduce energy usage. Dow is also undertaking projects to use renewable energy, as evidenced by a recent decision to tap landfill gas to power a plant on Georgia, and the announced collaboration with General Motors to generate up to 35 megawatts of fuel cell power at its site in Freeport, Texas, using by-product hydrogen from its manufacturing processes.

The American Chemistry Council (ACC) represents the U.S.'s leading companies engaged in the business of chemistry. ACC members apply the science of chemistry to produce innovative products and services that make people's lives better, healthier and safer. ACC is committed to improved environmental, health and safety performance through Responsible Care, common sense advocacy designed to address major public policy issues, and health and environmental research and product testing. The $460 billion business of chemistry is a key element of the nation's economy. It is the country's largest exporter, accounting for ten cents out of every dollar in U.S. exports. Chemistry companies invest more in research and development than any other business sector. Safety and security have always been primary concerns of ACC members, and they have intensified their efforts, working closely with government agencies to improve security and to defend against any threat to the nation's critical infrastructure.

Today's hearing comes at a time when the United States is facing a natural gas crisis. Prices for natural gas in the U.S. are the highest in the world. American consumers will pay $70 billion more for gas in 2003 than in 2002—- $70 billion. Natural gas storage levels are near record lows. Only continued record injection rates, helped by a mild summer, will ensure adequate supplies this winter. Clearly, supply and demand are out of balance, and weather is neither the cause nor the answer. And, praying for rain is a poor substitute for a rational energy policy.

Factors Fueling the Natural Gas Crisis

An array of factors is contributing the unprecedented costs for natural gas. Here are some key indicators:

- Last winter, the nation experienced the largest supply deficit in history, 1.5 trillion cubic feet.
- Current storage figures are below historical averages (25 percent below as of 6/6/03) in spite of recent record injection rates.
- Domestic gas production has been decreasing as five of the nation's largest supply areas are in decline.
- Demand for natural gas by U.S. electric power generators has risen by 33 percent in the past 5 years as nearly every power plant constructed during that period is natural gas fired.
- Imports from Canada are poised to decline sharply their electric utilities place greater reliance upon gas to meet emissions targets under the Kyoto Protocol and production drops off in more mature fields.
- Last month, the Northeastern NOx reduction plan commenced, encouraging greater reliance upon natural gas for power generation.
- Markets remain jittery as Congress has shown little willingness to support policies that would significantly increase production.

This current shortfall developed while the economy was struggling and was further masked by a string of mild winters. As a result, overall demand growth was suppressed. Yet in January of 2001, prices reached a then record high of over $10.00. In the past, price increases have brought a production response, but today that no longer seems true. In the wake of the January 2001 price increase the "rig count" peaked at over 1,000. However, these new rigs were being put into mature fields and the result was a negligible increase in production. As prices climbed during the summer of 2002, after falling below $4.00 in late 2001, gas producers failed to show the same response, because they now understand that putting new rigs in old fields is not a wise investment.

A further indication of the decline of existing domestic gas fields is that the natural gas industry has tripled the number of rigs drilling new wells over 15 years. The number of producing gas wells has also tripled—yet production is still declining. With gas production having peaked in the U.S. in 1971, it could not be clearer that the industry needs access to new areas.

Demand for natural gas by residential and commercial users has barely grown over 30 years—thanks to better insulation and other efficiency improvements. Industry's use of gas hasn't grown either. But the demand for gas in the power sector is booming—up almost 40 percent in 5 years, as almost all new power plants have been based on gas. This over-reliance on gas as a growth fuel for power generation is why we have a natural gas crisis.

In his appearance before the Energy and Commerce Committee last week, Federal Reserve Chairman Alan Greenspan was asked if Congress or the Administration could do anything to improve the short term situation. His answer was a flat "No." Dow does not hold as pessimistic a view as Chairman Greenspan, but we do understand that the options are limited and would not by themselves supplant the need for more gas production.

Policy Recommendations

- Enact provisions to streamline permitting of new natural gas production and transmission facilities
- Reform the Coastal Zone Management Act to ensure timely resolution of permit applications and provide greater certainty for all participants
- End current moratoria on exploration and production on Federal lands both on and off-shore and direct the Department of Interior to proceed with leases in those areas.
- Bolster the recent rule by the Department of Interior to encourage "deep gas" production.
- Provide royalty relief and other incentives to encourage greater production from marginal wells both on and off-shore.
- Provide for reimbursement of private party NEPA costs that are the responsibility of the Federal Government.

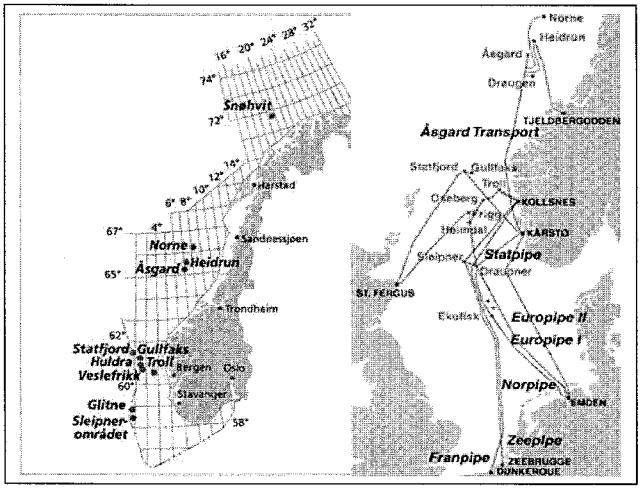
Among the limited options to moderate prices and improve the storage situation going into the winter months, the most important is conservation. Currently the nation generates a little over 20 percent of its electricity from gas and a large portion of that is from gas-fired "peaker units" that only operate at periods of high demand. A reduction in electricity demand from conservation would first back out power from these peaker units and save natural gas. Dow's internal estimates, derived from data from the Energy Information Agency, project that a 5 percent saving in power use could cut gas use for power generation by 25 percent. For the summer months no other remedy can free up as much gas.

To this end, we recommend that the President set an aggressive goal to reduce electricity and gas consumption by Federal agencies immediately. The President must also call upon the public to conserve. For its part Dow has stepped up to the plate with a public commitment to improve its energy efficiency 20 percent from 1995 through 2005.

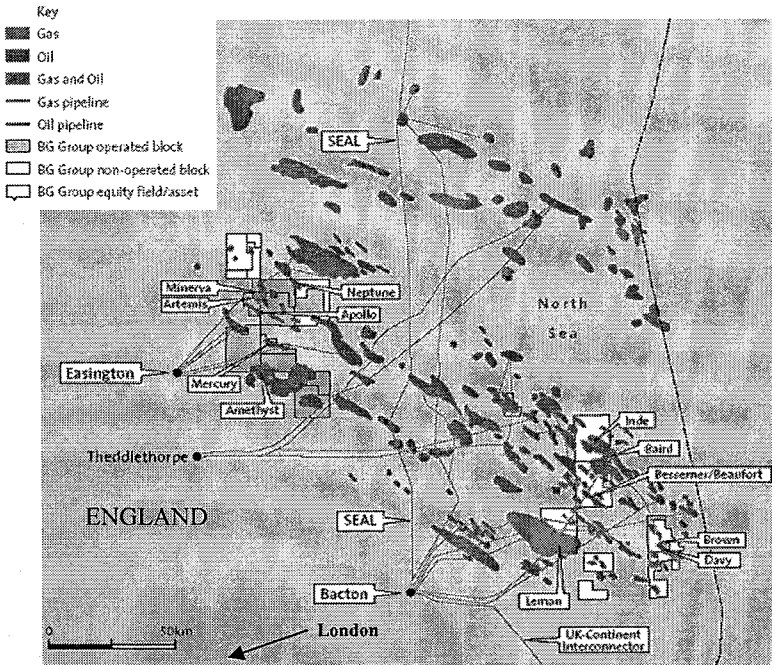
Another way to reduce gas demand would be to encourage power generators to switch to distillate fuels. Many new power plants are equipped to burn distillate but are limited by permit to only a few days per year. Improving flexibility for these plants can go a long way to ensure that our natural gas supplies are not depleted for summer power generation and are available to heat homes and power industries this winter.

For the medium term, Congress, with the aid of this Committee, should make all reasonable efforts to increase domestic natural gas production. Congress should end the moratoria on exploration and production for natural gas on Federal lands, both on and offshore. The Department of Interior should be directed by Congress to begin the process of leasing those areas as quickly as possible. Permitting of production facilities and pipelines to access new gas supply should be streamlined. Incentives for states to allow production should be developed. All these should be done while taking care to consider the environmental impact. However, we must also consider the environmental consequences of our failure to increase domestic gas supply. Responsibly produced and affordable natural gas is key to achieving our broader environmental goals, including improving air quality and reducing greenhouse gas emissions.

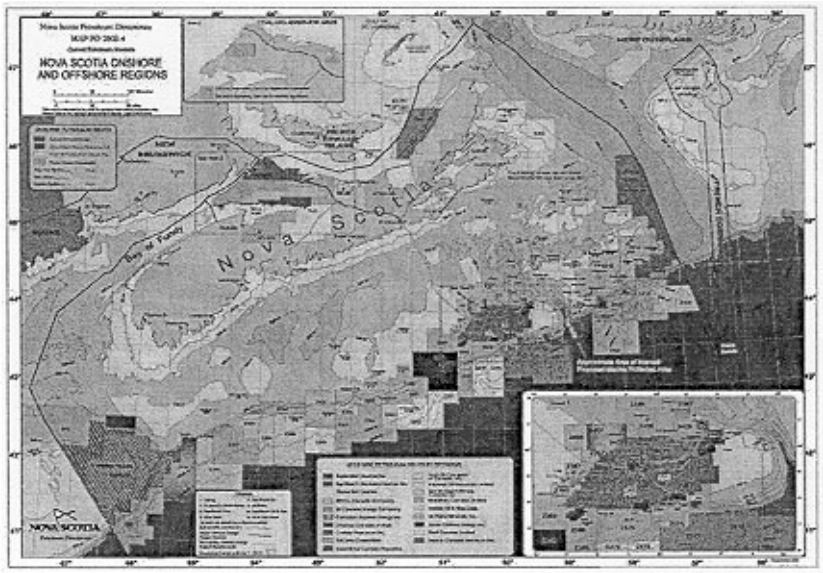
Other nations with strong environmental ethics recognize the inextricable link between their environmental goals and natural gas, and are encouraging production both on- and offshore. Countries such as Canada, Great Britain, Norway, and Japan have recognized that increasing their domestic production of natural gas will help them improve their environmental conditions and continue to grow their economies. Great Britain and Norway have aggressively pursued natural gas production off their coasts in the North Sea.

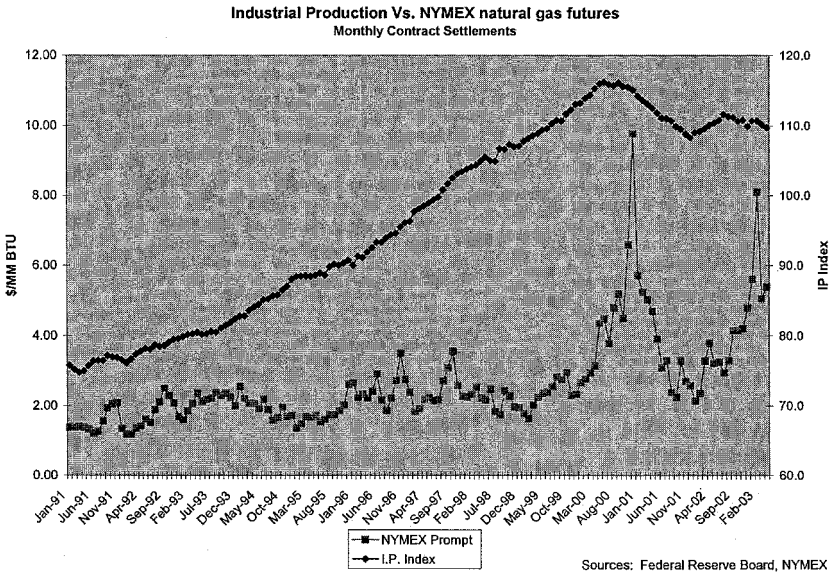


Norway's Statoil is the largest producer in the eastern half of the North Sea. At the far left is a map of the lease areas with the Statoil production platforms marked. Also at left is a map of undersea pipelines that connect the various rigs in to England and the Continent.


Key
Gas
Oil
Gas and Oil
Gas pipeline
Oil pipeline
BG Group operated block
BG Group non-operated block
BG Group equity field/asset
SEAL
Minerva
Artemis
Neptune
Apollo
North
Sea
Easington
Mercury
Amethyst
Inde
Baird
Theddlethorpe
Bessemer/Beaufort
ENGLAND
SEAL
Brown
Davy
Bacton
Leman
0
50km
London
UK-Continent
Interconnector

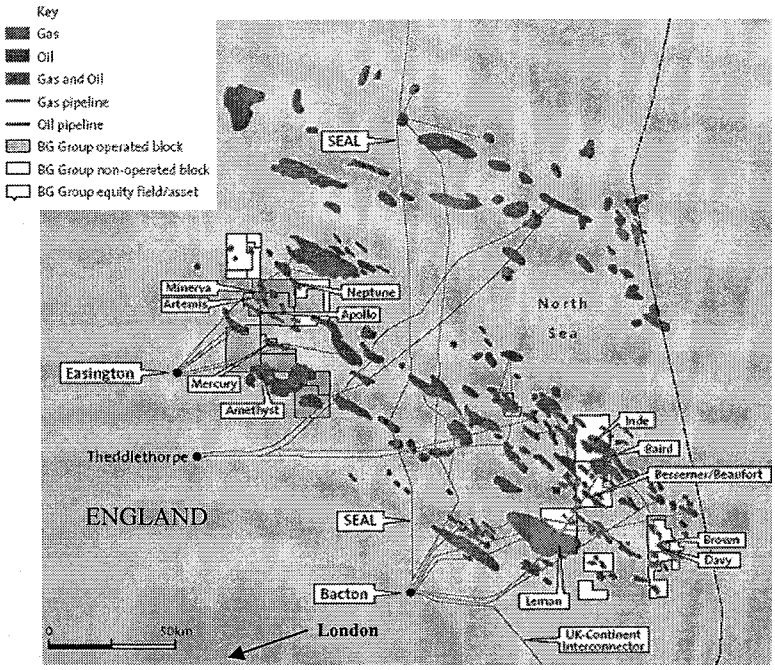
SAKHALIN ISLAND
Odoptu
Arkutun
Dagi
Chayvo
Okha
Sakhalin I
Sakhalin Island
Yuzhno-Sakhalinsk
Vladivostok
Sapporo
Niigata
TOKYO
Osaka





British companies have also been encouraged to explore for and produce natural gas off of that nation's shores. Below is a map of one company's (BG Group) natural gas and oil production operation off the eastern coast of England. Some fields are being safely and cleanly produced as close as 25 miles from shore. Many additional gas fields to the North are also being produced.

England, once a nation heavily dependent upon imported energy, is now one of the world's leading exporters of energy because of its willingness to allow for production off its shores. The British economy that, as recently as the 1970s, was crippled by energy shortages is now enjoying a period of extended price stability and sustained growth.

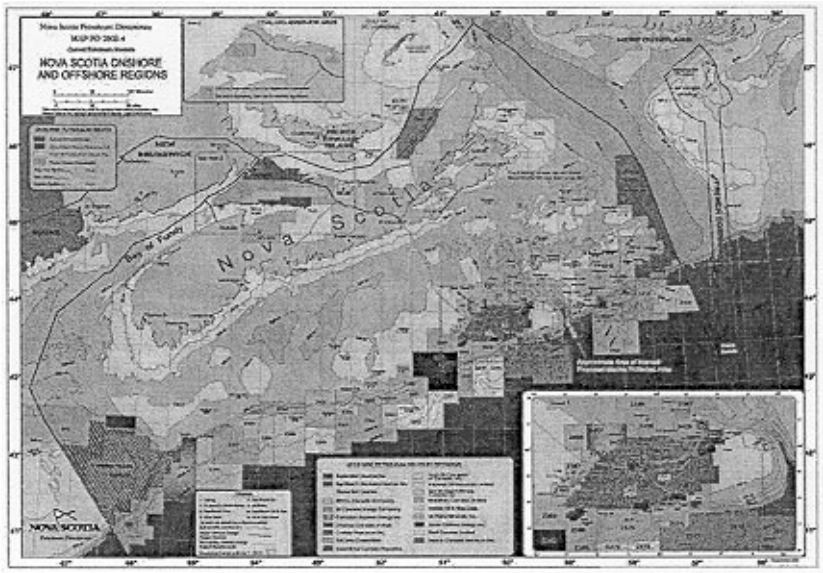


Other European nations are benefitting from natural gas imports from the North Sea and from the former Soviet republics. The fall of the Eastern Bloc has allowed for natural gas once trapped due to political boundaries to now flow into Western Europe, helping to fuel industry and attract jobs.

Japan has also undertaken natural gas production both on-shore as well as near shore. Its Iwaki Gas Field, less than 30 miles from the Japanese mainland, began production in the mid–1980s and continues today. Notoriously energy resource poor, the Japanese have welcomed natural gas discoveries off their shores as well as those to their north off of Russia's Sakhalin Island.

Closer to home, Canada has also realized that its environmental goals are riding on the back of natural gas. Sizable natural gas finds off of Nova Scotia buoyed not only Canada's energy markets but benefitted nearby New England gas consumers. Production on these off shore fields began in the late 1990s. More new drilling rigs are scheduled to go into the field in the coming years, as well, to meet Canada's growing demand and environmental goals.

Below are maps indicating the location of gas production facilities both on and off of Nova Scotia.



Looking to the future, the U.S. must take a comprehensive look at environmental and economic goals. As Norway, Britain, Japan and Canada have demonstrated, there need not be a choice between a clean environment and energy production. Natural gas prices in Europe are currently well below those in the U.S. Canada's prices have recently moved upward as a result of its market being integrated with ours. Japan's market, which competes with the U.S. for shipments of liquid natural gas (LNG) brought in by ship, has for the first time in history enjoyed prices comparable to ours, yet more stable.

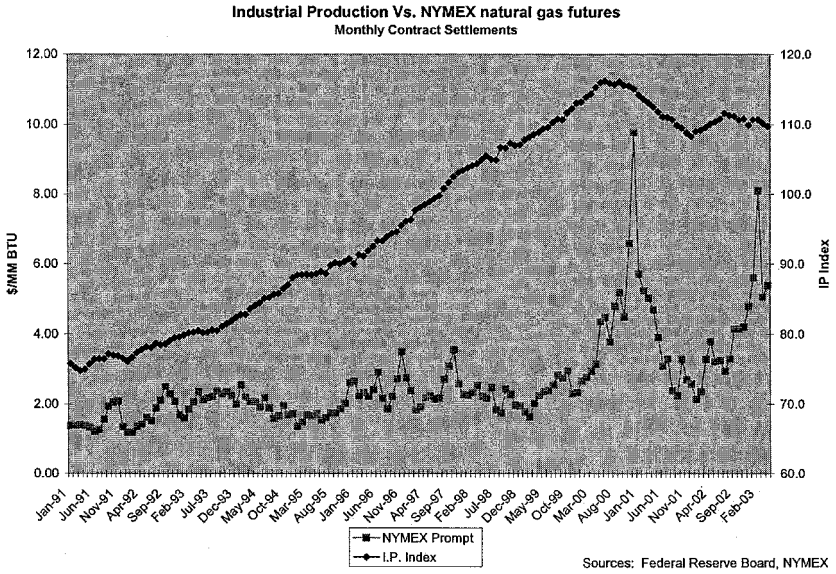
Like the United States, these countries have encouraged the use of natural gas for electric power generation. Unlike the U.S. these counties do not have near the reliance on gas for home heating, so its use is limited to power generation and industrial needs. Understandably, each nation is projecting continued growth in demand for natural gas for their economies and the environment. As global competition for this clean burning fossil fuel increases it will be those nations that take the necessary steps to utilize their domestic natural gas reserves that will be able to meet their environmental and economic goals.

In planning for the long term we must recognize how the U.S. consumes its energy today. The largest sector of use is electric power at 40 percent of our energy use larger than transportation or heating. It is also the fastest growing sector.

For too many years U.S. energy policy has violated the fundamental law of supply and demand. It is not sustainable to promote policies that drive up demand for an energy source yet restrict access to it at the same time.

We are trying to fuel practically every new kilowatt of electricity with a fuel source that is in steady decline. It won't work. Electricity must come from a diverse mix of renewable energy, nuclear, clean coal, LNG and natural gas produced from new domestic sources.

Finally, for those who doubt a correlation between natural gas costs and industrial output, the following graph clearly shows the impact of the price spike of January, 2001. Industrial production peaked in 2000, then dropped with the $10 price spike and has not recovered. Following that sharp increase industrial production began to drop off of the growth that had been constant for the preceding 10 years.



It is a valid question to ask whether we have the will to produce enough natural gas to supply our economy. Every recession in modern history has been preceded by an energy crisis. Natural gas shortages have contributed to our current economic slowdown and Chairman Greenspan promised that we have not seen the worst if costs remain high. Furthermore, our nation's continued progress in improving the quality of our environment will also be jeopardized unless we are able to bring more natural gas to market at prices that were counted on when our goals were established. In both cases, economic and environmental, we can't get where we want to go without affordable natural gas. The Dow Chemical Company and the American Chemistry Council remain hopeful that Congress and the Administration will quickly address these challenges. The nation's economic recovery depends on it.

Mrs. CUBIN. Thank you very much. I would now like to recognize Keith Rattie for his testimony.

STATEMENT OF KEITH RATTIE, CHAIRMAN, PRESIDENT AND CEO, QUESTAR CORPORATION

Mr. RATTIE. Thank you. Good afternoon, Madam Chairman, other esteemed Members of Congress. It is a privilege to be here. My name is Keith Rattie. I am Chairman, President, and Chief Executive Officer of Questar Corporation. We are an integrated natural gas company. We operate primarily in the Rockies and the mid-continent. We operate in all segments of the natural gas chain. We are an E&P company, we are in the interstate pipeline business, and we are in the utility business. I have been asked to appear today as a representative of the American Gas Association and thus a representative of the 50 some million American households and businesses that depend on natural gas for heat and fuel. And I will try to stay within my time.

As Alan Greenspan noted in his testimony to Congress last week, today's natural gas market conditions have been a long time in the making. What Chairman Greenspan didn't tell Congress, and I think what Congress needs to understand, is that the supply

problem is largely one of our own creation. It has as much to do with politics as it does with geology.

I have three objectives today. First, I will try to give you some comfort that the market is responding. Barring abnormal weather, gas prices should be lower a year from now. Now, second, I will explain why I believe that it would be a colossal mistake for policymakers to assume that LNG imports alone will be enough to close what I am going to define as the supply gap. Third, I will recommend four things that Congress can do long term to help bring natural gas prices down to more reasonable levels.

In the short term, we have little choice but to let the market work, and the good news is that the market is working. On the supply side, we are drilling more wells. As you heard earlier, the U.S. natural gas rig count is up over 33 percent since the 1st of the year, and it is going to rise higher. A major pipeline expansion from Wyoming to California went into service in May and therefore moving surplus gas from the Rockies region to gas-short California. I would suggest that the California delegation might want to send a thank you to the Wyoming and Utah delegation for that. LNG import terminals on the east coast are being expanded. There is a boom underway in LNG ship construction. The LNG fleet worldwide is going to be 40 percent larger within a few years. Meanwhile, we can't ignore the fact, as the others on this panel have testified, that high prices are driving down demand, and that is at the expense of economic activity and the well being of gas-intensive industries, including the sugar and the petrol chemical industry. All of this, of course, is what you would expect from a competitive deregulated natural gas market. With all due respect to those that are calling for government-mandated conservation, the market is way ahead of you. Conservation is what you get when prices rise.

Now there is more encouraging news. Last week, the EIA reported a record injection of 125 billion cubic feet of natural gas into underground storage. This morning, the number came out, it was 114, the same as it was 3 weeks ago. This is a record. We have never had three straight weeks of this level of gas injection. The AGA member companies are stepping up natural gas storage, which at the end of last winter stood at record low levels is now being refilled at a record pace. And, again, barring abnormally hot weather this summer, storage should return to normal or close to normal by November, ensuring that adequate supplies are available for this winter.

Of course, in response to this record storage injection, near-term natural gas prices plunged 10 percent in 1 day last week, just 2 days after Mr. Greenspan's testimony. Indeed, the forward natural gas price curve signal that prices will be about 25 percent lower 1 year from today.

And if all this sounds familiar, it is because we have seen this movie before. Just two and a half years ago a confluence of events, cold winter, hot summer and lackluster drilling activity, drove natural gas prices to levels that we have been experiencing recently. Then, as now, the market responded. Drilling ramped up, fuel switching and conservation kicked in, prices fell again. That is just what you expect. So in the short run, the only sensible option for policymakers is to let market forces work, but there is a lot we

need to be doing in this country long term, and Congress has to play a key leadership role.

So let me turn now to the long term, and what I need to do is give you some numbers, simple numbers to help you with some arithmetic on this. Let me explain what I mean by the supply gap. I think you have heard the EIA and its annual energy outlook predicts that U.S. natural gas consumption will increase at an average rate of about 1.8 percent per year from about 60 billion cubic feet per day today to about 95 billion cubic feet per day in 2025. Now, the difference between those two numbers is what I am going to refer to as the supply gap. That is the need for an incremental 35 billion cubic feet per day of natural gas supply.

To put that into perspective, the current production from the entire Gulf of Mexico is only 14 BcF a day, imports from Canada are about 10 BcF per day. LNG imports last year were just six-tenths of a BCD per day, just about 1 percent of the U.S. supply. The EIA predicts that increased LNG imports will help close the supply gap over the next two decades, and that is a view that of course was endorsed by Mr. Greenspan. Clearly, LNG imports can and must be counted to help us close the gap. But I would encourage Members of Congress to be very skeptical about some of the numbers that get tossed around on LNG, numbers like $2.50 per McF landed in the U.S. The questions that need to be asked when you hear these numbers are where is that cheap LNG coming from, how much is available for how long, and what is the price going to be when the demand for this product doubles worldwide over the next 10 years?

In truth, global LNG production today is only about 15 billion cubic feet a day. That is about a quarter of the natural gas that we consume in the United States, on average. And nearly all existing capacity is dedicated to long-term contracts for delivery to non-U.S. markets. Moreover, non-U.S. LNG demand is growing faster than U.S. gas demand, and in many markets LNG prices today are approaching the levels or near the levels that we are seeing here in the U.S.

In addition, the major LNG consuming countries, countries like Japan, Korea, Taiwan and in a few years India and China, have minimal domestic natural gas resources and they are thus dependent on LNG imports. Competition over the long run from these countries that have no viable domestic gas alternative will likely drive global LNG prices higher in the future.

So for these reasons, plus you can throw in the strong-not-on-my-beach opposition to siting of LNG terminals in this country, a major supply impact from LNG is clearly not a certainty. And that uncertainty becomes even greater when you ask someone to put their finger on the map of the globe to show where the large stranded supplies of natural gas are, countries like Angola, Nigeria, Venezuela, of course the Middle East. I would suggest that these are not exactly ideal places to invest the billions of dollars that will be needed for gas supply development, production and liquefaction. Of course, Alaskan gas is also mentioned as an important gap filler, and clearly we need those supplies. Alaskan gas may add three to five BcF a day of supply. Clearly, that is not the silver bullet for U.S. gas supply.

Canada, which currently exports about 10 BcF per day to the U.S., faces many of the same supply challenges as U.S. producers do. Demand in Canada is growing, and Canadian producers are on the same treadmill that their U.S. counterparts are on. Under optimistic conditions, Canada may be able to increase exports to the U.S. by about five BcF a day over the next couple of decades. So Canadian gas is not the silver bullet.

When you do all this arithmetic, the inescapable conclusion is that much of the incremental supply needed to serve growing U.S. markets must come from the U.S. lower 48, both onshore and offshore. And, frankly, I believe it is a mistake to write off domestic natural gas production. North America is blessed with abundant natural gas resources. Most of us in industry believe that the resource base is more than adequate to supply a—to grow a supply by 35 BcF by 2025. We are not running out of natural gas, we are not running out of places to look for natural gas. However, we are running out of places where we are allowed to explore for natural gas, and the truth that must be confronted now is that as a matter of policy this country has chosen not to develop much of its natural gas resource base.

Opponents of domestic gas development often exaggerate environmental concerns. The irony, of course, is that by choosing not to develop our most environmentally benign fuel, we are burning more coal, importing more oil and running our aging nuclear plants harder than ever. And I think the key point has been made earlier so I will leave it for Q&A today, but the key point is is that we don't face this either/or option. We have proven, the industry has proven that it can develop our domestic energy resources without harming the environment. So the key question for policymakers is can we afford policies that leave vast amounts of our domestic natural gas resource base untested and undeveloped. I think if the consequences of those policies were understood, most Americans would answer no.

What should Congress do? Four things. First of all, let us continue to let the market work. I think we will see prices come down in response to price signals that consumers, unfortunately, are having to experience, and they are very painful. Second of all, I think we need leadership from Congress. Congress can help forge this national consensus that natural gas is abundant, development is good for our economy and that our domestic natural gas resources can be developed without harming the environment. Third, Congress needs to hold Federal agencies accountable for significantly streamlining permitting of high potential Federal land, particularly in the Rockies. Fourth, we need to develop our natural gas resources off the east and west coast and in the eastern Gulf of Mexico. It is time to rethink our fear about exploring for and producing gas in offshore basins. Clearly, offshore platforms have a visual impact on the environment, but there is no evidence that offshore platforms hurt the environment. Finally, I just will repeat again market forces ultimately will ensure that supply and demand come together; the question is at what price? Madam Chairman, thank you for the opportunity today.

[The prepared statement of Mr. Rattie follows:]

Statement of Keith Rattie, Chairman, President and CEO, Questar Corporation

Good morning, Madam Chairman, and esteemed members of Congress. It's my privilege to appear before you today. My name is Keith Rattie. I'm the Chairman, President and CEO of Questar Corporation. Questar is an integrated natural gas company headquartered in Salt Lake City. We have significant businesses in each part of the natural gas value chain—upstream exploration and production, interstate pipelines, and downstream retail gas distribution. We operate primarily in the Rockies and the Midcontinent. We're one of the fastest growing gas producers in the country. Our interstate pipeline companies move gas from the Rockies to energy markets in the West. Our retail gas distribution company serves over 750,000 homes and businesses in Utah, Wyoming and Idaho.

I'm here testifying today on behalf of the American Gas Association ("AGA") and its natural gas utility members. AGA is grateful for the opportunity to provide input on the natural gas supply issue that has been so much in the news of late. AGA is comprised of 191 natural gas distribution companies, which deliver gas throughout the United States. AGA member companies deliver approximately 83 percent of the natural gas used by more than 64 million customers nationwide.

This past winter, America received a wake-up call—our second in the past three years. Natural gas prices shot above $8 per Mcf at the Henry Hub for the first time since 2001. Spot prices in the Northeast at times exceeded $20 per Mcf. This spring, natural gas prices have remained well above historic levels for this time of the year. High prices convey a simple message: we have a natural gas supply problem.

It is a problem largely of our own creation.

I have three objectives today. First, I'll briefly explain why the only appropriate near-term response to high natural gas prices is to let the market work, and I'll try to give you some comfort that the market is working. Second, I'll define the magnitude of the natural gas supply gap over the next two decades, and explain why LNG imports alone will not be adequate to close this gap. Third, I'll recommend several actions that Congress can take to help bring natural gas prices down longer term.

As Federal Reserve Chairman Greenspan noted in his testimony to Congress last week, today's natural gas market conditions have been a long time in the making. But what Mr. Greenspan didn't tell you—and what Congress needs to understand—is that today's high natural gas prices are largely the result of policy choices that have encouraged greater natural gas consumption while impeding development of new supplies. Most American consumers are probably unaware that these choices have been made on their behalf.

Predictably, consumers faced with higher gas bills are calling upon their elected representatives to "do something." In the short term, about the only thing Congress can do is let the market work. The good news is that the market is working. On the supply side, the U.S. natural gas rig count has jumped over 33% since the first of this year, and it will rise further. A major pipeline expansion from Wyoming to California went into service in May, bringing new supplies and lower prices to Southern California. LNG import terminals in Georgia and Maryland have been expanded, and at least six new terminals are advancing in the permitting process. LNG ship construction is booming—the global LNG shipping fleet is set to rise by over 40% in the next 3 to 4 years. Meanwhile, high prices are driving down demand—albeit at the expense of economic activity and the well being of gas-dependent U.S. manufacturing companies, notably the U.S. petrochemical industry.

This is just what you'd expect from a competitive, deregulated natural gas market. With all due respect to those in Congress who are calling for conservation, the market is way ahead of you. Conservation is what happens when prices rise.

There's more encouraging news. Last week, the Energy Information Administration (EIA) reported a record injection of 125 billion cubic feet (bcf) of natural gas into underground storage—the second straight week in which storage injections topped the 100-bcf level, well above historic averages. AGA member companies are stepping up—natural gas storage, which at the end of this past winter stood at record low levels, is being refilled at a record pace. Barring abnormally hot weather this summer, storage should return to close to normal by November, ensuring that consumer needs are met next winter.

In response to this record storage injection, prompt-month gas prices plunged 10% in one day last week, two days after Mr. Greenspan's testimony. Indeed, the forward natural gas price curves signal that prices will be 25% lower one year from today.

To be sure, high prices are taking their toll on energy consumers. While some sectors of our economy benefit from high prices in the short term—notably producers and the companies that provide services to producers—in the longer term, high

prices are not in anyone's interest. AGA members, working with state regulators, are taking steps to soften the impact of high prices. The Low Income Home Energy Assistance Plan (LIHEAP) is providing help to low income residential customers, although funding for that program is chronically short of needs. Some AGA members, with cooperation from state regulators, have hedged to manage price volatility.

If this all sounds familiar, it's because we've seen this movie before. Just two and a half years ago a confluence of events—cold winter, hot summer, and lackluster drilling activity—drove natural gas prices to levels comparable to what we have seen in 2003. Then, as now, the market responded—drilling activity picked up, fuel switching and conservation kicked in, and prices retreated. Again, just what you would expect.

While the only sensible option for policymakers in the short run is to let market forces work, in the longer term the most important thing that Congress can do to help ensure natural gas supply keeps pace with demand is to remove the unnecessary barriers to domestic natural gas development.

Let me explain by first defining the "supply gap"—that is, the difference between current domestic natural gas supply and expected demand.

The EIA in its Annual Energy Outlook 2003 predicts that U.S. natural gas consumption will increase at an average rate of 1.8% per year to about 35 trillion cubic feet (tcf) per year in 2025, from 22.7 tcf in 2001—a 50% increase over the next two decades.

Clearly, much of this demand growth has already been pre-built into the U.S. energy market. We've added over 150,000 megawatts (MW) of new gas-fired electric generation in the U.S. since 1999—the equivalent of about 70 Diablo Canyon nuclear power plants. Now, some are second-guessing the fact that this country has bet its electricity future on natural gas. In reality, natural gas has become the fuel of choice for power generation in part because it is the most economic and environmentally benign fossil fuel, and in part by default. While getting permits to build a new gas-fired power plant can be very difficult and time consuming, it is virtually impossible to get permits to build new nuclear, coal or hydroelectric plants. Windmills and other renewable energy alternatives generate a lot of enthusiasm in some circles—but not much electricity.

Given this enormous investment in gas-fired power generation, and given the strong preference for gas in the residential and commercial sectors, the only apparent prerequisites for natural gas demand growth are a growing economy and normal weather. Simply put, natural gas is the fuel of choice for many consumers.

So let's put the EIA's projected 35-tcf per year U.S. gas market into perspective. A 35-tcf per year market implies a jump in average daily gas production from about 60 bcf per day today to about 95 bcf per day in 2025—a 35 bcf per-day increase in deliverability. To put this 35 bcf per day supply gap into perspective, current production from the entire Gulf of Mexico is only about 14 bcf per day, and imports from Canada are about 10 bcf per day. Moreover, LNG imports last year averaged just 0.6 bcf per day, about 1% of U.S. supply.

The EIA predicts that increased LNG imports will help close the supply gap over the next two decades. Indeed, Mr. Greenspan summed up his remarks by stating that a major expansion of U.S. import capability would ensure widespread natural gas availability in the years ahead.

Clearly, there are enormous amounts of stranded gas around the world that can be brought to the U.S. on LNG ships. Indeed, LNG developers around the world are responding to the price signals from the U.S. market. But given the magnitude of the supply gap, it will be a colossal mistake, in my view, if policy makers assume that LNG alone will solve our supply problem.

Some have suggested that the U.S. LNG imports will grow from less than 1 bcf per day today to perhaps 10 to 15 bcf per day in 20 to 25 years. Even if this turns out to be the case (and it may not, given the many hurdles facing LNG project developers) LNG imports would still fall far short of covering the future 35-bcf per day gap.

I would encourage you to be very skeptical about some of the numbers that get tossed around on LNG—numbers like a $2.50–$3.00 per Mcf price for LNG landed in the U.S. The questions that need to be asked when you hear these numbers are: where is that cheap LNG coming from, how much is available, for how long, and at what price? In truth, global LNG production today is only about 15 bcfd, and nearly all available capacity is dedicated to existing long-term contracts for delivery to non–U.S. markets. Non–U.S. demand is growing faster than U.S. demand, and in many markets LNG prices today are as high as current U.S. gas prices. The major LNG-consuming countries—Japan, Korea, Taiwan, and within a few years China and India—have minimal domestic natural gas resources and thus are de-

pendent upon LNG imports. Competition from countries that have no viable domestic gas alternative will likely drive global LNG prices higher in the future.

For these reasons, and given the strong "not-on-my-beach" opposition to siting LNG terminals, a major supply impact from LNG seems a tall order. The magnitude of the challenge is even more daunting when one puts a finger on the map of the world where the major stranded gas reserves are located. Angola, Nigeria, Venezuela, and the Middle East are not exactly ideal places to invest the billions of dollars needed for gas production and liquefaction facilities.

In addition to LNG imports, Alaskan gas will likely be developed and transported to the U.S. lower–48. The proposed pipelines from Prudhoe Bay and the Mackenzie Delta, which are at least five and probably more like ten years from reality, together might eventually deliver 3 to 5 bcf per day. Alaska gas will help—but it is not the silver bullet for U.S. supply.

Canada, which currently exports about 10 bcf per day to the U.S., faces many of the same supply challenges as the U.S. Demand for gas is growing, and Canadian producers are on the same treadmill as their U.S. counterparts. Under optimistic conditions, Canada may be able to increase exports to the U.S. by about 3 to 5 bcfd over the next two decades.

So, let's do the arithmetic. To close the future supply gap, we need to increase U.S. gas supply by 35-bcfd over the next two decades. If we take the most optimistic projections, LNG imports, Alaskan gas, and increased imports from Canada together might cover about half of the 35 bcf per day future supply gap.

The inescapable conclusion is that much of the incremental gas supply needed to serve a growing U.S. market must come from the U.S. lower–48 onshore and offshore. That implies that the burden of delivering a major increase in gas supply over the next 20–25 years will fall primarily on the shoulders of U.S. independent producers. This is a key point for policy makers. Except for Alaska and the deepwater Gulf of Mexico—which incidentally is primarily an oil play, not a natural gas play—the majors have essentially thrown in the towel in the US. They've taken their know-how and their capital overseas to drill in places like Angola, Kazakhstan, and Nigeria. With the U.S. gas market set to boom, U.S. independents are being called upon to perform a large and growing job on behalf of U.S. prosperity and energy security.

There's only one way to get the job done. Simply put, we need to drill more wells in the U.S. lower–48.

The sobering reality is that we're already drilling a lot more wells today than we were five years ago, but production is still down. U.S. gas producers are on an accelerating treadmill, running harder to stay in place. The main reason: a typical well drilled today will decline at a faster rate than a typical well drilled a decade ago. This is partly due to technology, and partly due to the maturing of the accessible natural gas resource base. Moreover, because up to half of this country's current natural gas supply is coming from wells that have been drilled in the past five years, this decline trend is likely to continue.

Before we can grow gas supply, we first have to replace decline. The U.S. natural gas decline rate will range from 26 to 28 % this year. In practical terms, if we stopped all drilling today, one year from now U.S. natural gas production would be 26–28% lower than it is today. Accelerating decline helps explain why U.S. gas deliverability has been stuck in the 52–54 billion cubic feet bcf per day range for the past eight years—again, despite an increase in gas-directed drilling.

The current situation notwithstanding, it's a mistake to write off domestic natural gas production. Yes, U.S. natural gas production has stagnated, but that has little to do with the adequacy and potential of the resource base. Please be assured of this point: North America is blessed with abundant natural gas resources. The National Petroleum Council (NPC) study in 1999 did a good job describing North American gas potential. Most of us in the industry believe that the resource base is more than adequate to supply a 35 tcf per year U.S. natural gas market in 20 to 25 years.

A growing percentage of U.S. gas supply today comes from plays that didn't even exist a decade ago. New technology has reduced both the costs and risk of exploration. New technology allows the industry to drill deeper, maintain or increase production in old fields, and develop unconventional gas that only a few years ago was considered uneconomic.

Indeed, technology will someday unlock vast amounts of natural gas trapped as hydrates beneath the ocean floor and the Arctic tundra. Some scientists believe that that there is enough potential in gas hydrates to supply the U.S. market for at least 100 years.

The bottom line: we're not running out of natural gas, and we're not running out of places to look for natural gas. However, we are running out of places where we

are allowed to look for gas. The truth that must be confronted now is that, as a matter of policy, this country has chosen not to develop much of its natural gas resource base.

By some estimates 40% of this country's domestic natural gas resource base is either off limits to development, or open under highly restricted conditions. Onerous laws and regulations prohibit exploration in areas where there is huge potential for new supplies. Permitting has become next to impossible for new pipelines and LNG import terminals.

By many estimates 30 to 40% of U.S. potential natural gas resources are located in the Rockies region that includes Wyoming, Utah, Colorado, New Mexico and Montana. Indeed, the Rockies is the only region in the U.S. to deliver growth in production over the past 30 years, and it remains significantly underdeveloped. Three of the four largest U.S. onshore gas discoveries in the last 25 years are in this region.

The Federal Government manages more than 40% of the land in the Rockies. Despite all the attention given to Federal agency performance in processing applications for permits to drill on Federal lands, permits that used to take 30 days to process can now take up to a year or longer.

A vast and growing amount of Federal acreage has been placed off limits for drilling. It's time to ask: how large an inventory of untouchable acreage can the U.S. afford to maintain? Policies that emphasize preservation of land for recreational use over other uses have human consequences that have often been ignored—like higher energy prices, fewer jobs, a weaker economy, not to mention lower tax revenues for government.

Opponents of domestic gas development often exaggerate environmental concerns. The irony, of course, is that by choosing not to develop our most environmentally benign fuel, we're burning more coal, importing more oil, and running our aging nuclear plants harder than ever. Those who oppose drilling on Federal lands exploit conflicts in Federal laws to obstruct development. They offer no viable alternative—only fantasies about a planet free from the scourge of hydrocarbon fuels. They prevail by intimidating lawmakers. If they continue to prevail, the American economy may be at risk.

Like it or not, our nation's economy will run on hydrocarbons for many years to come, and natural gas is the most benign hydrocarbon fuel.

Moreover, the industry has proven that our energy resources can be developed without harming the environment. Yes, drilling disturbs the surface, but not much, and not for long. Among the many technological advances made by the industry are improved methods of restoring land after the drilling rig has done its thing and gone. Advances in technology have allowed exploration and production companies to greatly reduce the footprint of their activities over the past two decades. Opponents of domestic energy development routinely ignore this fact.

Similarly, the argument that drilling drives wildlife to extinction is pure fiction. To the contrary, in most cases wildlife adapts and thrives in harmony with energy development.

The key question for policymakers is this: can we afford policies that leave vast amounts of our domestic natural gas reserves untested and undeveloped? If the consequences of these policies were understood, I believe most Americans would answer "no."

What role can Congress play? First, we need leadership. Congress can help forge a national consensus that natural gas is abundant, that development is good for our economy, and that our domestic natural gas resources can be developed without harming the environment.

Second, Congress must hold Federal agencies accountable for streamlining permitting on high-potential Federal land in the Rockies. Studies show that the average processing time for applications for permits (APDs) slowed by 60 percent in 2002.

Third, we need to develop our natural gas resources off the East and West coasts, and in the eastern Gulf of Mexico. It's time to rethink our fear about exploring and producing gas in our offshore basins. Clearly, offshore platforms have a visual impact on the environment. But there is no evidence that offshore platforms hurt the environment. And, for the folks who live along our coasts who don't want to see a distant offshore platform on the ocean horizon, the industry has a solution. Subsea wells can reduce or eliminate the need for offshore platforms

Fourth, Congress should reaffirm the FERC's lead role in permitting interstate pipelines and LNG import terminals. Opponents of pipeline construction exploit conflicts in existing laws and overlapping jurisdiction to block pipeline projects. For example, the Coastal Zone Management Act has been invoked by states to block FERC-approved natural gas pipeline projects.

Finally, Congress should continue to let market forces allocate supply and demand. High prices signal the need for more investment. The industry is responding

to high prices today with a rapid increase in investment. We have proven that we can get the job done—if we are allowed to—and we can do so without harming the environment.

Madam Chairman, we applaud your focus on the natural gas supply issue. Now, I will be glad to field your questions.

Mrs. CUBIN. Thank you. Now it is my pleasure to introduce—I don't see your name right there and I am sorry—yes, Mr. Prindle. I am sorry. Thank you.

STATEMENT OF WILLIAM R. PRINDLE, DEPUTY DIRECTOR, AMERICAN COUNCIL FOR ENERGY-EFFICIENT ECONOMY

Mr. PRINDLE. Thank you, Madam Chair and members of the Committee. My name is Bill Prindle. I am deputy director of the American Council for an Energy-Efficient Economy. The ACEEE is a national non-profit organization whose mission is to advance energy efficiency as a means of promoting economic prosperity and environmental protection at the same time.

We have heard today that this is a very complex problem, and we believe that this complex problem requires a balanced portfolio of resource solutions. But our bottom line is that for the near term, that is for the next 2 years especially, demand is where the answer is going to lie. We need to moderate energy demand sufficiently to have a moderating impact on prices and to free up supplies for more essential uses.

Let me just say a little bit about what this thing called energy efficiency is. It gets sort of thrown out there as a term. Energy efficiency—we have heard the term, "silver bullet,' here used several times, that there is no silver bullet for this problem. Well, that also applies to energy efficiency, what we like to think is that we have a collection of silver BBs, that if we use enough of them, we can get to a satisfactory response.

But just to give you a few examples of energy efficiency, energy efficiency is installing high efficiency gas furnaces at 90 percent efficiency or greater as opposed to the 65 percent furnaces that were in place maybe 20 years ago. It is installing water heaters that are 65 or even 80 percent efficient as opposed to the 50 percent efficient models we saw 20 years ago. It is putting in electric generation capacity that uses combined heat and power that gets 75 percent of the energy out of the input fuel as opposed to now the average generation fleet only gets 33 percent of the energy out of the input fuel. And on peak, those combustion gas turbines that are generating energy on peak are often operating at less than 20 percent efficiency. So we can do a lot across the board.

I also couldn't help noticing as I was waiting during the interim period that this room uses a fair amount of electricity. Just in a rough calculation, if all of the electricity used to supply the lighting in this room came from natural gas, it would amount to something on the order of 225 McF a year. We know that today's lighting technology can save more than half of that energy. So there is a lot of opportunity out there. We are not saying don't drill for gas, we are saying let us drill for it in as many places as we can find, and we think we can find some places in our basements, in our offices, in our factories that can really complement the other efforts in this whole campaign.

I also just want to point out that energy efficiency is a significant resource, and it is a significant industry. You don't hear a lot about the energy efficiency industries, but if you add up all the companies that make furnaces and air conditioners and appliances and CHP technologies and lighting technologies that are giving us the energy efficiency solutions we have today, it is a multibillion dollar business, and that provides American jobs, that contributes to the American economy just as do nuclear, oil, coal and gas.

And we also, given that this is a Subcommittee of the Resources Committee, we want to just remind you that energy efficiency has contributed to our energy resource portfolio over the last 30 years. Right now we are using 26 percent less energy than we would have if the energy intensity of the economy has stayed the same as it was in 1973. If you put that another way, we are essentially using the same amount of energy per capita that we were 30 years ago. However, our GNP per capita is up 75 percent. So energy efficiency is an essential component of economic growth. It has really been one of the key resources. And in fact that 26 percent is a larger number than some of the conventional fuel resources that we see. So we just want to point out that energy efficiency is a significant contributor, and we know we can do more. My written testimony has some preliminary analysis as to where we can go in terms of future potential.

I also want to just point out probably the most relevant recent example where efficiency and conservation solved an energy price and supply problem. California in 2001 was faced with a severe electricity problem, although part of that electricity problem was driven by high natural gas prices. We could all argue about who made what error in structuring the particulars of that electricity market and who manipulated what and so forth, but one thing is crystal clear about 2001: It was a combination of energy efficiency and conservation that took the wind out of those—in 2001, corrected for economic activity and for weather. And I would also say that this didn't come for free. The State spent about a billion dollars on efficiency and conservation programs to get that result. So we don't believe the market is completely self-correcting. There needs to be a certain amount of activity from the government, both in terms of incentives and bully pulpit. But we believe that we can get that kind of response. We are not sure how much we can get in the short term, we are still working on that.

I wanted to kind of pose a theoretical question that we get asked a lot, which is kind of classic free market question, and we have heard it from different folks in the room today: Won't higher gas prices just correct the demand problem by themselves? Why do we need policies and programs and so forth? Well, that is a valid question, and we believe in free market solutions. We work every day with a variety of people in the industry, and we believe the markets ultimately will solve the problem, they just need a little help from time to time.

The fact is that we continue to have barriers in the market. Many, many customers in this country still are not experiencing these high gas prices, and that is for a couple reasons. One is that many of them are served by utilities that have conventional rate regulation. So if the utility experiences high gas prices, they have

to go through a rate case and get those costs recovered. That can take a year, 2 years or even more. We also have a majority of gas sold under long-term contracts. It takes a while for those market prices to work their way through the contract structure. So in a sense a large portion of our population is still being lulled into complacency by the fact that they are not seeing market prices. So I think we need to do something in advance of the day that those prices hit the market with full force.

There is a bunch of other market barriers that are in my testimony, I won't go into those right now. Just suffice to say that I have been working on this stuff for 30 years and we have moved some of those barriers but many of them are still in place. Bottom line for us is that we do believe that a certain amount of government support is needed to solve this problem in the next 2 years. I have a couple of short-term recommendations and a fewer longer-term recommendations I would like to quickly summarize.

The first thing that Congress needs to do is to reverse the declining support for the cost-effective efficiency programs that are currently out there. Yesterday, the Interior Appropriations Subcommittee cut DOE's energy efficiency programs by another $12 million. EPA cut its flagship energy efficiency program, the Energy Star Program, by 30 percent this year. We think in order to respond to this crisis Congress and the Administration need to reverse that decline and put some short-term funds into these kinds of programs, working with the States, working with the utilities.

And there also needs to be a bully pulpit influence here, that the Administration and Congress need to work with manufacturers and with utilities and consumer groups around the country to point out the severity of this problem and just get people to do the common sense things that we all know we could do if we thought about it: Keeping thermostats where they need to be, turning off lights when they are not needed, doing the common sense kinds of housekeeping that can give us significant savings on the margin.

Longer term, we need to take a look at some of the energy efficiency standards that have brought us significant increases in efficiency. The current standard for natural gas furnaces is currently at 78 percent. The Department of Energy recently downgraded the priority for that rulemaking. We think that under the current conditions they will want to upgrade that priority and take a look at, well, should we be looking at higher standards for furnaces? Congress is currently looking at tax credits as part of the omnibus energy bills that are hopefully heading for conference this year. We could certainly look at ways to increase incentives for gas-saving technologies in the tax credit portion of the energy bill. We could do a lot in the utility sector. I won't go into those details here.

But last but not least, I just want to hold up one more time the whole issue of combined heat and power, which, again, operates at an efficiency on the order of 75 percent, which is more than double the average power plant fleet today. And that is probably the largest medium- to long-term area of savings that we can explore. Thank you for the opportunity to testify today, and I will be happy to answer any questions.

[The prepared statement of Mr. Prindle follows:]

Statement of William R. Prindle, Deputy Director, American Council for an Energy Efficient Economy (ACEEE)

Summary

ACEEE proposes both near-term and longer-term policy responses to the looming crisis in natural price and supply. Our testimony first discusses the roots of the current situation, and points out the limits of supply-side solutions. In the near term—within the next two to three years—moderating energy demand is the most realistic and effective approach to balancing natural gas markets.

We document the energy resource contribution energy efficiency has made to the U.S. economy, and define its overall potential for future contributions, including its potential for saving natural gas. We estimate that, over time, more than 10% of U.S. gas demand can be avoided via efficiency, and a significant portion of those savings can be realized in the short term. In addition, saving electricity can expand those savings because so much electricity is generated by natural gas, especially in peak demand periods. A substantial portion of these savings—enough to have an effect on gas prices—can be realized in the next two to three years through an aggressive program of energy efficiency and conservation.

ACEEE's recommendations for near term action include:

1. Supplement current efficiency deployment programs. We recommend Congress pass a supplemental appropriation for Federal programs that deliver energy savings, including the Energy Star programs and support for state-based efforts.
2. Conduct a national efficiency and conservation campaign. DOE should lead a partnership effort among efficiency manufacturers, utilities, states, and others to accelerate efficiency investments and encourage short-term behavior modifications. California used this approach with great success in responding to its 2001 crisis.

Recommendations for longer-term action include:

1. Accelerate Federal efficiency standards. DOE should accelerate its standards rulemakings for residential heating equipment and commercial air conditioning equipment, and should take gas price and supply issues into account in setting these standards.
2. Expand incentives for high-efficiency technologies. Congress should increase incentives for gas-saving technologies in the current energy bills.
3. Expand research and development. DOE budgets for advanced technologies that save gas in the residential, commercial, industrial, and power sectors should be increased.
4. Create public benefits funds for efficiency. Congress should include a Public Benefits Fund for energy efficiency and other clean energy initiatives in the current energy bills. While originally aimed at electricity savings, it would be equally applicable to natural gas utilities and their customers.
5. Create efficiency performance standards for utilities. Congress should follow Texas' example and require utilities to offset a portion of demand growth through energy efficiency.
6. Expand support for Combined Heat and Power (CHP). Congress should expand support for CHP by improving proposed CHP tax credits, and by encouraging states and utilities to provide fair and reasonable interconnection and tariff treatment for new CHP systems.

Introduction

ACEEE appreciates the opportunity to provide our comments to the Subcommittee on the important subject of energy efficiency as a response to the severe problems emerging in U.S. natural gas markets. Our analysis shows that energy efficiency and conservation efforts are the most effective response to these challenges over the next 24 to 30 months, and also offer longer-term insurance against future gas price spikes and shortages.

ACEEE is a non-profit organization dedicated to increasing energy efficiency as a means for both promoting economic prosperity and environmental protection. We were founded in 1980 and have developed a national reputation for leadership in energy efficiency policy analysis, research and education. We have contributed in many ways to congressional energy legislation adopted during the past 20 years, including the current energy bills, the Energy Policy Act of 1992 and the National Appliance Energy Conservation Act of 1987. We are also an important source of information for the press and the public on energy efficient technology, policies, and programs.

The Current Natural Gas Problem

Senior officials, including Chairman Greenspan and Secretary Abraham, have recently stated that natural gas price and supply problems are significant enough to warrant serious Federal response in the near term. As Chairman Greenspan said in his Energy and Commerce Committee testimony last week, gas prices are already shutting down some industrial production, costing U.S. jobs and threatening the sluggish economic recovery.

Gas prices are not only historically high, they are quite volatile, meaning that the rapid swings in prices we have seen since 2000 are likely to continue. Volatility is almost as much a threat to economic growth as high prices, because it makes it difficult for investors to plan rationally, either for exploration and development of new supplies, or for energy efficiency investments. It was expected that the sophisticated risk-management and trading techniques pioneered by companies like Enron would provide a price-stabilizing effect in energy markets. However, the demise of Enron and other traders has left gas markets without the hedging options than can moderate price swings.

Natural gas is proving to be a prisoner of its own success: increasing demands for this relatively low-emission, low-cost fuel over the past 15 years have outrun the North American supply system. As a result, we are experiencing prices that are both high and volatile. Indications are that new supply initiatives in North America will have a limited impact on this situation, especially in the near term, and that policy actions on the demand side are the most effective near-term measures to bring gas markets back into balance.

Natural gas markets have been largely deregulated since the 1970s, when Federal price regulation limited supply investments, shortages appeared in many markets, and new gas connections were embargoed by many gas utilities. Since the late 1980s, natural gas has become more widely available, and more popular as an environmentally-preferred, relatively inexpensive fuel.

Electric power generation continues to be the fastest-growing demand sector for gas. (See Figure 1.) While industrial demand remains the largest consuming sector, its gas use has declined somewhat from peak levels in the late 1990s. Commercial and residential natural gas demand continues to be strong. However, the power sector has been the dominant factor in driving gas demand recently, as gas is increasingly preferred for environmental and other reasons. (See Figure 2.) Gas is increasingly the dominant fuel used in peak-period generation: gas combustion turbines are relatively inexpensive to install and can be brought on line quickly.

However, these "peaker" turbines are also among the least efficient generation technologies, with thermal efficiencies between 12% and 20%. Today's combined-cycle gas power plants can perform at close to 50% efficiency, and combined heat and power (CHP) technology provides efficiencies in the 75% range. The overall U.S. system average thermal efficiency is about 33%; so gas peaking generation is about half as efficient as average generators, and wastes more than three times the energy as today's best generation technologies.

The disproportionate use of natural gas for peaking generation, combined with the low efficiency of peaking units, shows that saving electricity, especially at peak times, is a key to freeing up natural gas for other uses. In this way, pursuing electric energy efficiency in peak demand periods is a powerful tool for saving natural gas.

The long-term prospects for significant increases in U.S. gas production are limited. The exploration and production of natural gas and petroleum are historically linked. U.S. oil production peaked in 1970, and has declined since. Oil imports have steadily grown to make up the difference. U.S. natural gas dry production peaked in 1973, and in 2002 was 13% below that peak. Most low-cost fields have been drilled; recovery of additional gas from existing and new fields will come at a premium price.

Imports, mostly from Canada, have helped fill the supply gap in recent years, but Canada's growing domestic consumption is limiting their ability to export. Liquefied natural gas (LNG) is available in limited supplies, and the gas industry is reactivating several LNG terminals, but LNG bears a premium price. If we rely on LNG as the marginal source for gas, it will tie U.S. gas markets to a permanent higher cost baseline.

U.S. gas production and delivery can be increased on the margin in the medium term through industry investments and policy measures. However, these efforts will not ultimately reverse the long-term decline in U.S. gas production. Imports may provide limited additional supply, but as LNG they will come at a price premium and also bear safety and homeland security risks. Most of these new supply initiatives are likely to come at a price premium.

Given the limitations and cost premiums associated with natural gas supply options, Congress must consider options to manage demand as part of a balanced energy policy. Energy efficiency and conservation are proven resources for moderating energy demand, and are also the most effective tools to apply in the near term to bring balance to gas markets. By combining aggressive demand management with supply development, we can stabilize natural gas markets and husband this strategic fuel to support America's economic growth and environmental protection.

Energy Efficiency as a Vital National Resource

Energy efficiency is a quiet but effective energy resource, contributing substantially to our nation's economic growth and increased standard of living over the past 30 years. Energy efficiency improvements since 1973 accounted for approximately 25 quadrillion Btu's in 2002, which is about 26% of U.S. energy use and more energy than we now get annually from coal, natural gas, or domestic oil sources. Consider these facts which are based primarily on data published by the Federal Energy Information Administration (EIA):

- Total primary energy use per capita in the United States in 2002 was almost identical to that in 1973. Over the same 29-year period, economic output (GDP) per capita increased 74 percent.
- National energy intensity (energy use per unit of GDP) fell 43 percent between 1973 and 2001. About 60% of this decline is attributable to real energy efficiency improvements and about 40% is due to structural changes in the economy and fuel switching.[1]
- If the United States had not dramatically reduced its energy intensity over the past 29 years, consumers and businesses would have spent at least $430 billion more on energy purchases in 2002.
- Between 1996 and 2002, GDP increased 21 percent while primary energy use increased just 2 percent. Imagine how much worse our energy problems would be today if energy use had increased 10 or 20 percent during 1996–2002.

Energy Efficiency's Resource Potential

Even though the United States is much more energy-efficient today than it was 25 years ago, there is still enormous potential for additional cost-effective energy savings. Some newer energy efficiency measures have barely begun to be adopted. Other efficiency measures could be developed and commercialized in coming years, with proper support:

- The Department of Energy's national laboratories estimate that increasing energy efficiency throughout the economy could cut national energy use by 10 percent or more in 2010 and about 20 percent in 2020, with net economic benefits for consumers and businesses.[2]
- ACEEE, in our Smart Energy Policies report, estimates that adopting a comprehensive set of policies for advancing energy efficiency could lower national energy use from EIA projections by as much as 11 percent in 2010 and 26 percent in 2020.[3]
- The opportunity for saving energy is also illustrated by experience in California in 2001. Prior to 2001 California was already one of the most-efficient states in terms of energy use per unit gross state product (ranking 5th in 1997 out of 50 states[4]). But in response to pressing electricity problems, California homeowners and businesses reduced energy use by 6.7% in summer 2001 relative to the year before (after adjusting for economic growth and weather)[5], with savings costing an average of 3 cents per kWh,[6] far less than the typical retail or even wholesale price of electricity.

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[1] Murtishaw and Schipper, 2001, Untangling Recent Trends in U.S. Energy Use. Washington, D.C.: U.S. Environmental Protection Agency.

[2] Interlaboratory Working Group, 2000, Scenarios for a Clean Energy Future. Washington, D.C.: Interlaboratory Working Group on Energy–Efficient and Clean–Energy Technologies, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

[3] Nadel and Geller, 2001, Smart Energy Policies: Saving Money and Reducing Pollutant Emissions through Greater Energy Efficiency, www.aceee.org/energy/reports.htm. Washington, DC: American Council for an Energy–Efficient Economy.

[4] Geller and Kubo, 2000, National and State Energy Use and Carbon Emissions Trends. Washington, DC: American Council for an Energy–Efficient Economy.

[5] California Energy Commission, 2001, Emergency Conservation and Supply Response 2001. Report P700–01–005F. Sacramento, CA.

[6] Global Energy Partners, 2003, California Summary Study of 2001 Energy Efficiency Programs, Final Report. Lafayette, CA.

Energy Efficiency Potential for Natural Gas

ACEEE has conducted years of research on the energy efficiency potential in a wide range of technologies and end-use sectors. We have a research effort underway to refine energy efficiency potential estimates specifically for natural gas. On a preliminary basis, we identified a number of cost-effective efficiency measures that would collectively save more than 10% of U.S. gas usage by 2020. A summary of these measures is shown in Table 1.

Table 1
Natural Gas Energy Efficiency Measures

Measure	Current Efficiency	Efficiency Target	Units for Efficiency Target	Potential Gas Savings In 2020 (TBtu)	Average Cost of Saved Energy ($/therm)*
1 Ind'l management practices	Typ. plant	8%	savings	402	0.351
2 Comm'l building retrocommissioning	149	134	kBtu/sf	362	0.229
3 Res duct sealing & infiltration reduction	Avg. home	20%	H&C svgs	310	0.450
4 Residential windows	.64/.65	.33/.44	U-Factor/ SHGC	233	0.154
5 Commercial furnaces and boilers	standard units	Power burner	savings	181	0.082
6 New homes	Avg. home	30%	H&C svgs	178	0.401
7 Res. furnaces/boilers (equip. & install.)	82%	90%+	AFUE+	162	0.479
8 Sector-based comm retrofit (e.g. offices)	0.5	0.4	therms/sf	162	0.361
9 Advanced commercial glazing	1.3/.69	.45/.45	U/SHGC	145	0.301
10 Comm'l new construction	90.1-1999	30%	savings	140	0.322
11 Res. combo gas space & water htg unit	82/59	90/90	AFUE/EF	85	0.543
12 Comm'l cooking and ventilation	typ equip	improved		76	0.300
13 Major residential appliances	Federal Standards	21%	savings	53	-0.859
14 Res. gas water htg (stand-alone units)	0.59	0.62	Energy Factor	52	0.370
15 Bldg. operator training & certification	Typ O&M	Better		51	0.063
			TOTAL1	2,590	

* Note: Cost of Saved Energy is the cost of a measure per unit of unit of fuel saved. Measures costing less than retail gas prices (currently averaging $0.83/therm for residential customers) are cost-effective. A negative cost of saved energy means that savings in non-energy costs can fully pay for the measure.

Source: Nadel, Steven, 2002, *Screening Market Transformation Opportunities: Lessons from the Last Decade, Promising Targets for the Next Decade*, Washington, DC: American Council for an Energy-Efficient Economy available online at http://aceee.org/pubs/u022full.pdf.

A significant portion of this efficiency potential could be realized within three years through an aggressive nationwide effort. In addition, conservation efforts aimed at short-term usage reductions could increase these savings by at least double. The California experience of 2001 indicates that the energy savings were divided roughly equally between efficiency investments and conservation behavior. The natural gas savings potential for electricity efficiency measures is also substantial, and will add significantly to direct natural gas end-use savings. We will be completing that analysis in the near future.

Overall, we project that energy efficiency and conservation initiatives, if pursued vigorously in the next two years, will moderate natural gas demand sufficiently to have a significant impact on gas prices.

Barriers to Free–Market Solutions to the Natural Gas Problem

An economist or a free-market advocate might argue that high natural gas prices contain their own remedy, since by economic theory price elasticity would cause demand to fall when prices rise. This argument contains a fundamental element of truth, and ACEEE believes in markets as a key focus for energy efficiency solutions. However, several factors in today's U.S. markets keep the laws of economics from being applied in their purest form:

- Regulatory Lag. In many states, public utility commissions set retail prices, at least for residential and smaller business customers. In these cases, gas utilities that experience gas commodity price increases must go through rate case pro-

ceedings to pass through these costs in rates. This can take a year or more, and masks the effect of market prices on customers.

- Contract Structures. Most gas in the U.S. is sold under long-term contracts, which serves to delay the impact on most customers. Some utilities in deregulated states pass gas costs through to customers on a monthly basis, and some industrials buy some of their gas on the spot market. But for those with most of their supply in multi-year contracts, it can take years to fully feel the effect of market prices.

These factors are currently insulating many consumers from the pending gas crisis. But they must not mislead Congress into waiting to take action on this problem. If we wait until most customers feel the full effect of today's gas prices, the ensuing crisis could be much worse than if we act now to take prudent steps that will help keep markets in balance.

In addition to these price-masking effects, a variety of market barriers to energy efficiency keep worthwhile investments and behavior changes from being made, even when prices rise. These barriers are many-fold and include: "split incentives" (landlords and builders often don't make efficiency investments because the benefits of lower energy bills are received by tenants and homebuyers); panic purchases (when a product such as a water heater needs replacement, there often isn't time to research energy-saving options); and bundling of energy-saving features with high-cost extra "bells and whistles."

Energy efficiency is also hobbled by being a "distributed resource". It is found in more than 100 million homes, over 5 million commercial buildings, and hundreds of thousands of factories. For many homes and businesses, energy costs are a small enough percentage of total budgets that price changes may not motivate efficiency investments, especially when compounded by the other barriers listed above. By the same token, the information and technical skills needed to understand and pursue energy efficiency projects are not available to most, smaller customers.

For these reasons, policy and program initiatives are needed to realize the benefits of energy efficiency for the economy and the environment as a whole.

Energy Efficiency Policy Solutions for Natural Gas Markets

Energy efficiency and conservation can help bring balance and price stability to gas markets in the near term and the longer-term. ACEEE's analysis indicates that several policy and program initiatives can be effective in curbing demand on the margin. Given the sensitivity of volatile gas markets to small changes in supply or demand, efficiency initiatives can make enough difference on the margin to affect prices.

First, it is important to define key terms used in describing these initiatives:

- Efficiency: permanent reductions in energy use based on changes in technology and management practice. Examples: replacement of older gas furnaces with new high-efficiency models; installing efficient showerheads; computerized rescheduling of building operations to keep equipment off during unoccupied hours.
- Conservation: temporary reductions in demand from voluntary curtailments in customer end-uses. Examples: changing thermostat settings beyond normal ranges; taking shorter showers; reducing lighting levels.

In our experience, affecting energy demand in the near term requires a mix of efficiency and conservation. As mentioned earlier, the state of California used such a strategy in 2001 to bring down state electricity use by almost 7%. This had the effect of bringing electricity prices down substantially. And because of the link between electricity and natural gas, this effort also helped reduce natural gas prices.

Recommended Near–Term Steps

ACEEE recommends the following near-term actions for Congress and the Administration to respond to the looming threat of natural gas prices.

1. Supplement current efficiency deployment programs. We recommend Congress pass a supplemental appropriation for Federal programs that deliver energy savings, including the EPA and DOE Energy Star programs, weatherization and other state grants, LIHEAP energy assistance funds (with a rider to expand the allowable percentage usable for weatherization from 15% to 30%), and DOE's industrial assistance programs. EPA's Energy Star budget has just been cut by 30%; these funds should be restored and directed toward gas-saving measures. This bill could also create matching grants for states that operate energy efficiency programs with their own funds; approximately 20 states, representing a majority of the population, fall in this category.
2. Conduct a national efficiency and conservation campaign. DOE should lead a partnership effort among efficiency manufacturers, utilities, states, and others

to accelerate markets for efficient technologies, and to motivate consumers and businesses to moderate their gas usage. This campaign would include public service announcements, educational materials, voluntary commitments from industry, and accelerated market transformation efforts. The California Legislature worked closely with the utility commission, utilities, and state and local agencies to mount a campaign in 2001 that succeeded in reducing electricity usage by almost 7%. This helped bring down both electricity and gas prices within that same year.

These initiatives can make a difference in the next 24–30 months, which will be critical in avoiding crippling gas price and supply problems

Recommended Longer–Term Steps

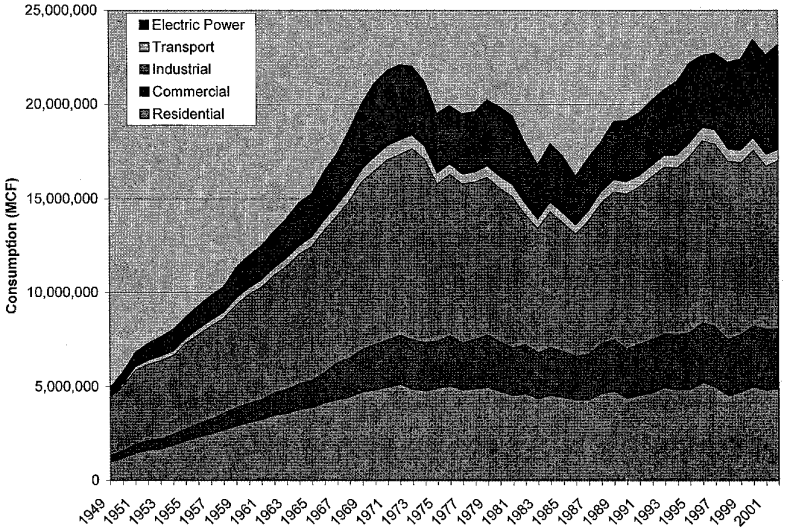
Looking three years and beyond, ACEEE recommends the following actions:

1. Accelerate Federal efficiency standards. The Department of Energy's appliance efficiency standards program currently has a rulemaking underway for residential heating equipment. Unfortunately, DOE recently downgraded the priority for this rulemaking. DOE should restore this rule as a top priority, and should take higher gas prices into account in setting the final rule. DOE should also accelerate its commercial air conditioning standard rulemaking, as commercial cooling is served mainly by inefficient gas-fired peaking turbines.
2. Expand incentives for high-efficiency technologies. The current energy bills offer tax credits for efficient technologies such as combined heat and power systems, new and existing homes, commercial buildings, and residential furnaces, air conditioners, and hot water heaters. Congress should consider increasing incentive levels, years of eligibility, and other features of these incentives to increase their natural gas savings. For example, the existing home credits do not cover duct sealing, which is one of the largest opportunities for reducing gas usage.
3. Expand research and development. Congress should increase funding for advanced technologies that save natural gas in: buildings through advanced heating, cooling, and hot water systems, advanced envelope designs, and control systems; in industry through CHP, advanced manufacturing processes, motors and other components; and in power generation through CHP and other advanced generation technologies, plus efficient transmission and distribution technologies.
4. Create public benefits funds for efficiency. One provision Congress has not included in the current energy bills is a Public Benefits Fund for energy efficiency. It would place a small charge on utility bills to fund a pool of money that would be allocated to states for efficiency and other clean energy programs. While originally aimed at electricity savings, it should be equally applicable to natural gas utilities and their customers.
5. Create efficiency performance standards for utilities. Texas' electricity restructuring law created a requirement for electric utilities to offset 10% of their demand growth through energy efficiency, and enabled them to use public benefits funds for this purpose. Bills along these same lines have been introduced in Colorado and Washington, and have been discussed in Congress. This kind of performance standard also can be applied to natural gas utilities.
6. Expand support for Combined Heat and Power (CHP). CHP generates electricity far more efficiently than the majority of the conventional natural gas generation. Congress should expand its support for CHP by improving the proposed CHP tax credit by removing the minimum size limit and restoring depreciation periods to the 10 years allowed in current law. The Congress should also include language in the energy bill that encourages states and utilities to provide fair and reasonable interconnection and tariff treatment for new CHP systems.

ACEEE's experience with these programs and policies gives us confidence that they can make a critical difference in bringing balance to natural price prices and supplies in the coming years. We look forward to working with the Subcommittee on these important issues.

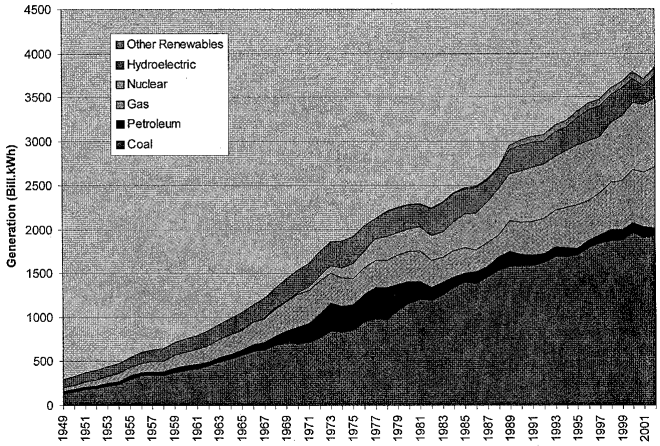
Thank you for the opportunity to share our views with the Subcommittee.

Figure 1
Natural Gas Demand By End-Use Sector



Source: ACEEE staff analysis based on Energy Information Administration data

Figure 2
Fuel Sources for Electricity Generation



Source: ACEEE staff analysis based on Energy Information Administration data

Mrs. CUBIN. Thank you, Mr. Prindle. First, I would like to recognize Mr. Bishop for a round of questioning.

Mr. BISHOP. Thank you, Madam Chairman. And I apologize, I will have to be going to present a bill in just a few moments, and hopefully I can come back and you won't be done by that time.

Let me give a couple of just general questions to all of you, because I think from what I have heard so far I am going to get a different answer from different sources on that. The first one is, Mr. Jewell, I think it was you who said that the options were either job loss or increasing supply. If indeed the concept of conservation is to decrease the amount of supply that is needed, is there then a correlation that says conservation will ultimately also equate to job loss? Can you make that kind of a junction? And then let me ask—let me do all three of them, and then you can have at it, whoever wants to.

The second one is, is because of the 23 percent of our energy that comes from natural gas, natural gas is an environmentally sensitive, environmentally sound process. Are there negative environmental consequences that might result from the failure to increase gas supply and then therefore going to other sources of energy?

And I do have one specific question that can be either yes or no for Mr. Jones. I am having a running battle with the Army Corps of Engineers. Can you actually grow sugar beets in wetlands successfully?

Mr. JONES. No.

Mr. BISHOP. Thank you. That is what I have been saying.

[Laughter.]

Mr. BISHOP. That was the easier of the questions, so thank you.

Mr. JEWELL. Let us see, on the energy efficiency question, Representative Bishop, I don't see that energy efficiency causes job loss. I think it can make our country more competitive, allow us to compete better overseas. But a lot of industry, the chemical industry has emphasized energy efficiency for 20 to 30 years. We are the leader in combined heat and power production, and the country is still out of gas. And so we are not going to be able to save our—short term, we are going to be able to save our way out of this gas shortage crisis, but conservation can contribute and it can make our country more competitive long term, and it should be a factor in the long-term supply. But when you look at the shortfall that we talked about in gas, you are not going to do it with conservation. We are going to have to produce more gas or else we are not going to be able to sustain the job level that we currently have.

Mr. BISHOP. Would anyone else like to go on that particular one since I started off with that?

Mr. RATTIE. Good afternoon, Congressman Bishop. Maybe I could give you an example from back in your district. Back in the 1980's, the typical customer for Crestar gas, average annual natural gas usage was about 185 decatherms per year. Today, the average customer is using 115 decatherms per year, and new customers that are being added to our system are using in the neighborhood of 90 to 110 decatherms, about half what they were using back in 1985. Now, that happened without the divine hand of government, to a large extent. There were some efficiency standards placed on equipment, but I would suggest to you that once again the way to cause conservation to happen is to have customers see price signals. And a better approach rather than government mandates might be the

use of time differentiated metering. So, for example, that customers that wants to turn their dryer on at 11 o'clock on a day when the temperature is 115 degrees outside is going to pay a substantial amount more for that electricity than if they had waited till 10 o'clock at night.

So I think the market will ultimately solve some of these problems without a lot of direct mandates from government. I strongly agree with my colleague to the right that we ought to use the bully pulpit. I think hearings like this are extremely useful. I wouldn't object to a modest amount of guidance to the industry as to what efficiencies we ought to be striving for, what is achievable within reasonable economic means, but, by and large, the market will take care of it.

Mr. BISHOP. But if I can go back to where I was trying to go with, or at least what I was hoping the answer was there. Expansion of the supply is the equivalent expansion of the economy. Are we going to be able to expand the economy, increase jobs merely through conservation or is expansion of the supply an essential element for that?

Mr. RATTIE. We have no choice. We have to grow domestic natural gas supply. There is a strong preference for natural gas as a fuel for power generation and certainly for residential use. There is no alternative, by and large, to natural gas in Mr. Jewell's and Mr. Jones' businesses, at least not given the constraints we have put on other fuel sources.

Mr. BISHOP. So what you are telling me is with or without conservation we still have to have this policy of being able to allow the exploration and development.

Mr. RATTIE. Absolutely, Congressman Bishop; we have no alternative.

Mr. JEWELL. And I agree with that. I would say absolutely as well.

Mr. PRINDLE. If I could add just briefly, Congressman Bishop. I think we are not faced with an either/or proposition here. I think we are faced with a both/and proposition, that we will continue to increase our energy exploration and consumption, but the question is can we increase it at a rate that is more sustainable? And when you invest in energy efficiency, you create jobs—high-efficiency furnaces, high-efficiency homes. That is a legitimate form of investment as well. Our analysis shows that if you invest in a balanced portfolio of resources, you actually get more net jobs overall. So we don't see an ultimate conflict there. We think we ought to be investing in the supply side and the demand side to get the best overall economic growth picture.

Mr. BISHOP. And can I just ask someone just to comment on the other question I have since you are going through there. If we fail to increase the supply, do we create negative environmental consequences because of that? Is that a risk of our policy as well?

Mr. RATTIE. Yes, we do. Most of the NOx reduction programs in the east and other States do have some element of using natural gas instead of coal. And, really, every State, as people have said, natural gas is a very clean burning fuel. It is not as clean as nuclear, but it is a very clean burning fuel, and if we do not have natural gas, we are going to have to burn more coal, and it will dam-

age the air quality, it won't be as good for the air quality in every State.

Mr. BISHOP. Madam Chairman, I appreciate the time. I appreciate the information. I apologize for having to leave because it is fascinating, and if you keep talking long enough, maybe I can come back.

Mrs. CUBIN. Thank you. OK. I will try. I would like to get something straight that I may have misunderstood, Mr. Jewell. In response to Congressman Bishop's question, did I hear you say that you didn't think high gas prices caused job loss?

Mr. JEWELL. No, I didn't—

Mrs. CUBIN. OK.

Mr. JEWELL. I certainly didn't intend to say that. I didn't recall saying that.

Mrs. CUBIN. Well, I just wanted to get that clarified.

Mr. JEWELL. Yes. I think high gas prices that make all of our industry less competitive and uncompetitive with the rest of the world absolutely causes job losses.

Mrs. CUBIN. Mr. Christopherson, you talked in your written testimony a little more in depth about the fertilizer prices and the problems that the fertilizer industry has with natural gas prices. Could you elaborate on that a little bit for me?

Mr. CHRISTOPHERSON. Certainly. As I said, in the feedstock for production of especially the ammonia fertilizer is primarily natural gas. With the increase that I stated there in my own particular operation as an example, and I have a relatively small farm in today's standards. My wife and I are the two primary sources of labor, we are the total support or source of management, so the blame and the buck stops either on my doorstep or hers, depending on who happens to be there at the moment.

Anyway, the long and the short of it is the increase over last year is going to amount to somewhere, depending on the breakdown, somewhere between $15,000 and $20,000 extra in terms of production costs, or a little over $20,000 in production costs. And, obviously, as we all know, in production agriculture, you have very limited ability to increase or to pass your increased costs along. So that is a big issue for us and of great concern for the industry as a whole.

Mrs. CUBIN. And that was a point I wanted to get on the record. Why is—is it because of foreign exports that you cannot increase the price of your crops to recoup that? Because I think as long as Americans are not really going through, say, what California went through this last summer, they aren't going to realize how devastating these natural gas prices are. And if they don't realize that, they won't realize the need to learn more about the environmental impacts of producing gas in the lower 48 States. So tell me why you can't pass that on to your customers.

Mr. JEWELL. Two primary reasons just off hand. First of all, production agriculture is very diverse, and we are not terribly organized. We are a group of individuals, and individuals don't necessarily always want to do things in concert with others. But even more importantly is the fact that we are indeed in a global market. In fact, there is soybeans and soybean meal coming into South Carolina, as an example, at a cheaper rate than what we can ship

down the Mississippi and over to South Carolina. So that is part of the dynamics of where we are in agriculture right now and other industries also but I am familiar with agriculture. And so that and the fact that we never have had the ability to be able to set a price on our commodities and I guess for some valid reasons, perhaps. But, nevertheless, so those are the two primary issues why we can't pass it on.

Mrs. CUBIN. And the mom and pop organizations or operations, I should say, that I consider the backbone of the agriculture industry in our country they are the ones that aren't capitalized enough that they can afford to do other things to increase the price, like the insurance companies that buy major farms or big farms, and so it is putting the little guy out of business, it seems to me. Would you think that is reasonable?

Mr. JEWELL. I think all farms are going to feel the impact of this. Now, obviously, if you have larger operations, you can spread your fixed costs over a larger land base and so you can absorb some of these things. You still feel the pain but it is not going to choke you. Certainly, the mid-sized farming operations are probably the ones that are going to feel it the most, because they are totally dependent, for the most part, on the production of that particular farming operation for the revenue. Now, you take the small farms, the step above, perhaps, the hobby farm, and there you are talking about people who are holding employment off the farm and are farming on a part-time basis. Now, they too are going to feel the pain but it is—

Mrs. CUBIN. Right.

Mr. JEWELL. —a lesser part of their total income for the year.

Mrs. CUBIN. Thank you. I would like to go to Mr. Prindle for a second. You talked about the declining support for energy efficiency and the Energy Star Program that was reduced, and, you know, I kind of think I have to agree with you on that, and I also agree with you on the fact that there is a bully pulpit that is vacant at the present time in terms of conservation and efficiency. I was thinking, my sister is from San Jose, she lives in San Jose, and last year she told me they set their thermostat at 78 degrees and middle-aged women don't like 78-degree thermostats, I am telling you. Anyway, so I was just looking through my house at the things that—you know, I will open my refrigerator door and walk across the kitchen to the sink and leave it open because I am going to go back and get something else. And I just think there are a lot of things we could do in terms of education. I think—well, I would like to know your opinion of Federal, state roles in education on efficiency and conservation.

Mr. PRINDLE. Thank you, Madam Chair. Well, I certainly agree there are a lot of things we could all do in the short term to change our behavior a little, and that is what we call conservation. We also believe that that kind of thing typically is only effective in the short term, because, as you say—

Mrs. CUBIN. Right.

Mr. PRINDLE. —people don't like their thermostats where they are not used to having them. We do think that can be effective on the short term. The longer-term solution is energy efficiency where

you have, for example, an electronic thermostat that allows you to smartly set it where you want it but only when you need it.

Mrs. CUBIN. But you have to be smart enough to set it. I have got one in my apartment.

[Laughter.]

Mrs. CUBIN. Could you come over there when you leave here and set my thermostat?

Mr. PRINDLE. You need someone under 21 to understand how to program that thing.

Mrs. CUBIN. That is right.

Mr. PRINDLE. As far as the Federal and State roles go, we are gratified to note that Secretary Abraham is holding a summit on this next week. We will be attending that. We do think there will be some commitments to communicate more actively about these issues throughout the consuming public, and we see that as a multi-partnership—the State energy offices, many of whom have active energy efficiency programs, many of the utilities are active in energy efficiency and can take up some of this. There are a lot of manufacturers involved in the energy efficiency business who are actively involved in the Energy Star Program, companies like Sears, for example.

Mrs. CUBIN. Right.

Mr. PRINDLE. Now, they can ramp up some of their promotional efforts. So there is a lot of things we can do to kind of encourage the market to respond a little quicker and a little more completely to this challenge, and I think we can get some small changes on the margin that will help moderate prices, help free up gas for some of the industrial users that really need it to keep their plants from shutting down.

Mrs. CUBIN. Well, I think everyone has to admit that what happened in California in terms of conservation was pretty significant and it was pretty impressive, at least it was to me and I think to most people across the country. Certainly, as you stated, and we all agree, it is not the only answer but it is a piece of the puzzle, and we did address that in the energy bill that we passed. I wonder—or I guess in your testimony you said that you thought we ought to increase the tax credits and the other issues that you talked about here.

Mr. PRINDLE. Well, just for one example, the House bill, unfortunately, does not include residential water heating and furnace credits as the Senate bill does, so if the bills get to conference, we hope that importance of the natural gas issue will cause the House folks who did their work back before this crisis was made public people will be able to rethink and refocus some of those tax provisions.

Mrs. CUBIN. We will certainly keep that in mind when we are working in the Conference Committee. Thank you.

Mr. Rattie, I appreciated your testimony, and I appreciated the detail in it because it was very informative. Tell me who is suffering the most, do you think, of those who are being impacted by the current policies of the government and the high natural gas prices.

Mr. RATTIE. Well, I think in the short term, Congresswoman, the large industrial users are taking the big hit here, and Mr. Jewell and Mr. Jones have already spoken to that. To some extent, Mr.

Prindle is right, in the residential sector our customers probably won't see the ramifications of higher prices until they get their winter bill, starting maybe November and December, and that is when Congress can expect to hear an outcry from a large segment of the population.

But I would like to urge Congress not to come to the conclusion that all we have to do is use bully pulpit and issue some efficiency standards for equipment and that will be enough to get out of this mess. It will help but the inescapable conclusion is that we have to do something starting now to accelerate the development of this abundant domestic natural gas resource base. Forty percent of our natural gas resources are either off limits or open under highly restricted conditions. I could give you lots of war stories about the battles that producers have to go.

The fear of producing offshore, let me use just one example, and I apologize for the long answer here, but offshore eastern Canada, a new major natural gas project, came online a couple of years ago. It is the Sable Island project. There are—that project was developed, it is bringing gas to eastern Canada and to the northeastern United States, and there is significant more gas development behind it. Now, I would submit to you, unless God pulled a fast one on the United States and put all the natural gas in the Sedimentary Basin off the coast of eastern Canada, that there is probably abundant natural gas reserves off the east coast of the United States. I find it amazing that some Members of Congress are trying to hide that fact from the American public. I think if the American public understood the magnitude of our resource base and then looked at Sable Island as an example of how you can develop offshore resources without impact to the environment, I think there would be a change in thinking about exploring and developing gas in our offshore basins.

Mrs. CUBIN. And I find it ironic as well that there is a proposed wind farm 25 miles out off Nantucket Sound, and those very people who are pounding their table and demanding that we have alternative renewable energy sources are saying, "No, no, no. Don't build there because we will have to look at it 25 miles out." And I am really disappointed that members on that side of the aisle are not here today, because they are the ones that pound this dais and say, "We have to have renewables," and then they don't even to show up to listen, and this isn't the only hearing. They don't want to know. What they want to do is to keep us from developing the resources on the shores and on the land, and they don't show up when they are faced with facts that can't be denied. So it is frustrating for me, and I know it is frustrating for you as well.

I want to talk a little bit also, Mr. Rattie, about LNG. I absolutely respect Mr. Greenspan's authority and knowledge of economics, but I am not necessarily certain he is an expert in energy policy, because I thought that his comments on LNG were a little bit nearsighted. Could you respond to that?

Mr. RATTIE. Well, I think—I hope what Chairman Greenspan was suggesting is that in the longer term there is abundant natural gas resources around the world that could be developed and brought to the United States on LNG ships. What I hope he wasn't trying to suggest is that that is the panacea for our natural gas

supply challenges, because it clearly is not. I have worked in the LNG business and it is—one way I would characterize the LNG business is when all gets said and done, more gets said than done. It is always a business that has a lot of potential, and were there is no question we are going to see LNG supply grow dramatically over the next couple of decades, but it will not be enough and not nearly enough to close that supply gap.

A lot of the numbers that get tossed around assume that the LNG is coming from a marginal train in Trinidad using a marginal ship with marginal gas that the producer in the host country are willing to sell as an alternative today, as an alternative to waiting 25 years to sell it at the end of a longer-term contract. There is not much volume available at 250, there is going to be—a huge amount of investment is going to have in countries like Angola, Nigeria and Indonesia, Malaysia, Venezuela, maybe Bolivia, certainly the Middle East to just get that supply available. And that is not going to happen overnight. And I would submit that it doesn't make a lot of sense for policymakers to send the jobs that are involved in developing that supply to those countries when we can have those jobs here.

Mrs. CUBIN. Mr. Jewell, I noticed in your written testimony that your policy recommendations are very much the same as the provisions that were in the House version of the energy bill. How do you think our bill will help your industry specifically, and what else do you think Congress can do that wasn't in the bill to help your industry?

Mr. JEWELL. I think that the key element for our industry is to get increases in natural gas production, and I think recognition that a lot of industries, including ours, use natural gas-based feedstocks also. We use natural gas for fuel, and we use ethane, which comes out of natural gas, as a feedstock. So we are all hit here; the chemical industry is probably hit doubly with that. So I think an emphasis on feedstock and keeping the natural gas liquids industry viable is important. When gas prices spike high, there is a tendency to want to put—leave all these liquids into natural gas rather than take them out. And so that would be important to us.

I think, basically, preserving the industrial jobs and preserving the industrial base is what is important to all of us. If we don't produce the natural gas and we don't develop other forms of energy, then our industry's customers who sell to basically other industrial customers, and they leave. So I think, basically, a strong economy, increased natural gas production, some attention to the liquids, natural gas liquids aspect is the primary thing that our industry needs.

Mrs. CUBIN. Mr. Jones, in your testimony, you mentioned the impact of permitting delays on natural gas supply, those impacts on your industry. You are on the ground. Do you—and I know that you don't have dealings with natural gas permitting but do you talk to guys that do? I think in your testimony you said it takes 175 days now for an APD, average, and it used to take 30. It was in somebody's testimony, I think it was yours. Do you talk to those guys that are working with those BLM offices in Wyoming in coal bed methane and other areas since you are right up in that area?

What do you think can be done to help speed up the permitting process.

Mr. JONES. Well, yes. In answer to your question, ma'am, yes, I do talk to them because we are securing natural gas supply for our process facility. What do I think can be done? Some way to streamline that. It actually went from 45 days to 175 days. Some way to streamline that process to allow those producers the ability to get the permits and go with the drilling in a more quicker fashion. Thus, we are going to increase the supply.

Mrs. CUBIN. We have discussed things—we can't—because there is a major play, for example, in the Powder River—or not—yes, the Powder River Basin on coal bed methane. Because there is a major play, we really—I mean that is not going to be a real long-term need for employees to process APDs because there is a glut of them and once we can get that glut taken care of then hopefully the number of employees that we need won't be as many, so we don't want to hire a lot of full-time employees. So some things that had been suggested are moving BLM employees from one part of the country to—or one area to an area where there are a lot of APDs that are pending. We have tossed out ideas like having the companies hire contractors that are recommended by the BLM that could process those APDs in which case they wouldn't become permanent employees. So are there any other ideas out there that the guys are talking about?

Mr. JONES. Not that I have heard, but to be perfectly honest with you, I am not the expert on the APD application process.

Mrs. CUBIN. Right.

Mr. JONES. I just understand that the BLM office in that Powder River Basin has a very long time lag to process those documents.

Mrs. CUBIN. Yes.

Mr. JONES. Some way to streamline that would be—

Mrs. CUBIN. There are so many. We have an excellent Director of the BLM now and she is willing to take the heat and do what needs to be done to get those things moving, and I appreciate her actions. In the past, I was kind of disappointed, I got extra money for the Powder River Basin to process APDs for coal bed methane, and I found out the BLM bought 12 trucks. And that wasn't really wasn't what I had in mind, so I don't think those things are going to be happening under the new State director and under Kathy Clark, the Director of the BLM.

We do have votes, and actually there are three, so I will not ask you to stay any longer. I do thank all of you very much for your testimony and the answers to your questions. And I believe that members will have written questions that they would like to submit to you in writing, and we will hold the record open for 10 days if you could promptly respond to that.

So having no other business before the Committee, the Committee is adjourned, and thank you once again for being here.

[Whereupon, at 1:01 p.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows:]

[A statement submitted for the record by Calpine Corporation follows:]

Statement submitted for the record by Calpine Corporation

Summary

Calpine Corporation is a leading North American power company dedicated to providing electric power to wholesale and industrial customers from clean, efficient, natural gas-fired and geothermal power facilities. The company generates power at plants it owns or leases in 22 states in the United States, three provinces in Canada and in the United Kingdom. Calpine is also the world's largest producer of renewable geothermal energy, and it owns approximately one trillion cubic feet equivalent of proved natural gas reserves in Canada and the United States. The company was founded in 1984.

Calpine believes that natural gas continues to be the fuel of choice for new investments in electric generating capacity. The U.S. is facing a short-term tight balance between supply and demand, not a long-term natural gas crisis. Gas continues to make sense not only because of its inherent economic and environmental advantages, but due also to the relative lack of acceptable and commercially available alternatives.

Calpine appreciates this opportunity to submit this written testimony in connection with the Subcommittee's on-going work on natural gas and related policy issues. Key points of Calpine's testimony are as follows:

- The U.S. is not facing a long-term natural gas supply crisis. Policymakers should be very cautious not to overreact to changes in the market or make long-term decisions based on short-term market conditions. At today's consumption level, the U.S. has approximately 70 years of domestic supply based on known, economically recoverable reserves, not including potential additional import capability.
- Short-term supply constraints can be partly addressed by dispatching the most fuel efficient gas-fired units first either before or in place of older less efficient units because new units use about one-third less natural gas to produce the same amount of electricity.
- Recent price trends in the gas market are primarily a function of the current tight balance between supply and demand, which, as history has shown, is likely to reconcile itself over time. U.S. EIA forecasts that natural gas prices will fall from current levels, rising slightly faster than inflation through 2025 to an average of $3.90/MMBtu (in 2001 constant dollars).
- As with all commodities, gas market prices send correct signals to induce an appropriate response from suppliers. Although there is often a lag between higher prices and increased production, the U.S. rig count has increased 44 percent since April 2002.
- Natural gas combined-cycle units continue to make the most sense for meeting incremental electric power needs because they represent by far the most efficient means of converting fuel to electricity, they compare favorably in terms of life-cycle cost relative to new coal units, and are especially cost effective when the potential future costs of environmental regulations are considered.
- Natural gas is far superior to even the cleanest coal technologies: A modern gas-fired power plant emits almost 90% less NOx, 99.7% less SO2, 54% less CO2 and 100% less mercury on a pounds per megawatt-hour (lb/MWh) basis, compared to a new pulverized coal plant.

Introduction

Natural gas still makes sense as a fuel for new electric generating resources. While recent price trends and today's tight balance between supply and demand have led to heightened political and regulatory concern, over the long term the U.S. has access to an abundant supply of natural gas and it is expected to remain a cost-effective and reliable fuel. Moreover, current natural gas-fired electric generating technology continues to offer significant cost and environmental advantages over other commercially available alternatives.

Since the enactment of the Energy Policy Act of 1992, which effectively created the idea of a competitive wholesale power market, gas-fired, combined-cycle power generation has largely been the technology of choice for new electric generating capacity. There are a variety of reasons for this market-driven trend, including:

- Recent advances in the reliability and fuel efficiency of natural gas combustion turbines;
- The relatively low capital costs of gas combined-cycle units compared with coal and other alternatives;
- The relatively short construction timeframe associated with gas-fired units;
- The small footprint/high energy density of combined-cycle units, which eases land use concerns and enhances community acceptance;

- The ability to site new units close to load centers;
- The operational flexibility of combined-cycle units, which allow them to operate in a variety of peaking, intermediate and baseload configurations;
- The overwhelming environmental benefits of clean-burning natural gas in combination with ultra-high plant efficiency, leading to significantly reduced air emissions per megawatt-hour of electricity produced; and
- The energy conservation benefits of replacing older, less efficient technology with new highly efficient technology.

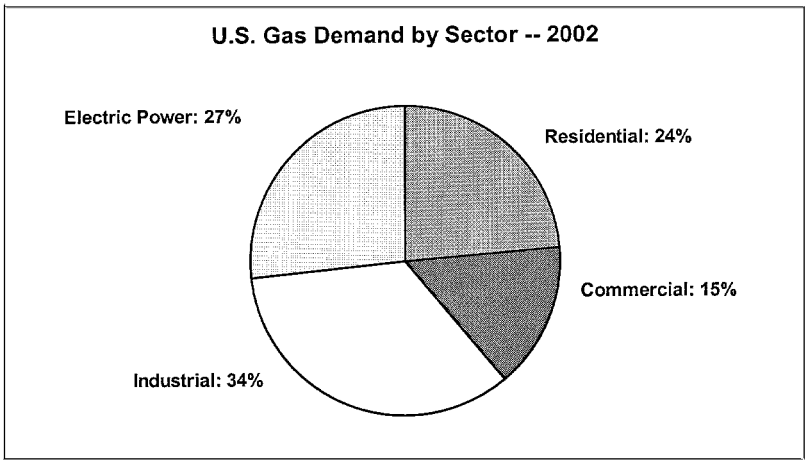
The adoption of gas-fired combined-cycle generation as the technology of choice of the last decade was not only market-driven, but was notably devoid of subsidies that have often accompanied the introduction of new electric generating technology.[1] Moreover, the relative benefits of gas combined-cycle technology are further enhanced by the lack of commercially available alternatives that either make sense for consumers or the environment, as more fully explored below.

The very success of gas-fired technology has led some to question this trend. It is extremely important, however, that policymakers not overreact to the current situation by making long-term policy based on short-term market behavior.

U.S. Natural Gas Demand

Total U.S. natural gas demand for the year ending December 2002 was approximately 23 trillion cubic feet (Tcf). According to the most recent forecast from the U.S. Department of Energy's Energy Information Administration (EIA), natural gas demand is expected to grow at an annual rate of 1.8 percent between 2001 and 2025. Half of this growth is projected to come from increased gas use in electricity generation, although this may be overly optimistic given the current slowdown in new power plant construction across the country.

During 2002, the majority of U.S. gas demand was attributable to the industrial sector (34 percent). With the rise in the use of gas for power generation, that sector now accounts for the second largest use of gas in the U.S., followed by residential and commercial use.[2]



Due to the "efficiency effect" associated with new gas units, the total amount of new gas-fired installed capacity does not translate into an equivalent net increase in demand. This is because many of the new, highly efficient combined-cycle units are displacing generation from older, less efficient gas units. A new combined-cycle power plant is generally more than 40 percent more fuel efficient than traditional

[1] During the same period, for example, we have seen more than $3.0 billion Federal investment toward the development of cleaner coal technology.

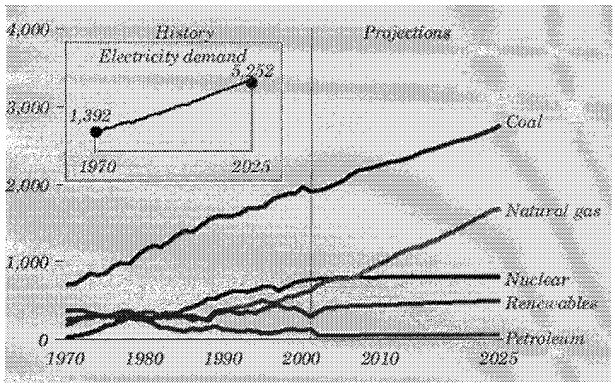
[2] Recent revisions to the EIA data show a combined "electric power" sector, which now includes gas used for industrial cogeneration (combined heat and power).

steam technology, which makes combined-cycle generation among the nation's leading energy conservation technologies.[3]

Even under the most robust projections, gas-fired generation is only one of many factors—such as weather affecting the overall balance of supply, demand and market pricing. Indeed, a modern 500-megawatt (mw) combined-cycle natural gas power plant running at a high capacity factor represents an incremental annual gas demand of about 28 Bcf (0.028 Tcf)—about one-tenth of one percent of the U.S. market.

U.S. EIA expects to see a continued rise in the amount of gas-fired electric generation through 2025. It is interesting to note, however, that the use of coal and gas are expected to rise at relatively the same rate, with most other types of electricity generation remaining flat. Therefore, coal, which currently supplies about half of the nation's electricity, will continue to be the dominant fuel for electricity generation in the U.S. for some time to come.

Figure 4. Electricity generation by fuel, 1970-2025 (billion kilowatthours)



(From US EIA 2003 Annual Energy Outlook)

Gas Supply

The U.S. continues to meet the majority of its demand for natural gas through domestic production, relying on Canadian and other imports for about 17 percent of its needs.

At present, total economically recoverable reserves in the U.S. are estimated to be 1,614 Tcf, a figure that has historically tended to rise or fall depending on assumptions about future prices. These estimated reserves can be translated into approximately 70 years of supply at today's level of consumption in the U.S. Conclusions about the long-term size of the gas resource base, however, have usually proven to be overly conservative as new discoveries and advances in exploration and production technology tend to expand the ultimate supply horizon.

Although overall North American production capability remains of vital significance, it is also important to understand the availability of natural gas on a global level, as well as the potential for increased trans-oceanic gas trade.

Worldwide, currently proved and estimated reserves, recoverable with present-day technology, are huge, adding up to more than 10,000 Tcf. Furthermore, many large gas reserves have been discovered in less developed countries that are not likely to use much of that gas but would very much like to take advantage of those resources as a commodity for export. Gas imports from overseas (in the form LNG) have already been proven as a cost-effective and reliable way to meet incremental market demand, and several large energy concerns have announced investments in additional U.S. LNG import capacity.[4] LNG terminals have been expanded on the East

[3] In areas such as California, New England and Texas, this is also translating into significant environmental improvement as new gas-fired combined-cycle capacity replaces older, less fuel efficient and dirtier oil- and gas-fired generation.

[4] New England, for example, has historically relied on LNG imports for as much as 30 percent of total winter peak day requirements.

Coast, are being developed on the Gulf Coast and are being considered in California, as well as in Mexico and Canada.

The U.S., therefore, continues to have a strong natural gas resource base as well as significant potential for increased gas imports both from North American and offshore sources. We are by no means "running out of gas.

Gas Prices

The U.S. gas market currently faces a tight balance between supply and demand, which has translated into higher-than-normal prices. This relatively modest imbalance in the market, however, has led to a disproportionate impact on market prices.

Weather continues to be the dominant factor affecting natural gas prices, and also remains among the most difficult factors to predict. Weather affects natural gas demand due to heating loads during the winter and air conditioning loads during the summer, to the extent a regional power market relies on gas-fired electricity generation.

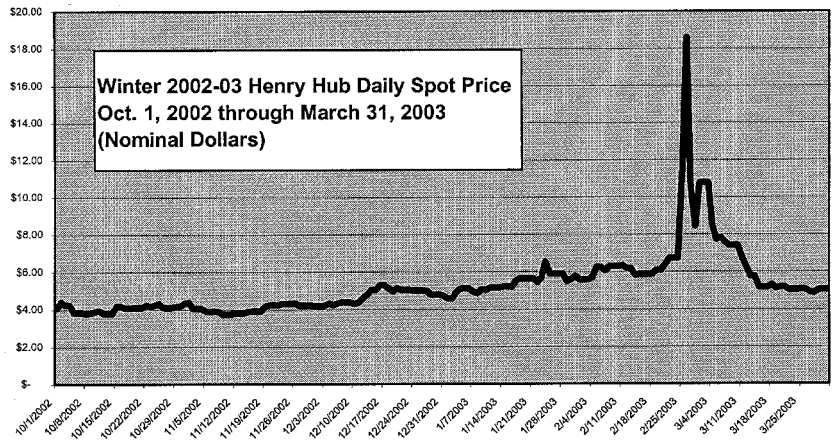
Weather also affects gas demand indirectly. For example, weather influences the availability of hydroelectric generation. Periods of low hydro output lead to greater reliance on other sources of generation, including gas-fired capacity.

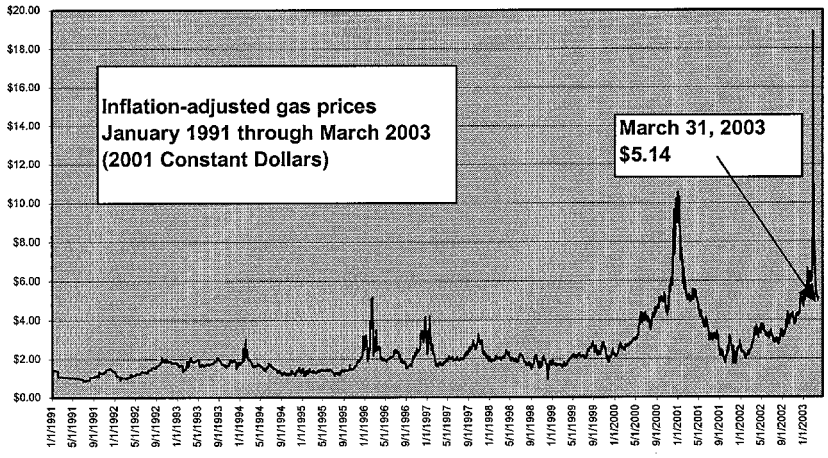
Another important factor affecting prices is the inherent lag time required for production to respond to unexpected changes in demand. This is exacerbated by the fact that historical price trends through the 1980s and 1990s have made gas producers skeptical that today's prices are sustainable, leading to a more cautious approach toward capital-intensive investments in exploration and production efforts.

Current prices are also being affected by a relatively long winter heating season during 2002–2003, which delayed the seasonal transition from storage withdrawals to storage injections, leading to concerns about the adequacy of storage inventories for the upcoming winter. In addition, unusually high oil prices (including residual fuels) have impaired the ability of some customers to fuel switch away from gas, leading to further demand and price pressure in the gas market.

So-called "spot" prices for natural gas reached record peaks during this past winter (2002–2003). Spot fuel prices, however, are not an accurate measure of prices that consumers pay. Power generators' fuel costs are not always highly correlated to spot fuel price because of contracting and hedging mechanisms, and/or because they may own and produce a significant portion of the fuel they use.

Similarly, wholesale buyers of electricity also shield themselves from short-term fluctuations of power prices through a variety of contracting and/or hedging mechanisms. As a result, the specific relationship between short-term fluctuations in fuel prices and power prices is at best moderate, and should not be the determining factor in consideration of major changes to national energy policy.

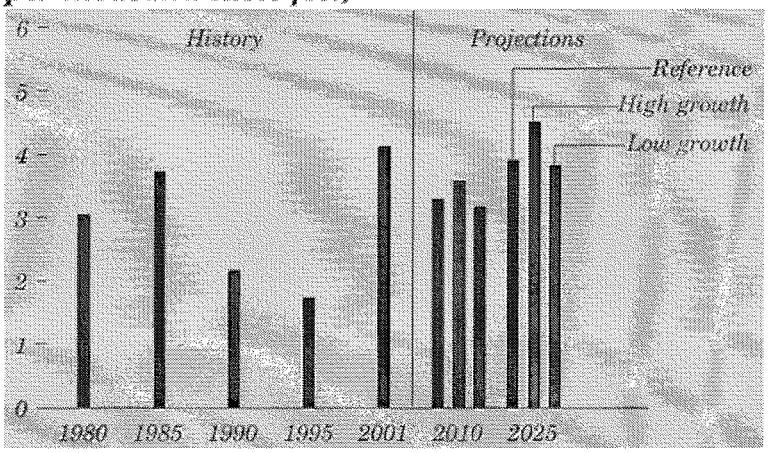




Looking at the longer-term trend, inflation-adjusted natural gas prices have experienced a variety of peaks over the last decade, but in each case returned relatively quickly to normal levels.

The U.S. EIA currently predicts that future wellhead prices for natural gas will fall from current levels and then gradually rise to $3.90 by 2025 (in 2001 constant dollars). Therefore, while EIA expects gas prices to rise faster than the general rate of inflation, they are by no means expected to remain at today's high levels.

Figure 78. Projected lower 48 natural gas wellhead prices in three cases, 2010 and 2025 (2001 dollars per thousand cubic feet)



(From US EIA 2003 Annual Energy Outlook)

Gas producers are now responding to higher prices. According to the Natural Gas Supply Association, the U.S. "rig count" is up 44 percent since April 2002. Historically, the North American gas market has proved to be highly responsive to changes in supply and demand, at least over the long term. However, recent weather and economic cycles have made it more difficult for gas suppliers to keep up with highly variable and unpredictable changes in the market over the short-term.

It is important to note that price spikes frequently abate much more quickly than experts predict, as happened after the winter of 2000–2001. This makes gas pro-

ducers skeptical about future price forecasts and reluctant to jump back into the market until they develop confidence that sustained prices will support their investments. Today's natural gas market, however, like any commodity market, is highly flexible and has historically been able to balance long-term supply and demand trends. Today's higher prices inevitably lead to tomorrow's increases in production.

Benefits of Gas–Fired Power

The efficiency effect

Combined-cycle gas units in many electric power markets are displacing older, less efficient gas-fired plants, rather than contributing solely to increased net demand.[5] For example, a recent report by the California Energy Commission[6] suggests that overall state gas demand would be even higher without the development of new combined-cycle units, since it would cause more reliance on older, less efficient gas-fired steam and peaking units.

Operational flexibility

Combined-cycle units offer highly flexible operation with the ability to either run as full baseload units or as intermediate resources that can flexibly cycle to meet changing market conditions. In a competitive market with an efficient regime for dispatch, many combined-cycle units can and do adjust operations on a daily or even hourly basis to reflect price and supply dynamics in both the electricity and gas market. For example, on a cold winter day when residential heating load is driving peak gas demand, many gas-fired combined-cycle units slow or curtail their power output and sell gas and/or pipeline capacity back to the market. Units with backup fuel capability may continue to operate but use their alternate fuel. Moreover, since gas demand peaks during the winter heating season, while power demand peaks during the summer cooling season, such units offer a great deal of operating flexibility and balance to the market.

Gas pipeline optimization

Combined-cycle power plants serve as "anchor loads" that help lower gas transportation costs for other consumers and encourages investment in new pipeline infrastructure. In fact, during 2002 more than 3,571 miles of pipeline and a record 12.8 billion cubic feet per day of natural gas pipeline capacity were added to the national pipeline network—largely made possible by the development of new gas-fired generating capacity.

The ultimate cost of natural gas to the end-use customer is a function of the initial commodity price of gas combined with the transportation costs across the interstate pipeline system and the local utility distribution system. Transportation costs are a significant component of the end-use customer's bill, especially in the residential and small commercial sectors due to relatively low use and inconsistent load factors. Combined-cycle generating units are almost ideal customers from a gas transportation perspective and, therefore, help utilize the existing pipeline system more efficiently. This in turn lowers the unit cost of pipeline transportation, which benefits all customers on the system.

Alternatives to Gas

In addition to its inherent economic and environmental benefits, natural gas continues to be a viable and attractive fuel for electricity generation due, in part, to the absence of realistic alternatives. Large-scale, commercially available renewable technologies are not yet cost-effective, and the public is not yet ready to accept the next generation of nuclear technology. Therefore, this discussion focuses on the merits of natural gas versus new and existing coal-fired generation. Even with today's higher-than-normal gas prices, natural gas combined-cycle continues to come out ahead.

Economic Considerations

The total cost of a new electric generating unit is a function of its capital costs (including land, equipment, construction and long-term financing, etc.) and operating costs (fuel, labor, taxes, Operation & Maintenance, etc.). Coal has a lower unit cost per Btu of fuel and, therefore, coal-fired generation would be expected to have a lower short run marginal cost of production. Today, however, the up front capital costs for new coal plants are typically two to three times as high as they are for

[5] This displacement could be accelerated by the adoption of regulations that would encourage the retirement of outdated, inefficient and typically high polluting generators. True economic dispatch is primarily occurring in the Northeast, Texas and California and particularly lags in the Southeast.

[6] "Preliminary Natural Gas Market Assessment", California Energy Commission, May 2003

gas. In addition, a similarly sized coal plant requires up to 4 years to construct compared with only 2 years for a natural gas unit, which results in significantly higher interest expenses during construction. Also, despite the relative fuel cost advantage, even the most advanced coal technologies continue to be significantly less efficient than natural gas units in terms of turning fuel into electricity.[7]

The combination of higher capital costs and lower efficiency dramatically erodes coal's advantage in fuel price on a life-cycle basis. For a new coal plant to be a lower cost option than a combined-cycle gas unit, the difference between the price of gas and the price of coal must be very large and stay at that difference for the life of the project, which is often 30 years or more.

Moreover, due to its lower capital costs, a natural gas plant would be economic based on a much shorter investment horizon. Indeed, independent power producers like Calpine will consider power sales agreements with terms of 10 to 15 years as being sufficient to finance and construct a new combined-cycle facility. This is an important consideration for regulators and ratepayers, since shorter-term obligations are inherently less risky than the longer-term obligations required to support the economics of new coal-fired capacity.

Environmental Considerations

The environmental impacts of coal-fired generation also erode any advantage related to fuel price. This is not only true for older coal units built before Clean Air Act requirements but is true for new coal units as well.

Natural gas is far superior to even the cleanest coal technologies for all major regulated pollutants. In addition, the risk of future regulations on emissions of carbon dioxide, or stricter regulations on other pollutants such as mercury and particulates, need to be considered in terms of the potential long-term cost of coal, since consumers often bear the consequences of required environmental retrofits. It is quite possible that the long-term environmental risks of coal (as translated into future costs) are equal to if not greater than the risk associated with future natural gas price volatility.

As shown in the chart below, a modern gas-fired power plant is significantly cleaner than a new coal plant, both in terms of pounds of emissions per Btu of fuel used, and when adjusted for the plant's thermal efficiency as measured in pounds of emissions per megawatt-hour (MWh) of electricity produced. This analysis compares a new combined-cycle plant with a recently proposed supercritical pulverized coal plant based on data pending before the Wisconsin Department of Natural Resources.

	Units	Natural Gas (combined-cycle)	New Coal	Percent Reduction (% gas cleaner than coal)
Plant Heat Rate (net)	Btu/kWh	7,000	9,000	
Nitrogen Oxide (NOx)	lb/mmBtu	0.0092	0.07	86.9%
	lb/MWh	0.064	0.630	89.8%
Sulfur Dioxide (SO2)	lb/mmBtu	0.0006	0.16	99.6%
	lb/MWh	0.0042	1.4400	99.71%
Carbon Dioxide (CO2)	lb/mmBtu	118.9	206	42.3%
	lb/MWh	832	1,854	55.1%
Carbon Monoxide (CO)	lb/mmBtu	0.0067	0.12	94.4%
	lb/MWh	0.047	1.0800	95.66%
Mercury (Hg)	lb/mmBtu	0	0.0000023	100.0%
	lb/MWh	0	0.000021	100.0%
Respirable Particulates (PM)	lb/mmBtu	0.015	0.018	16.7%
	lb/MWh	0.105	0.162	35.2%

Conclusions

- The U.S. is not facing a long-term natural gas supply crisis, and policymakers should be very cautious not to overreact to changes in the market or make long-term decisions based on short-term market behavior.

[7] This concept is "heat rate" and is measured in Btu's/kWh.

- Recent price trends in the gas market are primarily a function of the tight balance between supply and demand, which history has shown is likely to reconcile itself over time.
- Competent and knowledgeable market participants manage their natural gas supply requirements with long term contractual arrangements and other risk hedging instruments that are specifically designed to mitigate short term volatility.
- As for all commodities, gas market prices send correct signals to induce response from suppliers, although there is generally an inherent lag before new production is available.
- Natural gas combined-cycle units continue to make the most sense for meeting incremental power needs because they represent by far the most efficient means of transforming fuel to electricity.
- Based on current EIA forecasts ($3.90/MMBtu by 2025, in 2001 dollars) natural gas combined-cycle units compare favorably in terms of life cycle cost relative to new coal units.
- Natural gas is especially cost-effective relative to coal when the potential costs of future environmental regulations are considered.

Recommendations

While there is no magic bullet that can control prices in a commodity market, there are a variety of steps that policymakers can and should take now and over the long term to ensure the continued availability of natural gas at economic prices, and to ensure the U.S. continues to enjoy cost-effective, reliable and environmentally responsible supplies of electric power.

Near–Term

- Ensure the most efficient optimization of natural gas used for electricity generation by implementing market policies that ensure that modern, highly efficient plants are called upon to operate before older, more expensive and less efficient gas-fired resources.

Mid–Term

- Expedite permitting procedures for new gas wells and, where environmentally appropriate, allow increased access to economic gas reserves that are currently off limits to production;
- Support development of interstate pipeline access to Alaskan and Rocky Mountain reserves;
- Support efforts to expand U.S. LNG import capability.

Long–Term

- Support continued development of new, environmentally responsible power generation technology, including renewables and clean coal (such as Integrated Gasification Combined–Cycle), as well as demand-side management technologies and practices.

[A statement submitted for the record by the National Petrochemical and Refiners Association follows:]

Statement of the National Petrochemical & Refiners Association

NPRA, the National Petrochemical & Refiners Association, is a national trade association whose members include virtually all U.S. refiners and petrochemical manufacturers. NPRA appreciates the interest of the House Committee on Energy & Commerce in the vital issue of natural gas supply and demand. NPRA believes that diverse, ample and affordable supplies of fossil fuels are essential to maintain U.S. national security, economic growth, and the viability of the domestic refining and petrochemical industries.

America's standard of living and overall economic health are strongly linked to an adequate supply of energy at reasonable prices. The nation faces severe challenges as it strives to balance ever-increasing energy demands from all consuming sectors with sometimes contradictory and short-sighted public policies that limit supply while promoting additional natural gas consumption. These conflicting policies, either in the short or long term, are simply no longer compatible with continued U.S. economic growth.

NPRA believes that there is an urgent need to harmonize the nation's energy and environmental policies, and that any national energy plan must include traditional supply and market-oriented policies for all fossil fuels, including natural gas.

Background

Energy is a strategic commodity. Without it, either through insufficient supply, unreasonable cost (or both), any modern economy is at risk. The threat of shortages can cause significant price escalations and disruptions in the marketplace. In recent years, domestic demand for natural gas has substantially increased while production has recently decreased. Government, industry, and private experts agree that natural gas demand is expected to rise by the year 2020 by as much as 60% over today's levels. It is still unclear whether domestic gas production can increase to meet much of this new demand.

This is not a resource problem nor, lacking changes to current edicts, will it be short-lived. NPRA believes the current ill-advised national policy of limiting natural gas supply while encouraging gas use because of its environmental benefits—mostly in the generation of base and peak load electricity—has created and could exacerbate extended higher prices and volatility. In fact, EIA reports that demand by electricity generators is expected to account for 30% of total natural gas consumption in 2025. This equates to a doubling of gas use by the utility sector over current demand.

The domestic petrochemical industry, as well as others in the basic chemical sector, is primarily based upon natural gas and natural gas liquids. About 70% of U.S. petrochemical manufacturers use natural gas liquids as feedstocks. In contrast, about 70% of petrochemical producers in Western Europe and Asia use naphtha (a heavy oil) as a feedstock. While oil is a global commodity whose price is set on the global market, natural gas liquids are more locally traded commodities. As such, price increases in natural gas have had a larger impact on competitiveness in North American-produced petrochemicals.

The U.S. has generally maintained a reasonable-cost feedstock position relative to its competitors in Europe and Asia. However, that situation has been eroded as the price of natural gas has soared. North American natural gas and natural gas liquids prices have risen to unprecedented levels and placed a significant portion of the domestic petrochemical industry at a disadvantage to European and Asian producers. In fact, the increasing siting of base petrochemical production and expansion projects in overseas locations is directly attributable to this significant disparity in fuel prices. Additional displacements will occur if the current and projected gas price and supply situation is not addressed promptly.

Two years of extraordinarily high natural gas prices (2001–2002) have resulted in a negative trade balance for the U.S. economy. This negative trade balance allows foreign businesses to capture U.S. market share in part because European and Asian producers are not experiencing similar increased feedstock prices.

Short–Term Outlook: Focus on Conservation and Efficiency

Industry analysts report that domestic natural gas production has declined by 6% over the last six quarters. In turn, utilization of natural gas by the electric utility industry has caused unprecedented demand, especially in the summer season where natural gas provides "peaking" power to many industrial and residential users.

Historically, the summer months have been periods to re-supply natural gas storage facilities in preparation and anticipation of increased winter demand for commercial and residential home heating. The increased use of natural gas during the past summers has placed additional constraints on storage, and the U.S. is now experiencing some of the lowest levels of storage volumes ever—38% below normal volumes for the end of May according to the EIA. Under current conditions, it will take storage of 12.7 BCF per day for the remainder of the summer season to return to storage levels entering the previous winter of 2002–2003. Compared to the previous five-year average fill rate of 9.2 BCF, the nation currently faces a 3.5 BCF per day shortfall of natural gas as we enter the winter of 2003–2004.

Unfortunately, little can be accomplished from the supply side of this equation in what is a short, but nevertheless critical time period. In essence, our nation's natural gas energy policy for the next 8–10 months may largely depend upon good weather and good luck. We must try to improve things, but real possibilities of doing so are limited. We must hope that Congress and the Administration will act to provide greater supply and price certainty to natural gas markets in the mid and long-term.

While little may be practically accomplished on the supply-side of the equation in the immediate future, efforts can be made to help mitigate the problem through conservation and efficiency efforts. NPRA urges both Congress and the Administration to act to improve energy efficiency and conservation in the use of natural gas and power, especially as the nation enters the summer cooling season. Any reasonable reduction in electricity consumption would reduce natural gas consumption by the power sector and have a positive impact on natural gas availability. This, in turn,

would help moderate natural gas supply and price concerns. Further, if natural gas supplies become extremely tight this summer or early fall, the Federal and local government should consider allowing electric utilities and industrial facilities to switch to alternative fuels in order to conserve natural gas supplies.

Longer–Term Options: Energy and Environment Trade-offs

NPRA welcomes the Committee's review of the natural gas situation. We urge you to review current policy thoroughly and openly. The nation needs a frank and public debate on the future of natural gas and natural gas supplies. As previously stated, natural gas demand is projected to increase by 60% by the year 2020. The President's National Energy Policy Task Force projects that over 1,300 new electric generating power plants must be constructed to fulfill anticipated electric energy needs over the next 20 years. DOE suggests that over 90% of these facilities will be fueled by natural gas.

Based on these and other forecasts, Congress must evaluate current policies that inhibit or outright prohibit development of additional natural gas supply sources. Policies regarding natural gas must be modified to reflect both current and future realities. They must include increased access and development opportunities to onshore public lands as well as those on the Outer Continental Shelf. New and promising domestic areas for development must be open for exploration and production. In the meantime, NPRA would urge caution when Congress and the Administration consider any policies, environmental or other, that will accelerate the demand for natural gas when viable alternatives exist.

Environmental progress and energy supply need not be mutually exclusive. However, long-standing and recent environmental policies have overwhelmingly limited fuel and energy supply choices, promoted or even required fuel switching while at the same time they discourage expanded domestic production of natural gas. Anticipated environmental constraints could aggravate the current situation. This is a formula guaranteed to make an already bad situation worse.

The National Petroleum Council (NPC) at the request of the Secretary of Energy is currently developing recommendations and policy options on the long-term future of natural gas as one of the key elements of our nation's energy menu. NPRA is an active participant in this study and urges Congress to seriously consider any and all of the NPC's specific findings and recommended policy options.

In the interim, NPRA urges Congress and the Administration to re-think and re-evaluate current and future policy initiatives that inhibit or prohibit such beneficial practices as:

- Fuel choice mixture and flexibility.
- Gas supply source diversity.
- Modernization, expansion and permitting of infrastructure, including LNG facilities and pipelines.
- Development of new technologies.
- Natural gas market transparency and efficiency.

Conclusion

Natural gas and natural gas liquids serve as primary feedstocks in domestic petrochemical plants and other industries. Their availability at a reasonable cost is essential to keep the U.S. petrochemical industry competitive in a worldwide marketplace. We hope that the Congress will recognize that increased demand for natural gas supplies will result in even tighter supplies and the cost of gas as a feedstock will continue to rise. Policymakers should also recognize that since natural gas is used as a fuel and an industrial feedstock, negative impacts to our businesses will result if natural gas demand increases but supplies remain tight. Thus the principal focus of the discussion must be on the need for increased supply.

One thing is certainly clear: We urgently need a thorough review and analysis of natural gas-related policies and gas supply and demand to maintain a vibrant U.S. petrochemical industry and U.S. economy. Natural gas will play an increasingly important role in America's energy future. We must analyze, clarify, and correct policies to maximize the available supply of this key resource.

For this reason, NPRA appreciates the Committee's efforts to investigate the issues surrounding and impacting the supply, demand, and price volatility of this nation's natural gas resources. We hope to work with all stakeholders to craft a natural gas policy that provides adequate supply at reasonable prices to fuel the U.S. economy and maintain growth.

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