

**NATIONAL ENERGY POWER: ENSURING ADEQUATE
SUPPLY OF NATURAL GAS AND CRUDE OIL**

HEARING
BEFORE THE
SUBCOMMITTEE ON ENERGY AND POWER
OF THE
COMMITTEE ON COMMERCE
HOUSE OF REPRESENTATIVES
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NATIONAL ENERGY POWER: ENSURING ADE- QUATE SUPPLY OF NATURAL GAS AND CRUDE OIL

WEDNESDAY, MAY 24, 2000

HOUSE OF REPRESENTATIVES,
COMMITTEE ON COMMERCE,
SUBCOMMITTEE ON ENERGY AND POWER,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:15 a.m., in room 2322, Rayburn House Office Building, Hon. Joe Barton (chairman) presiding.

Members present: Representatives Barton, Largent, Shimkus, Wilson, Fossella, Bryant, Boucher, Hall, McCarthy, Pallone, Rush, and Strickland.

Staff present: Cathy Van Way, majority counsel; Elizabeth Brennan, legislative clerk; Sue Sheridan, minority counsel; and Rick Kessler, minority professional staff member.

Mr. BARTON. The subcommittee will come to order. We are having a roll call vote on the floor on the Journal. Today is the vote on Permanent Normalized Trade Relations for China, so the leadership on both sides is trying to find out how many Members are willing to stick their head out of the foxhole today. As soon as we get a few more members we will start, probably within the next 5 minutes. I am going to wait for Mr. Boucher. I am told that he is on his way. So in about 5 minutes we will start the hearing.

[Brief recess.]

Mr. BARTON. The subcommittee will come to order. We are going to go ahead and start. Congressman Boucher is enroute. His staff is not sure exactly where on the route he is but he is enroute, so we are going to start. I want to welcome my panelists today, the first panel and the second panel. This is almost like old home week for me. We have got Admiral Watkins, who I worked with on the Supercollider when he was Secretary of Energy; the Honorable Phil Sharp, who was subcommittee chairman of this subcommittee for many years and taught me quite a bit about the energy policy issues of the day.

And on the second panel we have got Cathy Abbott who I think is one of the brightest energy experts in the world and taught me unbelievably important things. And my memory of her is almost—the last time I saw her she had at that time a baby on a pallet, over I think at INGAA, and was doing policy work as her baby was screaming that she needed a diaper change. So it is good to see Cathy here. So anyway we are going to have a serious discussion

today on what our energy policy should be. Hopefully it is going to be done in a very positive way and with a lot of good feedback between the panel and the Congress.

I think we need to take a look at our energy policy. One could argue the last 7 years we have been adrift in terms of a comprehensive, coherent, coordinated energy policy. Today's hearing is the first of three. We are going to focus on the oil and natural gas industry and some of the issues that face us in that arena.

This past winter we got a wakeup call that gasoline is not forever going to stay below \$1 a gallon at the pump. OPEC reemerged as a force to be reckoned with. And we had the situation where our Secretary of Energy, a former member of this subcommittee, was running around the world trying to get OPEC to raise their production quotas, which was not a pretty picture in my mind.

As bad as the situation was this past winter, several of our witnesses today will paint a much more dismal picture for the future. And according to them, and I happen to share their concerns, unless we do a course correction on our national energy policy, the EIA representative will predict that by the year 2020 the United States will be dependent on foreign suppliers for 64 percent of its petroleum consumption and over 50 percent of that is expected to come from the OPEC countries.

I think that those numbers indicate that it is time for us to do this course correction sooner rather than later with respect to domestic oil and gas exploration and production policies in our Nation. We are a country rich in resources. There is no reason that we can't minimize that dependence.

Yesterday the Energy Information Administration released a report that estimated that there are 10.3 billion barrels of oil that could be recovered from the Arctic National Wildlife Reserve which we commonly call ANWR. Similarly, vast areas of the Outer Continental Shelf have been put off limits for natural gas exploration and production in the last decade. The Destin Dome near Florida's coast is estimated to contain at least 2.6 trillion cubic feet of natural gas. If this is true, it would be one of the largest natural gas fields in the Gulf of Mexico.

There are things that we could be doing to increase our national energy security by offering greater support to our oil and gas sector, especially the independent oil and gas producers and explorationists of this country. Marginal wells should be and could be kept operating much longer than most of them are today. We should look at ways to improve our natural gas infrastructure in terms of pipeline construction and things of this sort. This is especially important in the Northeast, that has to import a great deal of its energy.

As I said at our hearing, many believe that we need an energy policy. I think we should have an informed energy policy and we should try to develop an energy policy that assures that the United States is in charge of its own energy future.

Again, I look forward to hearing our witnesses today. I want to thank each of you personally for coming. We have made a really good effort to get two panels of really top-flight folks and I think we are going to have a very good hearing.

[The prepared statement of Hon. Joe Barton follows:]

PREPARED STATEMENT OF HON. JOE BARTON, CHAIRMAN, SUBCOMMITTEE ON ENERGY
AND POWER

I'd like to welcome everyone to today's hearing on energy policy. Today is the first of three hearings on energy policy that I hope to conduct. At each of these hearings I hope the Subcommittee can take a close look at our national energy policy and decide if we are headed in the right direction or if we need to do a course correction.

Today's hearing is focused on oil and natural gas policy. This past winter we got a wake-up call that some aspects of our policy with respect to oil and natural gas were being neglected. Unfortunately, we found ourselves in a situation similar to the situation we faced in the 1970's: suddenly rising fuel prices, a marketplace dominated by foreign players, and too few tools to address consumer's concerns.

As bad as the situation was this past January, several of our witnesses paint a far more dismal picture for the future. Unless we do a course correction, the Energy Information Administration predicts that by 2020 the U.S. will be dependent on foreign suppliers for 64% of its total petroleum consumption. Over 50% of that petroleum is expected to come from OPEC countries.

I, for one, believe that those numbers indicate that it is time for us to do a course correction with respect to domestic oil and gas exploration and production. The U.S. is a resource rich country. Yet, our policies deny our citizens the benefit of those resources.

Yesterday, the Energy Information Administration released a report that estimated that there are 10.3 billion barrels of oil that could be recovered from the Arctic National Wildlife Reserve (ANWR). Similarly, vast areas of the outer continental shelf have been made off-limits for natural gas exploration and production. The Destin Dome near Florida's coast is estimated to contain at least 2.6 trillion cubic feet of natural gas, one of the largest gas fields in the Gulf of Mexico.

There are things we can be doing to increase our national energy security by offering greater support to our independent oil and gas sector. Marginal wells should be kept operating as long as possible. We should also look at ways to improve natural gas infrastructure all over the country, and especially in the Northeast.

As I said at our hearing in March I believe we need an energy policy that assures that the U.S. is in charge of its own energy future.

I look forward to hearing the testimony of the witnesses. Thank you.

Mr. BARTON. I don't see the Honorable Mr. Boucher here yet, so I am going to recognize Mr. Pallone for an opening statement. Oh, Mr. Boucher just arrived. Do you wish to be recognized right off the bat or would you like a little time?

Let me welcome my good friend from Virginia, the ranking member of the subcommittee, Rick Boucher, for an opening statement.

Mr. BOUCHER. Thank you, Mr. Chairman, for organizing this hearing on a subject that is of high interest to the Nation's economy and general well-being. We are planning a series of several hearings in this subcommittee focusing on our domestic energy resources and our national energy policies. You are to be commended for undertaking this initiative in your initial term as Chairman of our subcommittee because this committee has not seriously and comprehensively examined the Nation's energy policy since the early part of this decade.

In fact, neither the Congress nor the administration have spent significant time on this subject over the last few years. I do not intend this statement to be a criticism; it is simply a fact. And it is somewhat understandable when the economy is doing well and at a time when energy prices are generally low. I share the concern regarding our growing dependency on foreign sources of energy. And this subcommittee is an appropriate forum to explore the various energy policies which exist today and to look at proposals that are aimed at promoting a higher level of energy self-sufficiency.

In 1998, the United States imported approximately 22 percent of the energy that we consumed in that year. And the Department of Energy predicts that our dependence on foreign energy sources will

continue to grow. In past years the Congress has taken prudent measures to address these concerns. For example, in 1980 Congress acted to encourage the domestic production of oil and natural gas by establishing the section 29 tax credit for companies that sought to produce oil and gas from unconventional sources such as tight rock formations, coal beds and from biomass. Congress recognized the benefit to the Nation of developing oil and natural gas from locations that are very difficult to reach and not economic from which to produce using conventional means.

The section 29 tax credit is scheduled to expire on December 31, 2002. Allowing the credit to expire would result in the abandonment of many wells that are producing today by virtue of the section 29 tax credit, and I would encourage, Mr. Chairman, that we recommend that the section 29 tax credit be extended, perhaps enduring the balance of this Congress, rather than waiting until the next Congress at the conclusion of which the credit is scheduled to expire. Having the credit expire and not be reauthorized would result in the loss of a substantial portion of our current oil and natural gas production base.

Mr. Chairman, I think the hearing that we are holding today is an excellent opportunity to examine a range of proposals that could lead to a higher level of energy self-sufficiency through greater utilization of our oil and natural gas production capabilities, and when tied to the subsequent hearings that we will be holding on oil and nuclear energy capabilities, these hearings do in fact provide an excellent forum for examining our Nation's energy policies and perhaps recommending ways that we can achieve a higher level of energy self-sufficiency.

So I commend you for organizing these forums, and along with you I look forward to the testimony of our witnesses.

Mr. BARTON. Thank you, Congressman. I want to let the panelists know that these microphones are live all the time, so be careful what you say up here. We would recognize Congressman Bryant of Tennessee for an opening statement.

Mr. BRYANT. Thank you, Mr. Chairman and ranking member, for this hearing and several others that you have alluded to as we begin to study this very important issue. We have two very qualified panels, and in the interest of time what I am going to simply do is adopt your statement as my statement in the record because I agree with you, Mr. Chairman, on what you said and yield back the balance of my time.

Mr. BARTON. We thank you, Congressman. I was told that Congressman Ralph Hall was actually the first member here, even before the Chairman. So we are going to recognize him, and for such time as he may consume, for an opening statement.

Mr. HALL. Mr. Chairman, members of the committee, I join everyone else in thanking you, and I probably ought to just endorse what the gentleman from Tennessee said and go down the road, but I think what I have to say is very important as one that probably knows more about this than anybody on the committee because I have heard it so doggone many times.

Mr. BARTON. I just thought that was a Texas attitude.

Mr. HALL. And your decision to hold hearings on the state of our national energy policy is once again in vogue again like it has been

so many times. It seems like we go up and down the system. The development and implementation of a coherent and flexible energy policy tends to recede into the background when energy prices are stable but come roaring to the front when things go up or when the public debates the prices as they rise, as they have over the last year.

So I don't believe there is a more important element of our economy on which Federal policy needs to be developed and carried out more consistently than energy. And inasmuch as I have to listen to your opening statements day in and day out, and you have heard me say this a lot of times, it is my opinion that we do need an energy policy and that energy policy can be very easy and simple. It simply is incentive to look for it and reward for finding it. Because the little ones look for it, they borrow money from the big banks to look for it, and when the little ones find it, the big ones buy it and redistribute it, make money and live happily financially ever after, while little ones go back to looking for a bank that will loan them some money. Even in high times bank won't loan money because there is no consistency.

If we could just have 4 or 5 years of consistency, I don't care if the price is at 16, 17, 20, 30, wherever, it has got to be consistent for some length of time in order for people who are the old-timers in the business to look for it. The ones that kept the energy thrust alive even during World War II, that filled the big inch pipelines to put in the land-leased destroyers to keep this country going, those people are true heroes.

I say this while there are some young people on the group that are to testify today. I see also much knowledge there in those of you that have been with us before and have worked with us. I think I don't believe there is a more important element in our economy. And I support the railroads, and I have said that before, because they are a national asset.

Energy is a national asset. People ought to support it more. But it is a fight between 10 of us that produce it and 40 of them that use it.

I don't like Amtrak. Darn things goes from here to Philadelphia 38 times a day and goes from here to New York 37 times a day and we subsidize it. It has improved in my district. They now whistle when they go through my district. They don't stop. And west of the Mississippi, we get very little folks west of the Mississippi out of Amtrak. But during national defense times, this country travels by rail and we have to have it. It is something you have to have. It is a national asset. They ought to look at energy like that.

I have got a lot more to say but I will give back my time. I don't think I have time to say it. That is, unless there is some insistence that I do. Thank you, Mr. Chairman.

[The prepared statement of Hon. Ralph M. Hall follows:]

PREPARED STATEMENT OF HON. RALPH M. HALL, A REPRESENTATIVE IN CONGRESS
FROM THE STATE OF TEXAS

Mr. Chairman and Members of the Committee: I too, will join the others in thanking you for convening this hearing today. Your decision to hold hearings on the state of our National Energy Policy, or as I believe—the lack thereof—is very timely. The development and implementation of a coherent and flexible energy policy tends recede into the background when energy prices are stable, but comes roaring to the

forefront of public debate when prices rise, as they have over the last year. However, I don't believe there is a more important element of our economy on which federal policy needs to be developed and carried out consistently than energy.

I say that not as a representative of a producer state—obviously I have a vested interest in a strong and robust domestic oil and gas industry—but as also a representative of a state that has enormous potential for the development of renewable energy sources. Wind and solar energy have bright futures in Texas and throughout much of the Southwest.

We shouldn't find ourselves attempting to choose among sources we need them all. In fact one of the reasons we have dithered for years on energy policy is that the U.S. is blessed with the greatest variety of viable primary energy sources in the world. Other developed nations, Japan and France come to mind, without indigenous energy sources have had to be rather single-minded about the need to meet energy demand at reasonable prices. Our time is coming, if in fact it hasn't arrived already.

Mr. Chairman, you have put together a pair of all-star panels for the Subcommittee today. It good to see some old friends back before us, and I appreciate all of the witnesses' continuing willingness to give us their time and the benefit of their wisdom. Welcome to you all. I also look forward to the subsequent days of hearings on coal, nuclear and the renewables. This is some of the most important business that will come before the Subcommittee, and I hope that this and the following hearings will build momentum to seriously address energy policy issues.

With that, Mr. Chairman, I yield back the balance of my time.

Mr. BARTON. We thank the gentleman for the 10-minute statement on the 3-minute rule. That is appreciated.

We would like now to recognize the gentlelady from New Mexico, Heather Wilson, who has done tremendous work this year on many of the issues before the subcommittee.

Mrs. WILSON. Thank you, Mr. Chairman. I am inclined to yield my time to the gentleman from Texas just because it is more entertaining. But in the interest of time and wanting to hear from several of the witnesses, what I will do is insert my opening remarks into the record and move it along. Thank you.

Mr. BARTON. I thank the gentlelady.

I would like to recognize the gentleman from New Jersey, Mr. Pallone, who has worked long and hard on many of these issues.

Mr. PALLONE. Thank you, Mr. Chairman. Our national energy policy involves a lot of complex resource economic and national security issues. And I also look forward to our witnesses' comments on the various aspects of the Nation's energy policy. But, Mr. Chairman, I have to take the opportunity today to somewhat criticize the Republican leadership's failure with regard to our national energy policy.

Mr. BARTON. We would be surprised if you didn't.

Mr. PALLONE. I know. I don't mean this as a reflection on you or the committee; more so in terms of the Republican leadership in the Congress. But in the 6 years that the Republicans have been in the majority, they have failed to pass any significant legislation to protect our energy security and give consumers, commuters, truck drivers, homeowners, farmers, any protection against these volatile oil prices that we have been seeing for the last year or so.

And you know, I can't help but go back to last year when the leadership put forward the proposal again to abolish the Department of Energy. In April and May of last year, long after OPEC's March 23, 1999 announcement and long after oil prices started to rise, Dick Armey, Tom DeLay, and John Kasich joined forces with Todd Tiahrt to introduce H.R. 1649, the Department of Energy Abolishment Act. And this bill would basically get rid of the De-

partment of Energy, and with it oil conservation programs and research and renewable energy conservation and research. That bill basically suggests that we get rid of the Strategic Petroleum Reserve and sell off outright any other assets we have to guard against an oil shock.

And that is why, in my opinion, probably why the Republicans prevented us from filling the Strategic Petroleum Reserve when gas was cheap. It is probably the reason why the Republican Congress hasn't reauthorized the law giving the President the authority to release oil from the Strategic Petroleum Reserve. We all know that that law, the Energy Policy and Conservation Act, expires or expired on March 31st. The Senate passed a bill that is pending before the House Commerce Committee, but the House leadership has done nothing and is on the verge of letting that authority slip away. I know we did it, we passed something in the House, but there is still nothing on the President's desk.

I have to also point out that the majority leadership's idea of a national energy policy involves drilling the Arctic National Wildlife Refuge unfortunately, this is not sound policy. If we open the Arctic refuge to oil and gas development, we will only have the equivalent of 6 more months' worth of oil supply. Yet in the process we would destroy one of our Nation's greatest natural resources forever. And drilling the Arctic refuge will do nothing to increase our energy security or lower prices at the pump. Instead of drilling in the Arctic refuge, we should be banning exports of Alaskan oil to other Nations.

Mr. Chairman, sound energy policy entails a comprehensive approach that includes promoting and funding commonsense programs to conserve energy and develop alternative energy sources. Such programs also would reduce our reliance on polluting fossil fuels and on oil imports from foreign nations. Regrettably, the Republican leadership has harmed the Nation's energy security by cutting funding for energy efficiency, renewable energy, weatherization and alternative fuel programs during the past several years.

In the first effort after taking control of Congress, Republicans cut energy efficiency programs by 26 percent. Over the past 5 years the GOP has slashed funding for solar energy, renewable energy, and conservation programs by nearly 1.4 billion below the administration's request. Again, I know that is not this committee; that is the Appropriations Committee. But we are talking about national energy policy; I have to talk about the Republican Congress as a whole.

We have to help ensure our Nation's short- and long-term energy security independence by using mass transit, bicycles, other fuel-efficient vehicles. There are a lot of things we can do in terms of conservation measures even here in the House of Representatives. And I just would like to see a more proactive effort so that we can go home and tell our residents and our children that we are working to protect the Nation's energy security as well as their pocket books as well as our resources. Thank you, Mr. Chairman.

Mr. BARTON. I thank the gentleman from New Jersey. I will go look in my folder in my office, as Chairman of Energy and Power Subcommittee, for all the legislative proposals the Clinton Admin-

istration has sent me to introduce, some of those issues that you just talked about. When I checked it yesterday, I think it was dusty, with nothing in it, but I will go back and look because there may be something that I just missed.

Actually some of your points are well taken. That is the whole reason we are doing these hearings. We appreciate your comments.

I would now like to turn to the gentleman from Oklahoma, Mr. Largent, who has always focused on energy issues in his time in Congress, and is one of our experts. Mr. Largent, for an opening statement.

Mr. LARGENT. Thank you, Mr. Chairman. I want to thank you for holding this very important hearing to examine what the future steps need to be from a public policy perspective to ensure an adequate supply of natural gas and crude oil. Last March this subcommittee held a hearing to look at the cause and effect of the recent price fluctuations in the world's oil markets. At that hearing I commented that unfortunately it is not until we experience sticker shock at the gas pump, or American families have to pay significantly higher prices to heat their homes, that oil and natural gas issues enter the national consciousness.

It would be a stretch to say that energy issues continue to garner the same amount of national media attention as they did 3 months ago. However, as we enter the summer driving season, coupled with increase in electricity use as temperatures begin to rise, Americans will again focus their attention to the price of gas at the pump and their electricity bills.

Fossil energy, specifically natural gas and crude oil, have to and will continue to dominate United States energy supply. According to the Energy Information Administration, petroleum consumption in the United States is projected to increase at an annual rate of 1.3 percent. However, also according to the EIA, our domestic petroleum supply, including natural gas, is projected to remain nearly flat.

What does that mean? It means that instead of currently relying on the rest of the world's petroleum for 52 percent of our domestic oil and gas consumption, in 20 years we will depend on foreign imports for 64 percent of our domestic consumption needs. Frankly, I think that estimate is conservative.

Mr. Chairman, we continually hear that the engine driving our economic prosperity is the growth of the information technology sector. But without fuel for that engine, our economic growth could come to an abrupt halt.

What do we need to do as policymakers to ensure our future energy security? A good start would be for the Federal Government to create policies that allow for responsible domestic exploration and production of our natural resources. Establish tax incentives such as extending the section 29 tax credit and eliminating the net income limitation on percentage depletion for marginal wells to encourage independent producers back into the oil patch rather than shutting down wells and creating a reasonable regulatory framework that protects the environment but does not add unnecessary compliance costs. These are just a few suggestions.

Mr. Chairman, I look forward to hearing what suggestions our illustrious witnesses have and I yield back.

Mr. BARTON. I thank the gentleman.

Now I would like to turn to the gentlelady from Missouri, the Honorable Karen McCarthy, for an opening statement.

Ms. MCCARTHY. Thank you, Mr. Chairman. Thank you for having this very important hearing and thanks to our distinguished panel. I look forward to your remarks and wisdom very much. Mr. Chairman, if I might have the liberty of making a brief comment on one of the members of the panel I would like to welcome especially.

Mr. BARTON. If it is a positive comment.

Ms. MCCARTHY. It is very positive. In 1982 I was a fellow at Harvard's Institute of Politics, teaching a course on the development or lack thereof of national energy policy. And I was a State legislator then, chairing the Energy and Environment Committee. I had come from a teaching background and obviously environmental issues inspired me to go into public service. And Dan Yergin came to my class and wowed my students on what it would take and what we would need to have in those days a cogent national energy policy. Well, he has gone on to become, as we know, a Pulitzer prize-winning author and someone who has shaped national energy policy.

Mr. BARTON. He told us the only reason he came is because you were on the subcommittee.

Ms. MCCARTHY. I don't think he even knew. But I am delighted to have him here today to share his wisdom, and also all of the panelists, and to say to Mr. Hall, my former ranking member and now an esteemed colleague, that I am very grateful for our support of Amtrak because it whistles quite a few days in my district and I was a State legislator who made that happen. I know how important alternative uses are. And to also echo my current ranking member, Mr. Boucher, about renewing the tax credit for section 29 which would extend those tax credits to alternatives such as natural gas and to biomass.

And that leads me to thank the committee and you, Mr. Chairman, because when Mr. Shimkus and I began our plea of extending credits and help to biomass to develop alternative fuels that would give our buses and our vans and other transportation systems a cleaner burning alternative for cities that were trying to meet those clean air standards, I know you looked at us, somewhat surprised, and wished we would go away. But thanks to you, it is now law and it is working. I hope as we explore a national policy that we take into consideration all the good things that we have accomplished as a Congress and as a Nation, but also the challenges we continue to face in order to set that standard for the world.

Thank you, Mr. Chairman.

Mr. BARTON. Thank you Congresswoman McCarthy.

Now I would like to recognize Mr. Shimkus for an opening statement.

Mr. SHIMKUS. Thank you, Mr. Chairman. I will just add to what my colleague, Ms. McCarthy, has mentioned in response to my colleague and friend from New Jersey, that this committee and Congress and the last Congress really passed, in addition to the Energy and Policy Conservation Act, on the biodiesel, the B-20 proposal which is probably the only significant piece of legislation that helped add price to a commodity of agricultural farm products but

also moved us in the direction of addressing our reliance on foreign oil. And it also helped in the environmental aspects, because the B-20 in the biodiesel proposal cleans the diesel exhaust by 50 percent, a 50 percent reduction in emissions. It does all the things that we ought to be concerned with as Americans.

I too, as a Member of Congress in 1996, questioned the role of the Department of Energy. I have now become convinced that there is a role and I look forward to working with DOE on provisions like this.

I would also be remiss not to mention the ethanol aspects of having another renewable fuel option. The reality is we have an over-reliance on foreign oil. And I do believe that we can safely go into the Arctic Wildlife Refuge. I think that was proven with the Alaskan pipeline. My now-deceased father-in-law worked on that pipeline and it has a tremendous record of the environmental safety of that program.

I think we also look at the continental shelves and also the marginal well issue as all part of a national energy portfolio along with renewable fuels. I am very excited about this hearing and look forward to continuing to fight this cause in my remaining years here in Washington. I yield back my time.

Mr. BARTON. I thank the gentleman.

No other members present. All members not present will have the requisite number of days to put a written statement in the record.

[Additional statement submitted for the record follows:]

PREPARED STATEMENT OF HON. TOM BLILEY, CHAIRMAN, COMMITTEE ON COMMERCE

Mr. Chairman: I'd like to commend you for holding this hearing on national energy policy. As members of the 106th Congress, we are at an historical cross-road. We are charged with putting in place the policies that will carry our nation into the 21st Century. A comprehensive, forward-thinking national energy policy is essential to our continued success.

Our economy demands abundant energy supplies at affordable prices. I am a strong believer in open, competitive markets. We have nearly twenty years of experience in letting the market set the price for oil. For natural gas, total deregulation of wellhead prices was finally completed in 1993. Soon we'll have competitive prices for electricity. I hope we'll be able to look back in a few years and say that occurred in the 106th Congress in the year 2000.

Competition and an open marketplace have resulted in a more than adequate supply and lower prices. Although in the past two years, we've seen both record low and high oil prices, when adjusted for inflation, oil prices today are still lower than they were in 1981. Consumers have benefitted from competitive oil and gas markets, and they will benefit from more competitive electricity markets.

However, market pricing for energy is just one many U.S. energy policies. Overall, I do not believe the U.S. has an energy policy. Instead we have many, often conflicting, energy policies. I believe we need to take a close look at these energy policies across sectors, as well as, look at how they interact with our environmental policies. Today's hearing is good first step in determining how these various energy policies can complement each other and where they are currently at odds. Knowing that I believe, will help us develop a single, unified national energy policy with many components.

I look forward to hearing from today's distinguished panels of witnesses. I hope they will help us find the balance between energy security and competitive global energy markets. Thank you.

Mr. BARTON. The Chair would ask unanimous consent that Congressman Tauzin of Louisiana's statement be included in the record at this point. He is not a member of the subcommittee but he is

a member of the full committee. Is there objection? Hearing none, so ordered.

[The prepared statement of Hon. W.J. "Billy" Tauzin follows:]

PREPARED STATEMENT OF HON. W.J. "BILLY" TAUZIN, A REPRESENTATIVE IN
CONGRESS FROM THE STATE OF LOUISIANA

Energy security for America requires not only an analysis for increasing domestic production but also an examination of ways to ensure the long-term viability of our nation's existing production. In the latter category, current tax incentives that have resulted in production from unconventional sources such as shale, tight sands and coal bed methane are scheduled to expire at the end of 2002.

Part of our plans for protecting energy security in an uncertain world must include a review of a now uncertain tax code with its current risk of energy supply loss resulting from abandonment of the wells qualifying for the tax credits that provided the incentive for their production. If abandoned, such supply sources cannot be replaced.

Extension of the tax credit system (known as Section 29) should be considered among the high priority options for strengthening our domestic resources for continued supply to Americans of low cost and environmentally efficient energy sources.

Mr. BARTON. We now want to welcome our panelists. I want to give a very warm personal welcome to our first panelist, former Secretary of Energy, Admiral James Watkins, one of the most decent people I have ever had the courtesy to know in public service and someone who helped me tremendously when he was Secretary of Energy.

We are not going to hold you all real tight to time but we are going to set the clock at 7 minutes. And if you go a little bit longer, that will be fine. We want to give each of you every opportunity to elaborate on your written testimony. I also want to thank each of you in the second panel also for having your testimony in on time. Even the Department of Energy, I think for the first time this year, got their testimony in on time. That is a record and I am very very proud of that.

So with that, we welcome former Secretary of Energy, distinguished military Admiral of the United States, Navy Admiral James Watkins.

STATEMENTS OF JAMES D. WATKINS, PRESIDENT, CONSORTIUM FOR OCEANOGRAPHIC AND RESEARCH EDUCATION; DANIEL YERGIN, CHAIRMAN, CAMBRIDGE ENERGY RESEARCH ASSOCIATES; PHIL SHARP, HARVARD ELECTRICITY POLICY GROUP, JOHN F. KENNEDY SCHOOL OF GOVERNMENT, HARVARD UNIVERSITY; WILLIAM F. MARTIN, CHAIRMAN, WASHINGTON POLICY AND ANALYSIS; JAY HAKES, ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION; AND MELANIE A. KENDERDINE, ACTING DIRECTOR, OFFICE OF POLICY, U.S. DEPARTMENT OF ENERGY

Mr. WATKINS. Thank you, Mr. Chairman, for inviting me to testify before your Subcommittee on Energy and Power. You asked that my testimony today address the subject of U.S. energy policy and security in general and answer the question as to whether or not the U.S. is headed in the right direction or if changes are needed. You also asked that particular emphasis be placed on U.S. energy policy as it relates to ensuring adequate supplies of oil and natural gas.

As you are well aware on this committee and from my experience as Secretary of Energy in helping Congress craft the National Energy Policy Act of 1992, the entire complex of energy sources, both production and consumption, needs to be analyzed and integrated in order to address any one of the individual components, like oil and gas, that aggregate to make up the whole.

As a consequence, I have prepared and submitted a long formal statement for the record which goes back nearly 10 years to the formulation of the National Energy Strategy by the Bush Administration in 1991. Lessons learned from that process and a review of all components that made up the energy strategy indicate interconnectivity and balance between these components and they are demanded when considering any one of them.

Recall that the 1991 Bush strategy was the culmination of nearly 2 years of intense efforts, holding hearings around the country to listen to all interested parties, developing a strategy which emerged therefrom, and drafting a report for the Congress. That report was reviewed by various analytically capable outside entities, including the Office of Technology Assessment here on the Hill before it was abolished, and was published and sent to the Hill to inspire the needed legislation. The strategy also included and complemented a number of Bush Administration initiatives which I enumerated on page 3 of my longer statement.

The strategy was then used by both the Congress and the administration as the template for constructing and passing the Energy Policy Act. This act, signed into law by President Bush in October 1992, was among the most comprehensive energy bills ever enacted. The Energy Policy Act affected every aspect of the way this Nation produces and uses energy, including reshaping Federal regulation of the Nation's energy sector to spur competition and investment in new technologies. It stands today as landmark legislation, but it must be periodically reviewed and updated if it is to remain relevant.

For example, an updated energy strategy is badly needed today to provide the broad framework within which so many other related pieces of legislation like the Clean Air Act, the Public Utility Company Holding Act, Public Utility Regulatory Policy Act, Nuclear Waste Act, and many others find themselves, and all of these related pieces have to be periodically updated themselves, but within some kind of overarching umbrella strategy because of their inherent interconnectivity.

Our strategy in the early 1990's, for example, predicted about \$30 a barrel in crude oil prices by the year 2000, recognizing cyclic variations enroute. Sure enough, that is where we are today. Additionally, the act passed by Congress had the potential to reduce oil imports by about 4.7 million barrels per day by the year 2010. This represented at the time a one-third cut in the projected level of petroleum imports. Not only would this enhance energy security but it would also positively influence balance of trade, effect considerable energy cost savings for consumers, and result in significant reduction in energy demand. Whether we are on track to achieve this objective I have no idea, but knowing how we are doing relative to that objective is germane to answering one of your questions.

In this connection, before leaving office in January 1993, we had established a complex tracking program called the Energy Policy Act Information System to comply with provisions of the 1992 act. This system has been used successfully in development of the National Energy Strategy and had also been reviewed by the Congressional Office of Technology Assessment and found to contain reasonable models and predictions.

I prepared my final DOE posture statement in January 1993 and reported the degree of compliance with the act to date. I also passed information regarding this tracking system to my successor in the new administration team.

The first required DOE report entitled "Implementation Status Report" was then published in April 1993, shortly after I left office, based on our tracking system. It is very well detailed, every single section of the track, to see how we are doing against the advocacy that was contained in the act. To the best of my knowledge, results of the detailed tracking system were not reported out again. Rather, our system was replaced in July 1995 with what I would call a puff piece, called the National Energy Policy Plan, allegedly the new Clinton Administration's energy policy.

The latter's direct relationship with or even reference to the 1992 Energy Policy Act is not clear. I have no information which would indicate the degree of congressional satisfaction in either specificity or quality of this or any of the follow-on biennial reports required under section 801 of the DOE Organization Act which demands submission of a national energy policy plan.

You asked in your letter whether or not the direction was the right one regarding energy policy and security in general, and oil and gas in specific. My answer, admittedly rendered from a distance without detailed data, is a simple no. If we had a clue as to the direction in which we were actually headed, we could have predicted the current oil crisis well ahead of time and may have had a chance to influence our national attitude toward oil, for this crisis was in part generated by our own failure to enhance U.S. oil production as initially recommended in the National Energy Strategy 10 years ago.

Further, east and west offshore oil and gas moratoria continue, the Arctic National Wildlife Refuge remains closed. By the way, I don't agree with Mr. Pallone that we would destroy one of the great areas of the world. I have been up to Prudhoe Bay. I have seen large pads that were used for oil drilling have been taken away and reconstituted into the tundra, the most beautiful sight you have ever seen. It can be done. We have the modern technology to do it. We spent the time to do it. The oil and gas companies up there have been responsible and we ought to get on with it.

And it won't all be dumped in 6 months. It is a contribution to the annual thing that will go on for 20 years. The gas that is available up there can be brought back down again through Alaska, and we can either sell it or use it at home.

So I really do believe that is a very important issue but it has to be placed in the context of everything else. If we go after the Arctic National Wildlife Refuge by itself, we will lose today politically. But if we put it in the context of what else we are doing, we can win it. We ought to get on with it.

We are importing 10 percent more oil now than we were 10 years ago. I just heard the data coming out of the Energy Information Administration that it is going to be 10 percent higher than that 10 years from now. We watch while the OPEC oil cartel manipulates the world marketplace and gains more, not less, leverage on the rest of us. Our trade deficit soars and the worst is not over. We are utilizing more and more natural gas in our utilities and this consumption will continue to grow exponentially. As a result, without new offshore exploration on either coast, we are now dusting off our liquid natural gas depots again.

Ten years from now, I predict we will decry the fact that we are being held hostage on an energy security problem to foreign imports of LNG from states like Libya. Yes, the potential exists to mitigate spikes in gasoline prices through enhanced oil production and reduced consumption at home. However, with no sense of urgency on upgrading our national energy policy, only sporadic attention being given to the trade and diplomacy aspects of our dependency on OPEC's whims, opposition to any increase in U.S. oil or gas production, and an unwillingness on the part of DOE to track what we are already supposed to be doing under existing legislation and make recommendations as to new strategic direction where needed, there is little hope of avoiding a repetition of unannounced oil and gasoline spikes in the years ahead.

Sadly, I now think we need to start the process all over again, similar to the one we put into place 10 years ago, and establish a new baseline. The new administration should be tasked by Congress to do this. If we get serious about energy policy again and follow such a path, we might be able to answer your question, Mr. Chairman: Are we going in the right direction or are changes needed?

Thank you, Mr. Chairman.

[The prepared statement of James D. Watkins follows:]

PREPARED STATEMENT OF JAMES D. WATKINS, PRESIDENT, CONSORTIUM FOR
OCEANOGRAPHIC AND RESEARCH EDUCATION

Thank you, Mr. Chairman, for inviting me to testify before your Subcommittee on Energy and Power. In your letter of invitation, you stated that the subject of the hearing will be "National Energy Policy: Ensuring Adequate Supply of Natural Gas and Crude Oil." You asked that my testimony today address the subject of U.S. energy policy and security in general and answer the question as to whether or not the U.S. is headed in the right direction or if changes are needed. You also asked that particular emphasis be placed on U.S. energy policy as it relates to ensuring adequate supplies of oil and natural gas.

As you are well aware, and from my experience in helping Congress craft the National Energy Policy Act of 1992, the entire complex of energy sources, both production and consumption, needs to be analyzed and integrated in order to address any one of the individual components, like oil and gas, that aggregate to make up the whole. As a consequence, I have prepared and submitted a long formal statement which goes back nearly ten years to the formulation of the National Energy Strategy by the Bush Administration in 1991. Lessons learned from that process and a review of all components that made up the Energy Strategy indicate the interconnectivity and the balance between these components demanded when considering any one of them. Recall that the 1991 Bush Strategy was the culmination of nearly two years of intense efforts to listen to all interested parties, develop a strategy which emerged therefrom, and draft a report. That report was reviewed by various analytically capable outside entities before it was published and sent to the Hill for incorporation into needed legislation.

But, let me first review some of the background. In July 1989, the President directed me as his Secretary of Energy to develop a National Energy Strategy. The

mission was accomplished and announced by the President at the White House on February 20, 1991. In his press conference, President Bush proposed a comprehensive and balanced program to ensure all Americans an energy future that is secure, efficient, and environmentally sound. The National Energy Strategy was designed to diversify U.S. sources of energy supplies and offer more efficiency and flexibility in the way energy is consumed.

The National Energy Strategy was the product of twenty months of public recommendations and Administration consideration. In developing this Strategy, the Department of Energy conducted eighteen public hearings and received thousands of written comments.

With the benefit of this input, the Administration analyzed the full array of energy options and developed a strategy that supported continued economic growth, increased energy efficiency, protection for the environment, and reduction of America's vulnerability to energy supply disruptions.

The Strategy was consistent with the Administration's policy of reliance on market forces. Over the next two decades, with well-thought out and periodic updates, the Strategy would have made the U.S. more energy efficient and enhance our competitiveness without resorting to heavy-handed regulations, taxes, or import fees that could hurt consumers and cost Americans jobs.

The Strategy acknowledged that the U.S. was part of an energy interdependent world. It recognized that it was not in our interest to adopt measures that may reduce imports, but inflict severe economic or environmental damage. Therefore, the National Energy Strategy balanced economic, environmental and energy security objectives.

Over the next twenty years, we believed that such a balanced approach to production and conservation would power a larger U.S. economy while using less energy. At the same time, the U.S. would produce more of the energy it uses. The National Energy Strategy by the year 2010 would have, if pursued aggressively:

- Reduced domestic oil demand by 3.4 million barrels per day, below projected levels.
- Increased domestic oil production by 3.8 million barrels per day above projected levels.
- Increased the electricity produced from renewable sources, such as solar, hydropower, and geothermal by 16 percent.
- Raised the use of alternative transportation fuels, such as compressed natural gas, ethanol and methanol, thereby reducing the need for up to 2.5 million barrels of oil per day.
- Reduced growth in electricity demand by unlocking market forces through elimination of costly regulation in existing law, thereby saving consumers approximately \$27 billion per year in electricity costs.
- With its proposals to increase the use of clean coal technology, natural gas, and nuclear energy to generate electricity, as well as to develop new energy efficient technologies, the Strategy would have also:
 - Held U.S. emissions of greenhouse gases by the year 2010 at or below 1990 levels.
 - Improved air quality by reducing emissions of pollutants that contribute to acid rain and smog.
 - Mitigated solid waste problems by reducing coal ash waste 25 million tons per year, and by lowering coal cleaning wastes by 50 million tons per year.

The Strategy incorporated and complemented a number of Bush Administration initiatives. These included: (1) the 1990 provisions to the Clean Air Act; (2) natural gas well-head decontrol legislation; (3) incentives provided to domestic renewable and fossil energy producers in fiscal year 1991 budget agreement; (4) the energy research and development initiatives announced in the President's FY-92 budget; (5) the Administration's domestic energy supply and demand measures adopted in response to the Iraqi oil disruption; and (6) the Administration's science and mathematics education initiatives.

To meet the challenges that lay ahead, the National Energy Strategy called on Federal, State, and local governments to work together to encourage energy conservation and new energy production through reduced regulation and streamlined licensing procedures, particularly in the natural gas, oil and gas pipeline and hydropower areas. At the Federal level, the Administration intended to lead by improving the energy efficiency of Federal buildings, Federal housing and accelerating the purchase of alternative fuel vehicles for the Federal fleet.

In February 1992, one year after initially promulgating the National Energy Strategy, the Strategy was adjusted to fit the reality of the latest and continually-changing data base of knowledge that drove the first projections in 1991. This up-

dated baseline was then used by the Congress as the template for constructing and passing the Energy Policy Act of 1992. This Act, signed into law by President Bush in October 1992, was among the most comprehensive energy bills ever enacted. The Energy Policy Act affected every aspect of the way this nation produces and uses energy, including reshaping Federal regulation of the nation's energy sector to spur competition and investment in new technologies. It still stands today as landmark legislation, but it must be periodically reviewed and updated if it is to remain relevant. For example, it is badly needed to provide the broad framework within which so many other related pieces of legislation like Clean Air Act; The Public Utility Company Holding Act (PUCHA); The Public Utility Regulatory Policy Act (PURPA); Nuclear Waste Policy Amendments Act; and the like find themselves. All of these related pieces have to be periodically updated themselves, but within some overarching umbrella strategy because of their inherent connectivity thereto.

I present all this background before addressing your question as to whether or not our oil and gas policies are adequate in view of the recent shock to the nation on high gasoline prices at the pump. As our National Energy Strategy clearly articulated, the inter-coupling of all energy generation and conservation mechanisms must be continuously melded together into a sensible, comprehensive, integrated, and balanced relationship. If they are not, we will continue to have unannounced and unwanted perturbations when we could have better predicted and mitigated them. Our strategy in the early 1990s, for example, predicted about \$30 per barrel in crude oil prices by the year 2000, recognizing cyclic variations enroute. Sure enough, that is where we are today. Additionally, the Act passed by Congress had the potential to reduce oil imports by about 4.7 million barrels per day by the year 2010. This represented a one-third cut in the projected level of petroleum imports. Not only would this enhance energy security, but it would also positively influence balance of trade, considerable energy cost savings for consumers and significant reduction in energy demand.

Finally, before leaving office in January 1993, we had established a complex tracking program called the Energy Policy Act Information System to comply with provisions of the 1992 Energy Policy Act. This System had been used successfully in development of the National Energy Strategy and then reviewed by the Congressional Office of Technical Assessment (OTA) and found to contain reasonable models and predictions. I prepared a final Posture Statement in January 1993 and reported the degree of compliance with the Act to date and passed information regarding this tracking system to my successor and the new Administration team. The first required report was then submitted to the Congress in April 1993, shortly after I left office including an assessment using the tracking system. To the best of my knowledge, the detailed tracking system was not used again and was replaced by issuance of a Strategic Plan in April 1994, followed a year later in July 1995 by a National Energy Policy Plan which was allegedly the new Clinton Administration's energy policy. This Plan's direct relationship with or even reference to the 1992 Energy Policy Act is not clear. I have no information which would indicate the degree of Congressional satisfaction in either specificity or quality of the biennial reports required under Section 801 of the DOE Organization Act which demands submission of a National Energy Policy Plan every two years.

In my opinion, therefore, it is time to rebuild the National Energy Strategy as we did ten years ago, using a similar approach—i.e. hold hearings around the country, listen to all parties with a goal of making recommended amendments to the 1992 Energy Policy Act so as not to lose the Act's relevance. Unless this is done, I do not believe the nation will be well served by a Department of Energy (DOE) that seems to put out energy "puff pieces" that have no associated implementing strategy for their execution or assessment. I have in mind here the Administration's "Sustainable Energy Strategy, Clean and Secure Energy for a Competitive Economy" report to the Congress in July 1995 which was their own first real response to the two-year reporting requirement. This 73-page document arrived on the Hill, with little fanfare, and had little impact. This 1995 report pays only lip service to the importance of energy policy. In reality this so-called "Sustainable Energy Strategy" is short on energy policy and long on wishful thinking. To take just two examples, among the five strategies set forth for a Sustainable Energy Policy are "Reinvent Environmental Protection" and "Engage the International Market." Then, later, during his confirmation hearings before the Senate Energy Committee in 1997, Secretary Pena promised that there would be a new National Energy Policy Plan (NEPP) by the fall of that year to answer growing Congressional concern about whether this nation has in place a program that addresses its energy and environmental needs for the next century. Subsequently, it was announced that this new NEPP would be delayed another six months, well past the December 1997 meeting in Kyoto at which commitments constituting a de facto energy policy would be

made. Whether it ever got submitted, I have no idea. But Secretary Pena departed in the summer of 1998 and I can't imagine his departing shot at a strategy was very effective. I don't know what the Congress has received since, but I can't believe there has been much substantive clarity or direction in whatever the DOE is doing in this area.

Further, you may recall in 1997 that President Clinton casually remarked to assembled students at American University here that the U.S. could reduce its emissions of carbon dioxide and other greenhouse gases by 20 percent immediately at no cost to the economy "if we just changed the way we do things." This bold assertion was a shock to even his staff since it was an off-the-cuff remark. No one had a clue, even the President, what or how he wanted us to change. Certainly, his remarks had nothing to do with studies emanating from within his own Executive Branch that would justify such an assertion. His own 1995 Sustainable Energy Strategy said there were no easy ways to reduce greenhouse gas emissions by 20 percent—immediately or over the next 10-15 years—unless the President had in mind truly profound changes in the world in which we work and live, induced by carbon taxes, rising energy prices and slower economic growth. With a realistic National Energy Strategy, the magnitude of such changes would be clear, along with their effects on individual states and regions.

Without a well substantiated strategy, then, enforced through negotiated Congressional adjustments to some logical baseline, like the existing Energy Policy Act of 1992, we are victims of the rhetoric of whatever advocacy-only minstrels wander by. Accountability and responsibility for our proposed actions can only be assured if we demand responsible analytically-based, and agreed-to frameworks which can span from one Administration to the next and against which we can monitor the reality of any plans which claim to "save the world" through advocacy only. DOE should, be held accountable to fulfill this responsibility on a continuing professional basis, using best available and accepted models. Congress should, in turn, demand an accounting of DOE's performance in carrying out, implementing and monitoring provisions of the Energy Policy Act and in making amendment recommendations to support an updated, well thought-out and analyzed strategy to justify change. If it cannot or will not do this, then the only function left to the DOE which has not already been made into an independent agency will remain unattended, as it seems to be today. If this situation is allowed to persist, then abolition of non-nuclear-related segment of the DOE would be one justified outcome.

You asked in your letter whether or not the direction was the right one regarding energy policy and security in general and oil and gas in specific. My answer, admittedly rendered from a distance without detailed data, is a simple no. If we had a clue as to the direction in which we were actually headed, we could have predicted the current oil crisis some time ago and may have made a course change in our attitude toward oil. But this crisis was in part generated by our own failure to enhance U.S. oil production as initially recommended in the Bush Strategy ten years ago. East and west off-shore oil and gas moratoria continue; the Arctic National Wildlife Refuge remains closed; we are importing ten percent more oil than we were ten years ago; and the worse is not over. We are utilizing more and more natural gas in our utilities and this consumption will continue to grow exponentially. As a result, we are now "dusting off" our liquid natural gas (LNG) depots again. Ten years from now we will be decrying the fact that we are held hostage to foreign imports of LNG from states like Libya. Further, we have not even maximized oil recovery from existing U.S. oil reserves to the extent possible. Yes, the potential still exists to mitigate spikes in gasoline prices through enhanced oil production at home. However, with no sense of urgency on upgrading our energy policy; apathy for any increase in oil or gas production at home; and an unwillingness on the part of DOE to track what we are already supposed to be doing, accompanied by recommendations as to new strategic directions, there is little hope of avoiding an accelerating series of unannounced oil/gasoline spikes in the years ahead. We need to start the process all over again that we put into place ten years ago. The new Administration should be tasked by Congress to do this. If we follow this path, we might be able to answer your question, "Are we going in the right direction?"

Mr. BARTON. Thank you Admiral. We appreciate those remarks and especially the intensity with which you discuss the ANWR. That is impressive.

We now want to recognize Dr. Daniel Yergin who is Chairman of the Cambridge Energy Research Associates. I have not had the pleasure to meet you personally, but I have read many of your works and books and have great respect for you. And Karen

McCarthy did talk to me about how impressive you were not only in the public arena but as a person. So we are delighted to have you. We will recognize you for 7 minutes. Again, that is not a hard 7 minutes. And we will put your entire statement in the record.

STATEMENT OF DANIEL YERGIN

Mr. YERGIN. Thank you very much. Mr. Chairman, members, I am very honored to be part of this expert panel today. I certainly do want to thank Representative McCarthy for her gracious words. I should say before becoming an outstanding Member of Congress, she really was a great teacher.

This panel is drawn together today by what we are seeing happening in the world oil and gas market, and there are plenty of energy considerations that have come to the fore again. And I think this series of hearings will be an important contribution to understanding on these matters.

In my testimony I really want to try and provide a context by looking at three things; one, a subject that is really vexing the American people today, which is gasoline prices, and more generally what is happening in world oil and natural gas markets.

The discussion on gasoline is drawn from a new study that we are releasing today at Cambridge Energy called "Gasoline and the American People." I think we would all agree that gasoline is the best known price in America. We see it dozens of times every day. Right now it is also perhaps the most perplexing price.

There is plenty of reason for the American people to be perplexed. In 1997, the national average gasoline price which was \$1.23 in inflation-adjusted prices, fell to as low as 95 cents at the beginning of 1999, which is actually lower than any time since recorded prices were kept; indeed, lower than the average price during the Great Depression. And now we are looking at \$1.50 a gallon on a national basis, and in some parts of the country a good deal higher than that.

Well, to make sense of the prices, first we must think in inflation-adjusted terms. With that it becomes clear that actually the long-term trend—and I should say the powerful long-term trend in gasoline prices is actually down. The major exception, those times of crisis: the oil shock years of the 1970's and the Gulf crisis of 1990 and 1991, indeed even where prices today are lower in inflation-adjusted terms than they have been in most of the last 80 years.

As we can see, despite this trend, prices do move up and down. This can be caused by an awful lot of different things, from political events, disruptions of refinery operations, new environmental standards. Right now to just kind of get it into a framework, the sharp increases in gasoline prices are the result of the higher crude oil prices that we are seeing, the very low levels of inventories, and new environmental regulations that are going into effect right now, because we are at the beginning of the summer driving season and we have a strong economy.

Let me turn then to what is the price of crude oil that is behind gasoline prices. The main reason for the high oil prices of 2000 has been the low oil prices of 1997, 1998 and early 1999. That is, these low prices resulted from the Asian financial crisis and created,

really, a financial crisis for the oil-exporting countries, and also really devastated the domestic U.S. oil and gas industry. And as a result, these countries came together and we have the prices we have now, accentuated by the fact that the U.S. economy and other economies are so strong. South Korea was supposed to have zero percent economic growth last year. South Korea is the sixth largest oil market in the world. It had almost 11 percent. So we have a strong economy driving prices, too.

What we do see is when prices reach around \$30 a barrel, it brings home the fact that oil prices are one of the few prices, along with the price of labor and the price of money, interest rates, that can really affect the economy and spook the stock market.

But also other factors are brought home. One is—and Admiral Watkins addressed it—we are very highly integrated into the world oil market and what happens there. But also things have changed a lot from the 1970's and it is the relative absence of confrontation that so characterized the 1970's that is striking today. We really do have a dense interweaving of interests with oil-exporting nations and we have to look no farther than Mexico to see that.

But keep in mind, the current oil market supply is taut. These prices could be subject to a great deal of volatility, which means going up again as well as going down, and they could be driven in that way by anything from another Iraqi showdown with the United Nations, political or technical problems in an exporting country, political tensions among exporters, to the pace of Eurasia's recovery and the strength of the U.S. economy. So there are a lot of things out there that will affect prices in the next few months.

If prices are in the \$300plus range for any period of time, we think that the impact of slowing economies will provide an inevitable correction on those prices. But this wide band of prices that we have seen, from 10 to \$34 a barrel, in this most basic commodity over a little more than a year, underlies the inherent volatility in what is probably still the world's most important commodity.

Let me in the last couple minutes turn to something that this subcommittee has considered a lot—and Congressman Sharp and I were talking about this for a very long time—which is natural gas prices. In a sense, this subcommittee is the home of consideration of that. So much of the energy consideration has been focused on oil recently. But the United States natural gas supply system right now is characterized by very tight supplies, and we are going to hear a lot more about that in the next few months. The spring market and the recent heat waves have shown how tight.

Natural gas prices right now are 70 percent higher than they were at this time last year. Demand pressures are intensifying while there are few signs of growth and supply. And recognize how important natural gas is to our country for energy and environmental reasons. It provides 23 percent of our total energy and, increasingly, it will be the key to our future electricity supplies.

Indeed, the United States is making a very big bet on the adequacy of future gas supplies without realizing it. Fifteen percent of our electricity today is generated with natural gas. In terms of proposed new capacity, that number goes up to 96 percent. We have

seen a slow supply response, partly because of the oil and gas price collapse the last couple of years.

Greater investment is needed. We do think by the end of the year we will start to see a supply response. We do believe at Cambridge Energy that there is the gas supply potential to meet the challenge of increased demand from power generation at a price that would not discourage market development.

But a few thoughts. One, it is very important to avoid short-term intervention, government intervention in the market that would discourage investment and supply, particularly at a critical time like this. Moreover, and it has already been suggested, we need to consider how to facilitate natural gas development in such a way as to support overall environmental objectives and not have the two separated.

There are big challenges ahead. No. 1 is to reverse the decline in supply. We estimate that in round numbers we need half a trillion dollars' of investment in the upstream natural gas business to get the kind of supply that we need in 10 years. We need to add 50 percent more reserves in this decade than in the last decade. We will need to connect new frontiers of gas development, including, as Admiral Watkins pointed out, the Arctic, and reduce the pressure on the gas infrastructure system in our country. We need to recognize the very large reliance we are making and we are putting on natural gas to power the growth of our new economy.

Thank you.

[The prepared statement of Daniel Yergin follows:]

PREPARED STATEMENT OF DANIEL YERGIN, CHAIRMAN, CAMBRIDGE ENERGY
RESEARCH ASSOCIATES

This hearing is very timely, and the Subcommittee is to be congratulated for its focus on this subject. The tightening world oil and North American natural gas markets and higher prices at the gasoline pump have pushed energy policy considerations to the fore again. Renewed consideration is at hand about the adequacy and security of supply, and of energy and related foreign policy issues. This hearing will be an important contribution to the national understanding on these matters.

In my testimony, I seek to help set the scene for this consideration by providing a context both for something that is vexing the American people—gasoline prices—and, more generally, on world oil and natural gas markets. The discussion on gasoline is drawn from the new study by Cambridge Energy Research Associates, *Gasoline and the American People*, which we are releasing today. This is a new version of a study we originally did during the Gulf Crisis almost a decade ago.

*Gasoline and the American People*¹

The best known price in America is that of gasoline. Americans see it posted along the road a dozen or two times a day; they pull in to fill up every week or ten days, if not more. It's also a price that—perhaps because of that visibility—can generate a lot of heat, especially when it is going up, as it has in 2000.

This is, in fact, a price that tells a complex story—of global supply and demand, of technological change and environmental consciousness, and of shifting consumer tastes and social change. That's the story we seek to tell in *Gasoline and the American People*. We hope that it provides not only the context for understanding what makes the price what it is at any give time at the pump but a window on how life in America is changing.

We produced the first edition of *Gasoline and the American People* almost a decade ago, during the Gulf Crisis, when major disruption threatened the security of world oil supplies right down to the retail market. The timing of this new edition is highlighted by the current volatility in gasoline prices, the need for a framework, and the considerable changes in consumer tastes and American society over the decade since. The American people have plenty of reason to be puzzled. In 1997, the

¹ *Gasoline and the American People*, Cambridge Energy Research Associates, May, 2000

national average gasoline price was \$1.23 per gallon in current dollars. It fell briefly to a low of 95 cents in early 1999. In inflation-adjusted terms, that price was lower than at any time since recorded prices began—lower even than average prices in the Great Depression. In not much more than a year since, however, gasoline prices have exceeded \$1.50 a gallon on a national basis and, in some areas, have been over \$2.00—the highest they had been since the Gulf Crisis of 1990-91.

Price: To make sense of price, one must think in inflation-adjusted terms. Those with longer memories might remember 30 cent a gallon gasoline from the 1960s; but, in today's prices, that would be the equivalent of \$1.75. More people will remember the \$1.25 from 1980. But today that would equivalent to over \$2.50 per gallon. For the purposes of comparison, let us put all gasoline prices into inflation-adjusted dollars. We use 1999 *real* or *constant* prices (which, owing to low inflation, are very close to current prices). With that, it becomes clear that the long-term trend in gasoline prices is down. The major exceptions are the periods of crisis—the oil shock years of the 1970s and the Gulf Crisis of 1990-91. Since 1991, gasoline prices (again inflation-adjusted) have continued to come down, and even at the high prices of this spring are considerably lower than they were in the 1950s and 1960s in most areas of the United States.

Why the Fluctuations? Despite the long-term trend, prices move up and down a great deal. These can be caused, among other things, by political events, shifts in the supply and demand of fuel, weather, the level of inventories, disruptions in refinery operations, and the introduction of new environmental standards. The recent sharp increases in gasoline prices are the result of higher crude oil prices, very low inventory levels of gasoline, and new environmental regulations. At the recent level of \$1.52 in late May 2000, they are about 25 to 30 cents per gallon higher than the middle-1990s and about \$1 below the peak years of 1980 and 1981.

How much in the gas tank? In 1999, the average driver used about 690 gallons and paid \$780 over the course of the year. That compared—using 1999 dollars—to \$936 in 1990 and \$1630 in 1980. If the price of a gallon goes up 10 cents over the entire year, compared to the previous year that will cost a motorist an additional \$70.

Taxes: One thing has gone up, and that is taxes at the pump. The price that motorists pay for a gallon is made up of many things—the price of crude oil, transportation and refining costs, the costs to operate the filling station—and tax. In 1999, the tax component of the price was about 40 cents per gallon or 34 percent—just about the same percentage as the cost of the crude oil. About half that total, 18.4 cents, was Federal tax, and 20 cents was the average state tax. (The lowest state tax is Georgia, at 7.5 cents; and the highest, Connecticut, at 32 cents.)

Compared to Other Countries: From an international perspective, however, what is striking is how much a bargain gasoline is in America. Currently, the average price in the United States is \$1.53 per gallon—compared to \$4.69 in Britain and \$3.87 in France. The reason for the difference is almost entirely one thing—tax. While the tax take by governments in America is just 34 percent of the retail price, it is 82 percent in Britain and 80 percent in France.

Where? Motorists may still say “fill’er up,” but there are a lot fewer people to respond today than 20 or 30 years ago. Americans have opted for the lower prices of self-service over the higher prices that come with full service. Today, about 95 percent of the retail stations offer self-service. And more and more motorists (and their families) pull in not only to fill up on gasoline but also on carbohydrates and caffeine. For fully 45 percent of retail outlets now include convenience stores. One of the biggest costs of operating a station is the land, and marketers have found that they can do better by bolstering the revenue stream from gasoline with a separate revenue stream from hot dogs and Hostess Twinkies. The next stage is “co-branding,” in which a gasoline station shares the same real estate with one of the familiar brands of fast food—and maybe a dry cleaning establishment too. Still unclear is whether the huge gasoline stations of the European style hypermarket (about half of total gasoline sales, for instance, in France) are ready to emigrate to the United States. And to what degree will gasoline, even if still pumped at the station, be sold over the Internet?

How much? Americans drive more and more. In 1980, the average licensed driver traveled 9,700 miles. In 1998, 18 years later, they were driving over 13,000—an increase of 34 percent. The number of licensed drivers is now over 180 million. But there are still more registered light duty vehicles—203 million—meaning that, on average, each licensed driver has 1.1 vehicles. A big source of new drivers—and more gasoline consumption and miles traveled commuting—has been the entry of a significant number of women into the labor force. Now that the rate of women entering the workforce has slowed and vehicle ownership has exceed saturation, that suggests that the increase in the number of miles driven will flatten out. An-

other major new factor is the astonishing growth in the driver population over age 65, which has increased from 15.5 million in 1980 to 26.2 million in 1998. Their numbers are increasing, but the mileage that they put on goes down, not up.

World Oil

The main reason for the high oil prices of 2000 was the low oil prices of 1997 and 1998 and early 1999. More than anything else, the low prices resulted from the Asian financial crisis. Asia was then the region of strongest growth in oil demand. When Asia went into sharp decline, the oil industry was perhaps the first major industry to feel the effects. Asian demand had been expected to grow by a million barrels per day in 1998; instead, it fell by 600,000 barrels per day. Worldwide production, however, remained geared to the anticipated demand levels, and the extra supply went into inventories, which were soon overflowing. Thus—the price collapse.

The domestic U.S. oil and gas industry was ravaged by the price collapse, and we continue to see the negative consequences today. The oil exporting countries were driven to act by the dire reality. Their own national budgets were being devastated. Mexico has done a remarkable job since the early 1980s in reorienting its exports away from dependence upon oil. But petroleum still provides up to 40 percent of the national budget. The collapse in prices meant cuts in spending on education, health, and social needs. For most of the major exporting countries, \$10 a barrel oil portended social and economic instability.

All this was enough to get the exporters together. OPEC countries not only agreed to new production restraint but also demonstrated a much higher degree of adherence than some anticipated. And non-OPEC countries, led by Mexico, collaborated.

What the calculations did not do was foresee the rebound in oil demand, driven by economic growth. Few saw how buoyant the US economy would be in 1999 and into 2000. A year ago, the consensus view on economic growth in South Korea (the world's sixth largest oil market) was for zero economic growth in 1999. At it turned out, economic growth was almost 11 percent.

The attention on oil when prices reached \$30-plus underlines the fact that oil prices are one of the few prices—along with the price of labor and the price of money (interest rates)—that can move the economy and spook the stock market.

One of the major changes from the oil turmoil years of the 1970s is the relative absence of confrontation that characterized that earlier period. Nor longer is there a North-South struggle. Instead, we are in an era of “emerging markets.” Countries like Mexico and Saudi Arabia—recognize how integrated their economies have become with the United States. Mexico worries about oil prices. But, especially post-NAFTA it also worries a great deal about the health of the United States economy. Exporters also have assimilated the great lesson of the 1980s—that customers count and you do not want to risk losing market share. They could see that prices at recent levels could well damage their interests in two ways. First, they could lead to a slowing of economies, reducing demand and thus creating new problems for the exporters. Secondly, although the oil industry has been cautious in its spending, persisting high prices could end up stimulating the development of a lot of new supply. And the exporters have no interest in seeing oil prices turn into a big campaign issue in the United States.

The message is similar for the United States. We import about half of our total oil supplies, and our dependence will grow. We have a dense web of interdependence with many of the oil-exporting countries, of which oil is but one, though a most important element.

The current supply picture is taut, which means that the market could be subject to a great deal of volatility. With low inventories, prices could be driven up again by everything from another Iraqi showdown with the United Nations, political or technical problems in a major exporting country, or political tensions among exporters, to the pace of Asia's recovery and the strength of the U.S. and European economies.

Continuing demand recovery in Asia and Latin America combined with further gains in North America are expected to propel world demand growth through 2002. We are looking at a 2.2 percent worldwide annual average increase in demand between 2000 and 2002c long as economies remain on the track on which they are. If prices are in the \$30 or higher range for any period of time, we think that the impact of slowing economies will provide the inevitable if unfortunate corrective. Many of the exporting countries suggest that an “appropriate” range for oil prices is \$20-25 a barrel—a price that is often said to be good for consumers and good for producers. But the much wider band of \$10 to \$34 a barrel within one year underlines the inherent volatility in the world's most important commodity market and the difficulty in getting the price “right.”

U.S. Natural Gas

Much of the energy attention in recent months has been focused on oil. But the U.S. natural gas system is also characterized by very tight supply. The spring market and recent heat wave have shown how tight: Prices today are 70 percent higher than they were this time last year. In CERA's view, for the first time in many years, there is real uncertainty about the ability of North American supply to meet demand without sharp price rises. Demand pressures are intensifying, while there are few signs yet of growth in supply. The differences are being made up by withdrawing supplies from storage, where the levels are very low. There is a similarity here to the oil market. Pressures on inventories are driving the market. But there are major differences, too. In contrast to the oil-exporting nations, there are no suppliers withholding supplies from the market. And there is no capability to ramp up production quickly to reduce the pressure in the market. In the months ahead, we may see prices at new, higher levels that have not been seen since the emergence of natural gas spot markets in the mid-1980s. How high will prices go this summer? That depends on how hot the summer. We could well expect \$3.50 to \$4.00 levels. With a hot summer, prices could spike to \$5.

In examining the outlook for the industry in our new study, "The Future of North American Natural Gas," we see major challenges. Natural gas is a critical fuel for the United States both for energy and environmental reasons. It currently provides 23 percent of our total energy. It heats 53 million homes; it is a major feedstock for industry; and, increasingly, it will be the key to our future electricity supplies. Electricity will continue to become ever more central to our economy; the digital economy depends upon a very high quality electricity supply system. But that system, in turn, will more and more depend upon natural gas. Indeed, the United States is making a major bet on future gas supplies—without realizing it. Currently, just 15 percent of our current electric generating capacity is fired by natural gas. However, 96 percent of proposed new generating capacity is gas-fired. The reasons are cost, flexibility, technology, and environmental attractiveness.

Demand for natural gas is currently very strong, owing to the completion of new gas-fired power generation plants, and as economic growth stimulates the demand for the power that both new and existing gas-fired generation units produce. At the same time, high decline rates in existing natural gas production require higher levels of drilling to maintain supply—let alone keep pace with demand.

The supply response—new exploration and development—has been slow in coming. The reasons are many and varied. One is the continuing impact of the 1998-99 price collapse, which devastated the cash flows of the upstream oil and gas industry and continues to leave many companies cautious and capital-constrained. An industry that has been hurt by boom-and-bust cycles is leery of setting off another one. The industry has downsized so much in response to lean times that it faces a shortage of labor. At least until recently, capital that might otherwise have flowed into the industry instead went into the technology sector of the stock market—although that may well be ending.

The result is that US supply is likely to be down this year, while western Canadian supplies are only now beginning to grow, and then only modestly. Reversing the recent declines in US wellhead supply requires offsetting higher decline rates in existing production and moving beyond the current plateau of drilling. Greater investment is needed in exploration as well as in development areas. Nevertheless, CERA expects supply to begin to show year-over-year increases in the United States toward the end of 2000, and in Canada supply growth is at last expected to be evident this spring.

CERA does believe that there is the gas supply potential to meet the challenges of increased demand from power generation at a price that would not discourage that market development. It is very important to avoid short-term government intervention in the market that would discourage investment in supply. Moreover, we need to consider how to facilitate natural gas development in such a way as to support overall environmental objectives. There are big challenges ahead. The number one is to reverse the decline in supply. To meet the target of 30 TCF in ten years, compared to the 22 TCF today, will require something on the order of half a trillion dollars in U.S. upstream development. We will need to add 300 to 350 TCF of new reserves in this decade, which is 50 percent more than we added in the 1990s. We will need to connect to new frontiers of gas development, including the Arctic, and reduce the pressure on the gas infrastructure system in this country. And we need to recognize the very large bet that we are making on natural gas to power the growth of our new economy.

Mr. BARTON. Thank you, Doctor. I am a little disappointed; in the Harvard Man, you have got this new study out, and you didn't have a copy out to hold up for the cameras.

Mr. YERGIN. Thank you. I will learn from my mistakes.

Mr. BARTON. We are now going to hear from another Harvard man, the Honorable Phil Sharp, who is the past chairman of the subcommittee and is the person that I try to model myself after as we hold these hearings. Congressman Sharp, when he was the subcommittee chairman, was always courteous and fair and thoughtful and comprehensive. And that is a tough act to follow. But I enjoyed serving with you when you were the chairman of this subcommittee and I enjoy having you on the panel today to give us your thoughtful comments on what our energy policy should be.

STATEMENT OF PHIL SHARP

Mr. SHARP. Thank you, Mr. Chairman, especially for those flattering remarks. And I am delighted to be back here with the committee and the members, some of whom know how wrong I have been on some of these issues over the years and I trust will not hold me to account at this point. And because of that battered experience from 1975 until 1995 on this committee, I do have a few general remarks to make which I hope have some relevance today, because I hopefully learned some things from all of us in this country from some of the mistakes that we made in the 1970's.

Mr. BARTON. We are not going to talk a lot about NGPA.

Mr. SHARP. I would have to argue that ultimately that proved to be successful. It was a very difficult route to a good end, which I would admit readily to. But, Mr. Chairman, what I would like to do is just mention a few general principles, because already I hear the voices in the political system on both sides of the aisle that might deflect us from some things that may not be wise for the country, in my view and many others', because I had to learn an awful lot from everybody else.

First, our basic energy policy on additives and natural gas and oil is to rely on the competitive marketplace. And we must stick with this policy. We had an intense ideological and political battle in this country for many years. It was very difficult to resolve and very difficult to finally get a bipartisan agreement which is effective in this country and which perennially we are being drawn to undermine in various ways.

And so I would strongly urge that we keep in mind no price controls, no efforts to temporarily try to dictate the price and allocation of energy supplies on this front. Every time we have turned to that, we have made major mistakes. Now our policy, as everyone here has been articulating, is certainly not one just of laissez-faire. There are many supplementary policies in which we tried by various techniques, from research and development to tax incentives to regulations, to alter the forces of the marketplace on both the production and the consumption size. Many of those are wise and some of them we find great difficulty making work in any consistent manner. But the unsettling price swings of this last year have again raised doubts of this basic policy of sticking with the marketplace.

And my overwhelming advice, I think, from all of us on the panel, would be just say no to any proposals for controlling price. Now, nobody is talking about direct price controls, but there are in fact a number of proposals to indirectly try to control the price. These are not nearly as Draconian as direct price controls, but nonetheless they suffer the same disability because they seek to outguess a very complex and rapidly changing marketplace: proposals like drawing down the Strategic Petroleum Reserve, proposals like having a reserve in New England for fuel oil, proposals like requiring the private marketplace to maintain a certain level of stocks. And I would applaud the President and this Congress for not drawing down the Strategic Petroleum Reserve and not deciding to do that during this price increase.

Now we all know that the prices in the marketplace are not fair to everybody equally. So we do need and we do have and we should aggressively have policies that try to help those people most severely damaged and least able to cope with price swings, such as the low income energy assistance program.

Mr. Chairman, let me suggest as a second proposition that we are interdependent on the world energy markets. We struggled mightily with the rhetoric in the 1970's of being independent, and of course it was what most Americans desired and it was a shock to us in the seventies that we were so involved and so dependent on the world oil market. But the hard fact and the reality is we are very much a part of that marketplace and we make a big mistake when we try to pretend anything otherwise. There were no sets of policies anybody has ever recommended that are acceptable economically, particularly in this country, to guarantee us independence. It is wise, as you and others have been pointing out, for us to try to reduce our reliance on oil in this marketplace for a variety of benefits. But we want to make sure that what choices we make actually make sense economically and from an environmental point of view.

It also behooves us, obviously, in our international policy to recognize that we have a major economic and strategic stake in open markets. That means we don't restrict our imports, we don't restrict our exports. We have a major, major interest in the development of alternative other sources of oil outside of the Middle East, such as in the Caspian Basin. We have a major interest in the long-term development of cleaner fuels, renewable fuels here and abroad. We obviously have diplomatic interest in keeping the peace abroad.

The third big point, which is no surprise to anybody here, is that if we are going to ensure adequate supplies that means we need both supply and we need to work on the consumption side as well. You have heard a number of proposals, and some of them are very serious and well founded, of ways that we have got to try to enhance our oil and gas exploration and development in this country. But at the same time, I would strongly urge you to take seriously those practical and reasonable proposals to try to make us more efficient in the ways in which we use energy in this country. And we have done a great job since the 1970's, partly by government policy, largely by the price in the marketplace, of improving energy and oil sectors.

The fourth major point is that oil and gas markets and our energy markets are dramatically shaped by our environmental policy. Indeed, the reality is that much of our energy policy is really environmental policy. It has to be. In fact, oil production and distribution and use have the greatest impact on our environment—land, air, and water quality—and it is inevitably tied up together. Therefore, it behooves us to be as rational and sensible and scientifically driven as we possibly can.

And there is a great need for Congress and the administration in the years ahead to see if they can rationalize the Clean Air Act and the energy environmental laws in general. This is a Herculean task. It should not mean backsliding on our environmental commitment, but we do need to, where we can rely on market mechanisms like in the NO_x market, as we did in SO_x, SO₂, under the Clear Air Act of 1990.

The second part of that is more difficult to politically swallow perhaps today, but that is, we have got to address a prudent path on carbon dioxide and other greenhouse gases. The reality is people are pressing scientifically, politically, all the around the world to do this. Our energy markets must respond to that. They are indirectly already taken into account, and we need to get some greater assurance as to what that path is going to be so the long-term investments that have to be made on production and consumption will know what the rules are.

Finally, on the environmental front, it is critical that we continue, as several members of the committee and both parties already indicated, support for renewable fuels. But we mustn't kid ourselves. They are not suddenly going to replace our fossil fuels and our nuclear fuels, and we have got to consider ways in which we enhance the clean and efficient use of those traditional resources. Much of that is a matter of research and development.

Finally, and I am sorry to run over, Mr. Chairman, but one of our major priorities here, as you and others have articulated, is that electricity and the electricity markets, which, by the way, increase the demand for gas, must be addressed at the Federal and State levels, because the greatest potential, in my judgment, of interruption of supply of energy may be in the electricity markets rather than oil and gas markets, although I don't mean to diminish at all the intensity of your interest in oil and gas issues here. The fact is, we are finding it is more difficult to create competitive markets with this enormous transformation undertaking.

It is much more difficult than it was in gas or oil for a variety of important reasons. Part of it relates to the nature of electricity, part it relates to the fact that the public policy issues that have to be resolved are bound up in a hodgepodge of governmental jurisdictions at the Federal and State level. Our political system is not designed to try to create a nice smooth interstate market, and it takes a lot of effort and a lot of cooperation to do that.

As you know, Mr. Chairman, although the task force I chaired for the Secretary on this recommended, as one of its many points, the reliability legislation that you have incorporated in your bill, neither I nor anybody on that task force believe that alone is enough. In fact, it is one of the most minor parts of having reliability in the electric utility industry, because the rules have to be

sufficiently in place, and investment will be attracted into generation, into distribution, and into the changes in consumption patterns. But the electricity system itself as we transform it, will become incredibly, in my view and many others', more efficient at all levels and that will help us on the environmental front and it will help us on meeting our energy needs.

I applaud the effort of this subcommittee last fall to pass an electricity bill. I would personally strongly disagree with a couple of provisions that I suspect the Chairman would.

Mr. BARTON. Did vote for it, though.

Mr. SHARP. I know you did, sir. I probably would have if I had been in your shoes as well. I think it is critically important that progress be made forward, and I know one of the values some Americans forget about the Congress, is that the multiple steps give it a chance to change and alter and adjust to what it learns. And the reality is the political system will never focus on these issues intensely until they start to move. Once they start to move, boy, you heard from everybody. I am sure you plainly know that; I don't need to tell you.

But, Mr. Chairman, I appreciate very much your having me back. I hope that we can move forward. I will answer any specific questions that you have.

[The prepared statement of Phil Sharp follows:]

PREPARED STATEMENT OF PHIL SHARP, HARVARD ELECTRICITY POLICY GROUP, JOHN F. KENNEDY SCHOOL OF GOVERNMENT, HARVARD UNIVERSITY

Mr. Chairman, thank you for inviting me to testify. For the record, my name is Philip R. Sharp. Currently, I am a Lecturer in Public Policy at the John F. Kennedy School of Government, Harvard University. Recently, I chaired the Secretary of Energy's Electric System Reliability Task Force which issued its final report, *Maintaining Reliability in a Competitive Electric Industry*, in September, 1998.

From 1975 to 1995, I was a Member of Congress from Indiana and for eight years had the honor of serving as Chairman of the Energy and Power Subcommittee.

During those twenty years, I participated in nearly all major legislative efforts regarding energy policy and clean air policy as well. During that time I supported policies which proved effective and others which did not. Fortunately, for me, no one is keeping score.

Chairman Barton, I applaud your efforts in taking on the challenge of these complex issues. Undoubtedly you and the committee are being pressed with a plethora of recommendations. You certainly have my sympathy.

Drawing from my battered experience on this committee, I would like to make a few general observations and will be happy to respond to specific questions, if I can.

Our basic energy policy for assuring adequate supplies of oil and natural gas is reliance on the competitive market. Stick with it.

That has been the policy for two decades. After years of intense political and ideological dispute, after several "energy crises," after experimenting with extensive economic regulation, a broad consensus emerged toward the end of the 1970's that market forces, not the government, should determine the price and allocation of oil and gas supplies—that market forces would be the main determinant of how we produce, distribute, and use oil and gas. It is a bi-partisan policy. It is an effective policy. It is not well understood.

Our policy has never been, however, simply one of laissez-faire. For reasons of equity, security, and environmental protection, we have a host of supplementary policies that seek to shape those market forces. Some of these supplementary policies have big impacts on the oil and gas markets and should be periodically re-examined.

The unsettling price swings of this past year naturally raise doubts about our market policy; and they inevitably give rise to political calls for short term-policies that will stabilize prices to avoid short term pain—either for producers or for consumers.

The overriding lesson from the past: “just say no” to proposals for controlling prices—directly or indirectly. Be wary of the siren song that lures the government to try to smooth the price path in a turbulent market.

No one yet is calling for direct price controls. Perhaps, we have truly learned how ineffective, counterproductive and costly oil and gas controls can be for consumers and the economy. Perhaps, there is also memory of how politically difficult it was to change or abandon them. Like many others in Congress, I underwent the metamorphosis from supporting controls to helping end them.

Today, however, we hear proposals aimed at controlling price spikes—not directly, but indirectly: release crude oil from the nation’s strategic petroleum reserve; create a regional product reserve in New England to quell future spikes; require private suppliers of fuel oil to maintain stocks at levels set by the government.

While not nearly as draconian as direct price controls, these proposals suffer some of the same disabilities. They assume the government can regularly out-guess the complex and rapidly changing market place. They are not likely to produce the desired result. They seldom can be invoked in a timely fashion. They often produce unexpected and undesirable consequences.

Earlier this year, the President was wise not to draw down the Strategic Petroleum Reserve; and the Congress was wise not to collectively press for such action.

Like it or not, in our enormously complex economy, it is the change in prices which stimulates added production, which moves products to where they are needed (like fuel oil to New England), and which encourages consumers to take seriously energy efficiency.

Quite naturally it is harder to focus on the positive benefits of the market when the imperfections are apparent and the pain is real. But our market policy should not be casually dismissed or changed. Only if the economy is seriously threatened should the government utilize the Strategic Petroleum Reserve or adopt other short-term policies designed to control the price and allocation of supplies.

The pain of price swings and the benefits of the market, of course, are not evenly distributed. That is why supplementary policies such as low-income energy assistance and weatherization are the compassionate courses to pursue, rather than efforts to control the price level.

We are energy “interdependent”—integrally connected to world oil and gas markets.

While we Americans today are far more cognizant of “globalization” than we were in the 1970’s, it is important to remind ourselves that we live in an energy interdependent world which is very difficult for most of us to understand. This may explain why some of our rhetoric about energy policy is so at odds with reality and why so many policy proposals miss their mark.

One of the major lessons from the 1970’s: there is no set of acceptable import-reduction policies which can achieve anything close to oil “independence.”

In nearly every conceivable way, we are a part of the international market—in terms of products, prices, capital investment, environmental impact, etc.

There certainly are benefits to us and to the world market if we can lessen our reliance on oil. But when judging proposals that purport to cut our imports, it is important to carefully ascertain the real benefits and carefully weigh them against the real costs—economic and environmental.

Cutting US imports, for example, by several million barrels—would diminish our drain on the world export market and diminish the potential impact on parts of our economy if there were a disruption in Persian Gulf production. But such a reduction in imports would in no way end our strategic concern with world oil markets in general and Persian Gulf supplies in particular. US crude oil prices are largely set by the world market; the economies of our major trading partners rely heavily on oil; and nearly 2/3 of the world’s proven oil reserves are located in the volatile Persian Gulf region.

We have major stakes in the promotion of open energy markets, the diversification of sources of oil (as in the Caspian basin), the long-term development of cleaner fuels, coordinated diplomatic efforts to advance peace in the Middle East., etc. etc. The range of international policy concerns is broad.

“Ensuring adequate supplies of oil and gas” is a question of demand—as well as supply.

As the Congress considers proposals to facilitate production and distribution, it should also consider proposals that advance efficiency in the use of energy.

In the 1970’s, there was much rhetorical fighting over whether we could “produce” our way out of the crisis or “conserve” our way out—as if we had an “either-or” choice. In the end, of course, the market dictated both; and policies were adopted in the name of doing both.

Efficiency improvements have played and will play a major role in helping us economically fuel the economy in environmentally acceptable ways.

Since the 1970's, significant efficiency gains have been made in nearly every sector of consumption. While market prices and market forces have been, and should be, the central driver of efficiency, government policies undoubtedly contributed to those gains—through R & D, tax incentives, jawboning, and, in a few instances, minimum efficiency standards.

In the United States, if we are talking oil, we are talking automobiles—that is, passenger vehicles. It is disturbing that the projections for fleet fuel economy improvements are so dismal. This must be a matter of public concern.

One of the chief reasons for moving to competition in the electric utility industry is to accelerate adoption of efficiency innovations throughout the system—from the generator to the customer.

Oil and Gas markets—all energy markets—are dramatically shaped by environmental policies.

This is necessarily so, because energy production, distribution and use have such significant impacts on the quality of our air, land, and water.

In the next few years, the Congress would perform a valuable service if it could rationalize and modernize our environmental laws, especially the Clean Air Act, so that we can more effectively protect the environment as economically as possible.

This may be a Herculean task. Where possible, for example, the law needs to allow more opportunities for market implementation of federally set requirements, as we did for SO₂ in the 1990 Amendments. Such legislating, however, should not mean backsliding on scientifically-identified environmental threats.

In the next few years, the United States in conjunction with other nations must come to grips with CO₂ and other green house emissions and chart a prudent course—the least costly course—for reducing the potential impact more and more scientists claim these emissions will have on the global climate. It is increasingly untenable to engage in political denial on this issue. There will be no quick and easy policies.

Participants in energy markets regularly make decisions which have long-term impacts on the way we produce and use energy—decisions which therefore have environmental consequences for years to come. The Congress must do the best job it can in shaping the authority of EPA in order to provide clarity and consistency in the rules that will govern those market decisions.

It is very important for the government to support the development of renewable fuels in order to meet our long-term energy and environmental needs. There is no realistic scenario, however, in which the United States and much of the world will not be heavily dependent on fossil and nuclear fuels for the foreseeable future. Therefore, we must continue efforts to find cleaner, safer, and more efficient ways to use our main energysupplies.

Electric issues must receive priority attention.

Our electric markets are undergoing a radical transformation. During this difficult transition to competition, we face increased risks of supply disruption. That was a major conclusion of the Secretary of Energy's Electric System Reliability Task Force.

Creating competitive markets in electricity is proving more difficult than was deregulating oil and gas. The nature of electricity requires a high degree of physical coordination to keep the system operational. The market issues are complex. Important public policy issues fall into a hodge-podge of governmental jurisdictions.

Assuring supply requires a number of public policy decisions in order to facilitate market development and attract needed investment. This, of course, is not simply a matter of adopting the "reliability" legislative proposal which deals with making and enforcing reliability standards.

Although I disagree with a couple of the provisions in the bill passed last fall by this Subcommittee, Mr. Chairman, I certainly believe you and the subcommittee deserve great credit for getting the legislative process moving and for trying to resolve exceptionally thorny issues.

Mr. BARTON. Thank you former Congressman. It is amazing to me—before I recognize Mr. Martin—we ask you all to provide written testimony; you do that. We ask you to summarize it in 5 minutes. We give you 7 minutes, and you take 10 minutes.

Let me welcome the Honorable Bill Martin. I first met him when he was in the National Security Council under President Reagan.

He later became Deputy Secretary of Energy, and I worked with him there. He is one of the truly Renaissance men that I have had the pleasure to meet since I have been a Congressman and we are delighted to have you here. We are going to give you 7 minutes also and see if you can give us back a little bit of that perhaps, because we still have two distinguished members from the Clinton Administration that we want to give a chance have something on the record.

STATEMENT OF WILLIAM F. MARTIN

Mr. MARTIN. Thanks, Mr. Chairman. It is real tough to follow two Harvard types and an Admiral. I was thinking what Ralph Hall said. He has left, of course, but Steve will appreciate this. I come from Oklahoma. My great grandfather, my grandfather, my father, were all wildcatters and of course they went out of business. That is why I had to go into government.

I want to give a bit of a story about natural gas today. The Admiral and my two Harvard colleagues and dear friends have told the story about energy security. Yes, we have a problem with rising imports, absolutely. Yes, we have a problem with rising CO₂. Yes, the rest of the world is increasing their oil demand just like we are. The concentration of Persian Gulf exports in the next 15, 20 years is going to be unimaginable. Therefore, we need to take measures in order to protect ourselves, our environment, and our economy. So thank you for having these hearings.

I am going to agree with most of what Dan Yergin said about natural gas. But we prepared a study for the Natural Gas Foundation using our model which, unfortunately, was developed at MIT, boys. We think in terms of numbers as opposed to arguments. But this model has been around for about 25 years and it has appeared before this committee many times—and the Senate. We are finally getting it right, I think. But it shows something very interesting about natural gas.

I think we will all agree natural gas is the fuel of choice. Whether you are a Democrat or a Republican or producer or consumer, you like natural gas. But it is interesting, we found in the model that coal and nuclear power plants are being extended quite a bit for economic reasons. So the role of natural gas may not be as rosy in electrical generations. Certainly it is capacity, but what if new capacity is not replaced as quickly? So there might be a bit of a problem.

So one of the things we looked at was the direct use of natural gas. Indeed this is a bit of a technology story on the demand side. If you look at the recent increase in use of turbines and fuel cells and the fact that any of us can someday have something the size of this chair at our house, which will actually convert natural gas into electricity and be economic and, by the way, be dependable, it is quite startling. And we are seeing companies, even on the stock market, that are investing in fuel cells going right for through the roof. So there a huge new technological development in natural gas.

We ask ourselves, what role is this technology going to have in spurring natural gas demand? We had a rather encouraging result. In fact, we are even more optimistic than the EIA, we are probably more optimistic than anybody on natural gas demand. We say that

natural gas demand could increase by 60 percent by the year 2020, roughly go from 22 quads to 35 quads. For my Harvard friends, a quad, as you know, is about 10 to 15 million BTUs and a quad fuels Cleveland for a year, roughly—just for the sake of Harvard.

Mr. BARTON. We appreciate you for educating our Harvard men and our Congress.

Mr. MARTIN. In any event, it is a good story for gas. It is not going to happen easily, meeting that type of natural gas demand—I think Dan and the Admiral said it well when they talked about access and the need for access to gas and oil and ANWR and the other resource base to stimulate gas production in this country—because we need to do some things on the supply side. We also have to make the rules of the game clear on the demand side.

For example, let's take electrical appliance standards. You know, we all go to Sears and we see now here is an electric hot water heater, it is 90 percent efficient or something; you think gee, I am really doing something for the country if I buy that hot water unit. However, we have to recognize that electricity has so many enormous processing losses along the way that the reality is it is not 90 percent efficient, it is much less if you figure we lose two-thirds of the energy getting it to that electric hot water unit. Whereas if it is a gas or gas cooling, unit we don't have all those processing losses.

So, for example, on the demand side, when the consumer goes to the store to make a decision between electric and gas, hey, you know, let's make it clear to him. And if he is doing something for the country and for the environment, let's make sure he is aware of that. So things like appliance labeling—and there are a host of other things which again levelize the field for natural gas consumption and use.

Now, let me mention here Dave Parker recently had a meeting of all the CEOs and heads of the energy associations, and they were talking about a national energy policy. It is interesting to me that while during the seventies when I worked with John Dingell, and in the eighties when I worked with you, Mr. past Chairman, they had fuel wars. But in reality our numbers suggest—and they are on page 12 and I commend them to you if you are numerative—these numbers suggest that if you increase natural gas demand by about 60 percent, and you could do it, and if you use this energy more directly you can provide the same amount of service to the consumer, whether it be automobiles or households or industry, for 6 percent less primary energy, again because you don't have these huge processing losses for electricity.

However, this doesn't do in the coal industry. In fact, coal use actually increases and nuclear power does quite well. By the way, I am a firm supporter of nuclear power as well. We need nuclear power and we need renewables and we need efficiencies as well. But also this particular scenario which utilizes all domestic fuels efficiently reduces our CO₂ by 900 million tons. So we actually make a bit of a commitment to climate change or acid rain or whatever the environmental problem is, and our oil imports are 2.5 million barrels less than they otherwise might be. So, in my view, it is a rather balanced energy scenario for the future.

I commend the Congress as you look at your policies, look what the impacts are of the policies and see what they have to do with oil imports. My scenario, which started out to be a natural gas scenario, ultimately ended up as a basically balanced set of energy for all fuels.

So in conclusion, Mr. Chairman, I would like to offer this for the record, and we also have a longer technological report. And I also want to again thank you for the chance to appear before the committee.

Final point: This is a bit of a bipartisan study. Jack Gibbons, a very close friend of mine, took part in this, the President's Science Adviser. We had a lot of help from the DOE and also from distinguished colleagues at the World Resources Institute who are excited about natural gas not only for the national security but for the environmental contribution. Thank you.

[The prepared statement of William F. Martin follows:]

PREPARED STATEMENT OF WILLIAM F. MARTIN, CHAIRMAN, WASHINGTON POLICY AND ANALYSIS

Natural Gas Consumption in the US Can Increase by 60 Percent in the Next Twenty Years

Washington Policy and Analysis (WPA) has prepared a number of energy supply and demand scenarios, both domestically and internationally for more than a decade. The methodology WPA uses is based on a spreadsheet model developed at MIT in the 1970s and refined over the years. *WPA Global Energy* is an international model that calculates energy supply and demand projections for 16 major countries and by regional breakdown. The model makes supply and demand projections for all fuels (coal, oil, gas, nuclear, renewables) across all end-use sectors (residential, commercial, industrial, transportation).

In our projections, we take a relatively conservative approach to efficiency improvements and the real annual economic growth rate, basing these numbers on historical long-term trends. For a developed country such as the US, WPA believes that significant declines in energy intensity can be safely projected because of anticipated structural changes and rising productivity based on advanced information system innovations as well as economic and policy-induced urgings toward greater energy efficiency.

Energy intensive industries tend to shift from mature economies to developing economies. This well-established trend is all the more evident today, as we move increasingly toward a service-based economy or perhaps more aptly, an internet-based economy. As the WPA model is global, with the US model representing just a segment of the global energy economy, it is noteworthy that the assumptions in our US projections are consistent with the global energy forecast. By maintaining this internal consistency, we avoid double counting that can occur in some modeling attempts. Overall the US economy is expected to grow at 2 percent annually in tandem with increasing energy efficiency.

Within these parameters, how will we meet our energy needs over the next 20 years? What role will natural gas play? What will happen to oil imports? What will be the impact on our environment? How will this impact the US economy?

We have answered these questions in a number of studies for a variety of academic, professional and government institutions, including: Council on Foreign Relations, The Trilateral Commission, the Senate Energy Committee, Los Alamos National Lab.

In 1999, WPA approached the American Gas Foundation for support in our study of the US energy future. This was, in fact, our third study of national energy markets focusing on natural gas. WPA's first study completed in 1988, which was viewed as wildly optimistic in projecting a 25 quad consumption level by 2010, now seems rather conservative. Our latest study *Fueling the Future: Natural Gas & New Technologies for a Cleaner 21st Century*, reveals that consumption of natural gas could increase by almost 60 percent over current levels, from 22 quadrillion Btus (quads) in 1998 to 35 quads by 2020.

The study was completed with the assistance of the following experts: Dr. William Fisher, Professor of Geological Sciences, University of Texas; Dr. John H. Gibbons, former Science Advisor to President Clinton; Dr. Nancy Kete, Director of Climate,

Energy & Pollution Program, World Resources Institute; and Maurice Strong, Secretary General of the 1992 UN Conference on the Environment and Development in Rio.

A Business as Usual Scenario for the US Energy Future Emphasizes Coal, Oil and Natural Gas

Since the first WPA study on natural gas almost twelve years ago, the prospects for natural gas have improved, due in part to political and economic support for the natural gas industry and energy sector deregulation. Our energy economy has improved significantly over the last twenty years in terms of efficiency and our domestic energy resources have also expanded—especially coal, nuclear energy and natural gas.

As we look to the future, we can expect that efficiencies will continue and that the market will be the primary driver of energy supply and demand. To analyze the further potential of natural gas two scenarios were examined by WPA. The “business as usual” projection, called the Current Trajectory in our study, assumes an economic growth rate of 2 percent per year on average, coupled with a continuation of present local and federal energy and environmental policies.

This led WPA to the conclusion that both coal and nuclear power remain important for electricity generation. In fact, we expect nuclear and coal capacity is unlikely to decline as precipitously by 2020 as many forecasts predict. Our projections assume that approximately two-thirds of all nuclear plants scheduled for retirement before 2020 extend their licenses and remain operational. Natural gas consumption is also seen as growing from 22 quads in 1998 to 29.7 quads by the year 2020, primarily in the electrical sector. We also see a significant increase in oil imports due in part to higher demand and declining domestic production.

Under these assumptions, natural gas maintains market share in the electrical sector, but makes relatively few inroads into growing end-use demand within the transportation, commercial, residential and industrial sectors. Foreseeable problems related to supply and demand constrain the expansion of natural gas usage.

On the supply side, WPA assumes that much of domestic natural gas reserves, both onshore and offshore, remain restricted or off-limits to exploration and production. Additionally, we assume that pipeline growth is constrained by factors including siting problems and inadequate capital investment based in large part on uncertainties about future demand in specific areas.

However, this scenario should not be considered a constrained “business as usual” case. It postulates substantial increases in efficiency—along with other advances in technology on both the demand and the supply side. Yet, this “conventional wisdom” scenario presents a number of problems for our energy future. It indicates a substantial increase in CO₂ levels, precipitously high oil import requirements, and an economy operating at less than optimum energy efficiency.

Natural Gas Can Play a Larger, More Direct and Dynamic Role in Meeting Our Energy Needs

WPA looked at an alternative case for the US energy future, one that emphasizes the developments in natural gas end-use technology and its potential impact on energy efficiency, environmental quality, and energy security.

This High Gas Use scenario reflects conditions in which consciously “pro-gas” policies are adopted on the supply and demand side, avoiding “command and control” strategies, but endeavoring to remove market barriers of various kinds. In this case demand exceeds 35 quads by the year 2020.

We see steady penetration of gas into the electrical market, but the key to the success of this scenario is the penetration of end-use markets, including vehicles powered in a variety of ways by natural gas, gas-cooling and increased use by key industrial sectors. This projection foresees greater use of gas for distributed generation to site-based power for the industrial and commercial sectors, and by 2020 even the residential sector will see growth in this category. The increasing share of distributed generation is reflected in WPA’s projections by end-use sector. In the electricity sector, coal and oil show little or no growth in market share, but grow in absolute terms. In our Current Trajectory scenario, coal exceeds 61 percent of generation share, while in the High Gas Use scenario, it remains well below that at under 56 percent.

Under this scenario natural gas consumption in 2020 is nearly 6 quads above the Current Trajectory. Roughly half of the increase is attributable to the residential and commercial sectors where more new customers choose gas and more customers convert from other fuels to gas. This scenario also exhibits continued expansion in a number of successful new markets such as residential gas fireplaces and commercial gas cooling. Additionally, distributed generation in the form of reciprocating en-

gines, microturbines and fuel cells advances, accounting for roughly 20 percent of all new electricity generating capacity and 5 percent of total capacity by 2020.

Industrial gas demand is roughly 2.5 quads higher, continuing the robust growth of the past 10 to 15 years. Although the cogeneration market becomes saturated, other forms of distributed generation are expected to prosper, and highly efficient heating, cooling and process equipment continues to evolve, enabling gas to remain the dominant industrial energy source.

Natural gas cars, trucks and buses consume over 1 additional quad. Although these vehicles account for less than 1 percent of the overall vehicular market in 2020, they can make significant contributions to air quality and operational economics, primarily in fleet applications in congested urban areas.

There are Adequate US Reserves of Natural Gas to Meet a 35 Quad Future at Reasonable Prices

The decade of the 1990's has demonstrated the vast and diverse nature of the gas resource base. Further, the resource base continues to "expand" as estimates today are larger than those made in the early 1990's by the same estimators—despite the fact that we have produced and consumed over 150 trillion cubic feet in this period. Some components of today's gas supply were not even acknowledged 10 to 15 years ago. Coalbed methane, for example, which now accounts for 6 percent of domestic gas production, was not included in most resource base estimates prior to 1988.

There were tremendous technological advances in the past 10 years, from 3D seismology to horizontal drilling and innumerable computer-related breakthroughs. Similar advances will be required, and should be anticipated over the next 20 years, in order to satisfy a 35 quad demand level. Such advances will enable domestic production to increase from over 19 quads today to over 29 quads in 2020. Canada will contribute a slightly greater share in the future, increasing their exports from 3 quads per year to roughly 5 quads. Abundant worldwide and Alaskan gas resources offer mid-term insurance, while methane hydrates and other more exotic sources provide longer-term potential.

The natural gas industry is capital intensive, and to meet the demand levels of the High Gas Use Scenario will require significant expansion of the gas production, storage, transmission and distribution systems. The number of oil and gas wells drilled, for example, may have to double from today's level to some 50,000 wells per year. However, this is well below the peak levels experienced in the mid-1980's—70,000 to 90,000 wells per year. The ramp-up for the production segment may prove to be more of a challenge than for the transmission and distribution segments.

Natural gas prices will remain competitive, even at higher consumption levels. Price regulation of natural gas was eliminated roughly a decade ago and from 1987 through 1998 the price of gas delivered to consumers increased by only 3 percent while consumer prices overall increased by 36 percent. Thus, natural gas prices have declined significantly in real terms in this deregulated era.

Although the gas levels analyzed in this report will exert somewhat more price pressure than conventional forecasts, we anticipate only modest gas price increases. In real terms wellhead prices will remain in the mid-\$2.00 per million Btu (MMBtu) range and consumer prices will be relatively constant. The gas resource base expansion and technological advances of the past decade in finding, producing and delivering gas will continue. The factors that lead to declining real gas prices in the recent past will continue, creating future price stability and an increasingly competitive energy market will also ensure this stability.

A Shift to Greater and More Direct Use of Natural Gas Provides Substantial National Benefits

There are many reasons why the country should capitalize on this powerful national asset in order to clean up the environment, spur economic growth, reduce oil imports and conserve energy. Several key advantages of the High Gas Use scenario are shown below:

1. Natural gas is inherently cleaner-burning than coal or oil. Switching from those fuels to gas will reduce greenhouse gas emissions, acid rain, smog, solid waste and water pollution. When burned, natural gas emits virtually no sulfur dioxide or particulate matter and far lower levels of nitrogen oxides, carbon monoxide, carbon dioxide and reactive hydrocarbons than either coal or oil. Our projections show that CO₂ emissions can be reduced by 930 million tons per year by 2020.
2. The efficiency of the natural gas system helps conserve the nation's energy resources. When the entire energy cycle of producing, processing and transporting energy is measured, natural gas is delivered to the consumer with a total energy efficiency of about 90 percent, compared with 27 percent for electricity. By 2020 overall US energy efficiency could be boosted by 6 percent, thanks in

- large-part to a shift to direct-use gas technologies and distributed generation. To put that in perspective, 6 percent (7.4 quads) is an amount equal to the energy needed to power Cleveland for almost a decade.
3. Natural gas is a highly reliable North American form of energy. About 85 percent of the gas consumed each year in the United States is produced domestically. The balance is imported from Canada. In comparison, roughly 60 percent of the oil used in the United States is imported, primarily from the members of OPEC. We project that oil imports could be reduced by about 2.6 million barrels a day (equivalent to Venezuela's current total production levels).
 4. Billions of dollars could be saved over the next decades as distributed generation accounts for approximately 20 percent of new electricity generation capacity, thus avoiding the need to build approximately one hundred and fifty capital intensive large-scale power plants
 5. GNP and trade balance improvements would occur as global gas demand spurs US exports of gas-using technologies. The US leads the world in terms of its natural gas infrastructure, and US companies are providing their equipment to countries in Latin America, Europe and the Far East that are just beginning to develop natural gas systems. As US export of gas-using technologies accelerates with the global expansion of natural gas usage, job creation and trade balance effects will have major positive GDP effects.

Key Technologies Which Will Drive Natural Gas Growth in Residential, Commercial and Industrial Markets Include Fuel Cells, Microturbines, and Gas Cooling Equipment

Our study analyzes evolving patterns of demand for energy in key economic sectors. The report highlights leading gas-using technologies that are instrumental in improving the utilization of natural gas in each of these sectors. The following technologies will have major impacts on the end-use energy consumption. By using natural gas directly at the source to generate power, they offer significant efficiency and environmental advantages. In contrast to the production and delivery of central station electricity that is only 27 percent efficient, gas is delivered to the consumer with an efficiency of roughly 90 percent. Gas consuming equipment is highly efficient, as evidenced by the fact that residential customers are using about 16 percent less gas today than they were in 1980. These new technologies offer even greater efficiency improvements.

Microturbines: Each microturbine, a small and high-speed power plant, consists of a generator, compressor, and turbine that share a single shaft, with a small rotor. Microturbines can be linked to the power grid or operated independently. Advantages include their small size, high reliability, low emissions, and quiet operation, with an ability to produce 25kW to 400kW of power. Microturbines are currently being tested and used commercially and could become cost-competitive in the residential sector by 2005.

Gas Cooling Equipment: Natural Gas-powered cooling technology has a huge role to play in the commercial and eventually the residential sector. The three basic types of gas cooling are engine driven chillers, absorption chillers and desiccant dehumidifiers. Gas air conditioners have been available for decades, but they have not fully met customer needs in terms of performance, economics, and reliability. That is now changing. Residential gas absorption units are now available that use 30 percent less energy than their predecessors, have an expected 20 year life with low maintenance, are extremely quiet and produce no polluting CFC's or HCFC's. Gas air conditioning has great potential, particularly in the West and South. The clean, dry air produced by gas-based desiccant systems is ideal for use in hospitals, schools as well as office and retail space.

Natural Gas Fuel Cells: A fuel cell is a self-contained unit that converts natural gas to electricity and heat through a chemical reaction as opposed to a combustion process. Fuel cells preclude the need to construct costly and disruptive transmission lines, and they protect consumers from power outages. They are energy efficient (40 to 60 percent) and they can reduce a number of pollutants—including CO₂ by 70 percent relative to coal-based electricity and NO_x by 85 percent relative to the ultra-tight Los Angeles standards—with no discharge. There are a limited number of residential fuel cells in use today with installed costs currently in the \$7,000 to \$10,000 range, although mass production could cut the cost in half within the timeframe of this study.

The Enhanced Natural Gas Future Described in WPA's Study Incorporates a Variety of Policy Assumptions

A "detached approach" to the role of natural gas in the US energy mix is likely to fall short of capturing the full benefits of that fuel's resources and substitutive

potential. It takes years to gain approvals for and to build pipelines, processing facilities, compressor stations, storage, and even local distribution networks. It could take the better part of another decade to develop some of the end-use products that can constitute a sizable part of natural gas demand in 2020. Thus, both supply infrastructure and customer-pull were factors in WPA's conclusion that the current trajectory is toward consumption in the range of only 29 quads or so by that time.

It is equally clear that conscious policy changes could boost that figure. An overarching one happens to be a concentration on total energy efficiency and a concomitant redirection of regulation and standards for both energy and environment. Lifecycle considerations would need to be emphasized, rather than first-costs alone. This is similar to a policy outlook that favors renewable energy in the longer run. It calls for thinking and planning for the mid-to long-term future, rather than a "quick fix."

Our study did not spell out specific policy prescriptions, but it demonstrated that achievement of the High Gas Use scenario it describes for 2020 is feasible from the standpoint of timing, technology and economics. Seven policy assumptions were incorporated in the development of WPA's accelerated gas scenario. It is difficult to isolate individual assumptions and project the specific gas demand impact of each, but the overall collection of assumptions fosters an environment conducive to the realization of the accelerated scenario and its resulting benefits. These general assumptions are:

- Energy efficiency and environmental regulations will be comprehensive, equitable and balanced
- The federal government, in recognition of increased potential national benefits, will promote rather than discourage increased natural gas consumption, and it will step up RD&D activities
- The potential of new technologies will be fully recognized in regulations that govern the natural gas industry
- Access to the natural gas resource base will not be unduly restricted
- The costs of providing gas service to new electricity generating plants will not be borne by residential, commercial and industrial customers
- Energy markets will be free and competitive, and natural gas utilities will be allowed to compete fairly in these markets
- Natural gas industry safety and reliability will not be compromised in a deregulated environment

Our Future Energy Policy Should be Based on Total Energy Efficiency to Achieve Environmental, Economic and National Security Objectives

We have discussed a conventional view of the US energy future and contrasted that with one based on more use of natural gas directly by consumers. After examining these alternative cases, there is an appropriate question we must ask. Does the conventional wisdom as reflected in our Current Trajectory or the EIA Reference Case, represent a sustainable energy outlook or, does the Higher Gas Use scenario offer a more sound mixture of our natural resources?

If you look at the coal projection in the High Gas Use scenario, it is actually very similar to EIA—therefore our gas scenario does not harm the coal industry, which has long been the backbone of our electric generation. The estimate for nuclear power in our projection reveals that we expect less plant retirements than the EIA Reference case. An enhanced natural gas future does not preclude a strong role for nuclear power in the coming decades.

One does distinguish that WPA's High Gas Use scenario offers significantly less dependence on foreign oil. Comparing the WPA High Gas Case to the EIA Reference Case reveals the energy security advantages of relying on North American reserves of natural gas. The differential in oil imports amounts to approximately 4.6 million barrels/day. At a price of \$25/barrel, the net difference is equal to nearly \$43 billion a year. In reality we present a much more sustainable energy future in the High Gas Use scenario because oil imports are kept to a more prudent level.

What does make a difference in our scenario is slightly less dependence on electricity and more emphasis on direct-use of our natural gas resources—the difference in the amount of primary energy utilized in our two scenarios is approximately 7 quads in 2020. That represents a 6 percent improvement in the nation's overall energy efficiency. This reduced demand for primary energy supply would likely have a positive effect on energy prices, thus efficiency gains from the fuller use of natural gas translate into gains for consumers in terms of lower energy costs.

Therefore, we commend to the Congress a prudent overall national energy plan—which includes all of the elements of our "so called" High Gas Use case. It is a prudent balance of fuels, an efficient and environmentally friendly scenario, and one that is strongly based on domestic technology and domestic resources.

But this scenario will not happen by itself. It requires a concerted national effort to foster the fuller utilization of natural gas in accord with the principles of total energy efficiency—measuring efficiency throughout the fuel cycle—and sound economics.

Mr. BARTON. Thank you.

And you finished with 7 seconds to spare. I think you have set the standard. A lot of numbers though, a lot of numbers. I am not sure we can all remember the numbers.

Mr. MARTIN. I understand the numbers up here, sir.

Mr. BARTON. We want to welcome now the Administrator of the Energy Information Administration, the Honorable Jay Hakes, who is soon leaving to go to the Jimmy Carter Library down in Atlanta. And since this is your kind of swan song before the subcommittee, I want to say what a pleasure it has been to work with you in the years that I have been in the majority and you have been appearing before our subcommittee and the full committee on some occasions. You have always been fair, your studies have been well balanced. You have been very cooperative and responsive when the committee has asked for information.

And I think we need to put on the record that EIA did predict the gasoline problem that we experienced last winter, about a year ahead of time, a year to 6 months ahead of time. So the fact that the Clinton Administration didn't act is not because they didn't know it was coming.

So we wish you the very best down in Atlanta, and I am sure in the future you will be invited back to be a distinguished member or some panelist when you are in the private sector. So your testimony is in the record. We recognize you for 7 minutes to elaborate on it.

STATEMENT OF JAY HAKES

Mr. HAKES. Thank you, Mr. Chairman. I am appreciative of your comments. One of the reasons we do the kind of work we do is to be of service to policymakers, and we have worked hard at that, and working with this committee has been a very positive experience for us.

I would like to, just because the time is limited, go over a few of the major graphics in my presentation which, of course, is available in more detail. And this refers to some comments that have been made earlier, but it sort of puts it in graphic form, this gap between the supply, which is at the red line at the bottom over there, and consumption at the top for the United States.

Mr. BARTON. Could we turn the chart so that the TV cameras at least have a chance to see it? I know all the members can see it. But thank you.

Mr. HAKES. What one can notice on the supply side is that we reached the peak of U.S. production for petroleum in 1972, and since that time have been more or less coming down. There have been some ups and some stable periods and we find ourselves now about 25 percent lower in U.S. production than we were at that peak back in 1972. So there has been a drop, although it has not been a complete dramatic fall-off.

On the consumption side, you see it looks a little bit more like a roller coaster, and you got a peak in 1978 of about 19 million bar-

rels a day. And actually we are at about that same level right now. So we had this deep drop as high prices and things like CAFE standards brought down consumption, and then as prices collapsed, consumption started edging back up and has a lot of momentum in that direction.

Mr. BARTON. Mr. Administrator, I don't normally interrupt the testimony, but that chart shows about 10 million barrels per day of products of oil and it ends in 1998. Isn't it true we are about 8.5 million barrels of production a day?

Mr. HAKES. One of the things that is a little confusing about the testimony is to make this chart work, you have to use all petroleum, which includes crude oil and natural gas liquids, refinery gains, and lease condensate. So in my later charts where I use just crude oil, you would have the number you are talking about. But to make the imports equal the difference between supply and demand, you have to include those other factors. So basically you have got a gap there of about 10 million barrels a day.

Imports rose rapidly in the 1970's, reaching a peak in 1977. Then we had dramatic improvement as consumption dropped and U.S. production rebounded. And we actually didn't get back up to that level of imports until 1997. Again, though, there does seem to be a lot of momentum for more imports.

Now, I wanted to concentrate on history so I left the projections off. I think, as we all realize, the projection business is a little bit risky. There are a lot of caveats that we would certainly put to any of our forecasts, but I think it is important to have some baselines that we deal with. You have about 25 million barrels a day of consumption in 2020, about 9 million barrels a day of production, which is roughly what we have been seeing recently, and then a gap of 16 million barrels a day for imports.

Now there is another way to look at this that I think is useful, and that is in figure 4 of my testimony where we look at who are the world's major oil producers. And if you go back to 1970, the United States was clearly the world's major oil producer. Between now and then, the Soviet Union ramped up its production for a while and for a while was the leading producer. But today we have fallen to the No. 3 position. This one is just for crude oil. It doesn't include natural gas liquids, that I included in the earlier chart. So we are still one of the world's major oil producers but we are not No. 1 anymore.

There is some encouraging news when you look at who produces the world oil, because crude oil production has become much more widely disbursed than it was in 1970. The production total of the top 6 producers amounted to 68 percent of the world's crude oil produced in 1970, but in 1999 the top 6 countries produced just 45 percent of the world total, a drop from 68 to 45. Whereas 4 members of the top 6 in 1970 were members of OPEC, just 2 of the top 6 were from OPEC in 1999.

Now, I don't want to slight natural gas. I want to refer to two graphics on gas that make some points that I think are also relevant to oil but I think can be seen most clearly for gas. Incidentally, we do have in our projections natural gas reaching the 30 trillion cubic feet level of consumption in 2015. We had said 2013 back a year ago because of some of the factors that were mentioned

about nuclear plants operating at higher levels and coal developments. We have moved that back to 2015, but that is still a very substantial amount of gas.

There are two points I would make on gas, and they also apply to oil. One is that technology matters. We would not be where we are today for domestic gas production or for domestic oil production if we had not seen rather incredible advances in exploration technologies and in drilling technologies that have enabled the domestic industry to operate with a great amount of efficiency and an ability to get the oil, frankly, that would not have been economic with old technology.

So as we are looking to the role that gas may play in the future, particularly in the electric industry, it is going to make a big difference what the pace of exploration and development technology is. And we do assume in our models that there will be continuing advances in technology beyond what is being implemented today. If that does not happen, gas will be in tighter supply and at much higher prices. But technology does have the ability, in our opinion, to make gas available at a reasonable and very competitive cost.

The final point I would make with regard to gas, and it also applies to oil, is that drilling matters. The level of drilling is not a constant. The ability to drill in many cases involves the ability to convince the financial community that they want to finance your drilling, and that is more difficult when prices are low and it is easier when prices are high, particularly if there is an expectation that those high prices will continue. You can see in the historical part of this, to the left of the line, how drilling can vary a lot. If you are looking back to why we would have expected high prices to have occurred recently, one of the reasons would be that those low price shocks discouraged drilling. And, whereas consumers at the time may have thought this was really great because they were getting the low prices, if they had observed what this was doing to the level of drilling activity, it would have become clear that they were planting the seeds of higher prices in the future.

As you can see in our projections, in the future we predicted there will have to be a lot of drilling. Now we assume current Federal policy with regard to Federal lands, but wherever the drilling occurs there is going to have to be a lot of it. And that will be difficult if the price is jumping all over the place and sending confusing signals to investors.

So I think I will leave it at that point. This is a big topic, and look forward to your questions.

[The prepared statement of Jay Hakes follows:]

PREPARED STATEMENT OF JAY HAKES, ADMINISTRATOR, ENERGY INFORMATION
ADMINISTRATION, DEPARTMENT OF ENERGY

Mr. Chairman and Members of the Committee: I appreciate the opportunity to appear before you today to discuss the views of the Energy Information Administration (EIA) on prospects for oil and natural gas supply and demand.

EIA is an independent statistical and analytical agency within the Department of Energy. We are charged with providing objective, timely, and relevant data, analysis, and projections for the use of the Energy Department, other agencies, the Congress, and the public. We do not take positions on policy issues, but we do produce data and analysis reports that are meant to help policy makers decide energy policy. Because we have an element of statutory independence with respect to the analyses that we publish, our views are strictly those of EIA. We do not speak for the Depart-

ment, nor for any particular point of view with respect to energy policy, and our views should not be construed as representing those of the Department or the Administration.

Today's analysis is based on EIA's Annual Energy Outlook, which provides projections and analysis of domestic energy consumption, supply, prices, and carbon emissions through 2020. These projections are not meant to be exact predictions of the future but represent a likely future, assuming known trends in demographics and technology improvements, and also assuming no change in current law, regulation, and policy. EIA does not propose, advocate, or speculate on changes in laws and regulations. So, one of our key assumptions is that all current laws and regulations remain as they were on July 1, 1999. That means, for example, that the Tier 2 vehicle emission and gasoline sulfur standards are not included in the reference case because the regulation was not finalized until December 1999.

Oil

Petroleum consumption in the United States increased sharply in the 1970's (Figure 1). From an average of 14.7 million barrels per day in 1970, petroleum consumption rose to 18.9 million barrels per day in 1978, a level that would not be reached again for the next 20 years. More than half (57 percent) of the increase was in the transportation sector and nearly 40 percent of the growth was attributable to motor gasoline. Distillate and residual fuel consumption grew by 0.9 and 0.8 million barrels per day, respectively, between 1970 and 1978.

Domestic oil supply (including crude oil, lease condensate, natural gas liquids, other liquids and processing gains) peaked in 1972 at 11.9 million barrels per day then declined slowly in part because of price controls and aging fields in the Lower 48 States. Completion of the Trans-Alaska Pipeline System brought about a 1.0 million barrel per day increase in domestic oil production in 1978. The rising consumption combined with relatively flat supply resulted in a dramatic increase in net petroleum imports, from 3.1 million barrels per day in 1970 to 8.5 million barrels per day in 1977. Ninety percent of the increase in net imports from 1970 to 1977 came from OPEC countries, as OPEC's share of U. S. imports rose from 42 percent to 72 percent.

From 1978 to 1980, world oil prices nearly doubled (Figure 2), resulting in a sharp decline in consumption. From the 1978 peak of 18.9 million barrels per day, consumption fell to 15.2 million barrels per day in 1983, a decline of 20 percent. Residual fuel led the decline as industrial users and electric utilities switched to alternative fuel sources. Residual fuel use fell 1.6 million barrels per day over the 5-year period, followed by gasoline (0.8 million barrels per day) and distillate fuel (0.7 million barrels per day.) By 1983, petroleum consumption in the United States had returned to the level of 1971.

Domestic supply remained fairly stable from 1978 to 1983, with rising Alaskan production making up for production declines in the Lower 48 States. Reduced consumption, along with steady supply levels, resulted in a decline in net imports from the 1977 peak of 8.5 million barrels per day to 4.3 million barrels per day in 1983. The decline in petroleum net imports from OPEC countries fell by slightly more than the total decrease as non-OPEC net imports increased slightly during this period. OPEC's share of U. S. petroleum net imports declined to 43 percent in 1983.

The sharp decline in U. S. and world petroleum consumption resulted in lower demand for OPEC oil, which in turn led to reductions in the world oil prices. From the 1980 peak of \$63.30 per barrel, the average world oil price fell to \$19.57 per barrel in 1986 (measured in 1998 dollars). The lower prices and growing economy stimulated petroleum consumption growth. With the exception of 1991, petroleum consumption has remained the same or increased each year since 1983. In 1998, petroleum consumption reached 18.9 million barrels per day, slightly exceeding the previous peak in 1978. In contrast to the increase in the 1970's, the rise in consumption from 1983 to 1998 was almost exclusively among the lighter petroleum products (gasoline, distillate, jet fuel, etc). Residual fuel consumption continued to decline during this period.

After remaining stable from 1978 to 1985, domestic supply again started to decline in 1985 due in part to the much lower oil prices. By 1998, supply had fallen to 9.2 million barrels per day from 11.4 million barrels per day in 1985. Increasing petroleum consumption and declining supply led to rising net import levels that, in 1996, surpassed the 1977 peak. By 1998, petroleum net imports reached 9.8 million barrels per day, comprising 52 percent of domestic petroleum consumption. Net imports from OPEC countries contributed 56 percent of the rise in total net imports from 1983 to 1998, in contrast to the 1970's when they contributed 90 percent of the increase. Net imports from Canada and Mexico made up 24 percent of the in-

crease from 1983 to 1998, and in 1998, these two countries provided 26 percent of U. S. petroleum net imports compared to 50 percent from OPEC countries.

Projected Prices

Just as the historical record shows substantial variability in world oil prices, there is considerable uncertainty about future prices. Three AEO2000 cases with different price paths allow an assessment of alternative views on the course of future oil prices. For the reference case, prices are projected to rise by about 2.8 percent a year, reaching \$22.04 in 2020 (all prices in 1998 dollars unless otherwise noted). In nominal dollars, the reference case price exceeds \$36 in 2020. The low price case has prices declining, after the current price rise, to \$14.90 by 2005 and remaining at about that level out to 2020. The high price case has prices reaching \$28 by 2015 before leveling off. The leveling off in the high price case is due to the market penetration of alternative energy supplies that could become economically viable at that price, if it is sustained. The AEO2000 price paths do not attempt to predict volatility. Oil prices have been quite volatile in the past, principally as a result of unforeseen political and social circumstances. The oil market volatility over the past 2 years has been the result of oil market fundamentals that are reasonably well understood but nearly impossible to predict. OPEC and some other producers responded to the low prices of 1998 by cutting back on production in the spring of 1999. This occurred just as several countries in Asia began to recover from their financial crisis and to increase oil consumption. The combination of lower production and higher consumption brought inventories down rapidly and, as inventories got to very low levels, prices rose sharply.

All three price cases reflect considerable optimism about the potential for worldwide petroleum supply, even in the face of the substantial expected increase in demand. Production from countries outside OPEC is expected to show a steady increase, exceeding 45 million barrels per day by the turn of the century and increasing gradually thereafter to more than 56 million barrels per day by 2020.

Petroleum Consumption Expected to Increase Steadily

Petroleum consumption in the United States is projected to increase 6.2 million barrels per day, from 18.9 million barrels per day in 1998 to 25.1 million barrels per day in 2020, an annual average rate of 1.3 percent (Figure 3). This compares to the average growth rates of 1.5 percent per year from 1983 to 1998 and 3.2 percent per year from 1970 to 1978. Most of the increase in petroleum consumption occurs in the transportation sector, which accounted for two-thirds of U.S. petroleum use in 1998. Petroleum use for transportation is projected to increase by 5.4 million barrels per day in the reference case between 1998 and 2020.

In the industrial sector, which accounts for more than a fifth of U.S. petroleum use, consumption in 2020 is projected to be higher than the 1998 level by 1.2 million barrels per day in the reference case. More than half the growth is expected in the petrochemical, construction, and refining sectors. Petroleum use is expected to decline in the residential, commercial, and electricity generator sectors, where oil gives ground to natural gas. For electricity generation, our projections show oil-fired steam plants being retired in favor of natural gas combined-cycle units.

More than 90 percent of the projected growth in petroleum consumption stems from increased consumption of "light products," including gasoline, diesel, heating oil, jet fuel, and liquefied petroleum gases, which are more difficult and costly to produce than heavy products. Although refinery investments and enhancements are expected to increase the ability of domestic refineries to produce light products, they are projected to compensate for less than half the additional demand; the remainder will be imported.

In the forecast, gasoline continues to account for about 45 percent of all the petroleum used in the United States. Between 1998 and 2020, U.S. gasoline consumption is projected to rise from 8.3 million barrels per day to 11.4 million barrels per day. Increased air travel results in a near doubling of projected jet fuel consumption from 1.6 million barrels per day in 1998 to 3.0 million barrels per day in 2020. Consumption of liquefied petroleum gases (LPG's)—primarily in the industrial sector—also increases in the projections, from 2.0 million barrels per day in 1998 to 2.5 million barrels per day in 2020. Consumption of "other" petroleum products, mostly petrochemical feedstocks, still gas used to fuel refineries, and asphalt and road oil used in road construction, grows from 2.8 million to a projected 3.3 million barrels per day by 2020. Distillate fuel consumption is projected to grow more slowly than other fuels, because of increasing fuel efficiency. Residual fuel use, mainly for electricity generation, is projected to decline by 250,000 barrels per day in the high oil price case but projected to increase by 530,000 barrels per day in the low oil price case.

Crude Oil Production Declines then Stabilizes, Total Supplies Remain Flat

In the reference case, domestic petroleum supply is projected to decline slightly from its 1998 level of 9.2 million barrels per day to 9.1 million barrels per day in 2020. This is the result of two offsetting factors. As U.S. crude oil production falls off, refinery gain and production of natural gas plant liquids increase. In the low oil price case, domestic supply is projected to drop to 8.3 million barrels per day in 2020. In the high oil price case, domestic supply is projected to increase to 9.9 million barrels per day in 2020.

Projected domestic crude oil production continues its historic decline through 2005. After 2005, technological improvements and rising prices are projected to arrest the decline, leading to relatively stable lower 48 production in the remainder of the forecast. In 2020, the projected domestic production level of 5.3 million barrels per day is 1 million barrels per day less than the 1998 level. Conventional onshore production in the lower 48 States, which accounted for 46 percent of total U.S. crude oil production in 1998, is projected to increase to a 49-percent share in 2020 because of declining Alaskan production.

Crude oil production from Alaska is expected to decline at an average annual rate of 3.7 percent between 1998 and 2020. The overall decrease in Alaska's oil production results from a continuing decline in production from most of its oil fields and, in particular, from Prudhoe Bay, the largest producing field, which historically has accounted for more than 60 percent of total Alaskan production. Offshore production ranges from 1.4 to 1.6 million barrels per day throughout the forecast. Technological advances and lower costs for deep exploration and production in the Gulf of Mexico help to offset a decline in production from shallow waters. Production from enhanced oil recovery (EOR), which becomes less profitable as oil prices fall, slows through 2006 and then increases along with projected world oil prices through the remainder of the forecast. The projected EOR production in 2020 is close to the 1998 level.

Although the number of available drilling rigs has been declining since 1982, price increases are a powerful incentive for increased drilling and the purchase of new drilling equipment. The number of available drilling rigs increased by almost 16 percent annually between 1974 and 1982—from 1,767 to 5,644—as natural gas prices more than quadrupled in real terms and oil prices more than doubled. This number dropped off as prices generally declined, and about 1,700 drilling rigs were available in the United States in 1998. Given the historical response to rising prices, even a modest increase in prices is likely to make additional drilling rigs available, and the forecast shows the number of rigs increasing to 1994 by 2020.

Both exploratory drilling and developmental drilling increase in the forecast. With rising prices and declining drilling costs, successful crude oil well completions increase on average by 0.1 and 3.3 percent per year in the low and high oil price cases, respectively, compared with a 1.7 percent projected increase in annual well completions in the reference case. For most of the past two decades lower 48 production of crude oil has exceeded reserve additions and production is expected to exceed reserve additions over the forecast period in all cases, meaning that projected U.S. oil reserves in 2020 will be below 1998 levels.

Petroleum Imports Projected to Increase

With consumption rising and production nearly flat, net imports are expected to continue to rise throughout the forecast period. Petroleum net imports are projected to increase to 16.0 million barrels per day in 2020 in the reference case from 9.8 million barrels per day in 1998. In 1998, net imports of petroleum climbed to 52 percent of domestic petroleum consumption and are projected to reach 64 percent in 2020 in the reference case. OPEC's share of the U. S. import market is expected to increase to 52 percent in 2020 while the North America and Caribbean share of imports is projected to reach 33 percent. Total annual U.S. expenditures for petroleum imports, which reached a historical peak of \$133.7 billion (in 1998 dollars) in 1980, were \$46.6 billion in 1998.

Although crude oil is expected to continue as the major component of petroleum imports, refined products represent a growing share. More imports of refined products will be needed as growth in demand for refined products exceeds the expansion of domestic refining capacity. Net refined products make up 28 percent of net imports in 2020 in the reference case, compared with 12 percent in 1998.

The United States Remains One of the Top Producing Countries

The United States was by far the largest crude oil producing country in the world in 1970, at 9.6 million barrels per day (Figure 4). The Soviet Union followed with 7.0 million barrels per day followed by four members of OPEC. By 1999, Saudi Arabia's oil production had increased to 7.8 million barrels per day, the only one of the

top six producers in 1970 that had a higher production level in 1999. The Soviet Union had broken apart but Russia remained in second place in global oil production in 1999. The United States had fallen to third and Iran fourth. China and Norway replaced Venezuela and Libya as the fifth and sixth largest oil producers.

The top six countries produced 29.6 million barrels per day of crude oil in 1999, down 1.7 million barrels per day from the 1970 combined production level. However, crude oil production has become much more widely dispersed than in 1970. The production total of the top six producers amounted to 68 percent of the world's crude oil produced in 1970, but in 1999, the top six countries produced just 45 percent of the world total. Whereas four members of the top six in 1970 were members of OPEC, just two of the top six were from OPEC in 1999.

U.S. production has fallen, because production elsewhere has been less costly. The United States has remained a major producer, however, because of a relatively low tax regime and innovative use of advanced technology.

Strategic Petroleum Reserve

The United States began putting crude oil into the Strategic Petroleum Reserve (SPR) in 1977 (Figure 5). The SPR is considered the first line of defense against an interruption in oil supplies and, therefore, is also considered a deterrent to possible oil import cutoffs. Between 1980 and 1985, inputs into the SPR averaged more than 200,000 barrels per day. By 1990, the inventory level had reached 586 million barrels. Since then, sales and additions have resulted in relatively small fluctuations in the total stockpile. The 1999 end-of-year inventory amounted to 567 million barrels.

Natural Gas

Demand for natural gas, with increases principally from the electric generation sector, is expected to rise to more than 30 trillion cubic feet (tcf) in 2020. As demand increases, pressure on natural gas supply will grow. These demand-side pressures will begin to raise questions like: Is there enough gas to meet demand at affordable prices? and Can we produce the gas fast enough to keep up with demand?

Last year U.S. natural gas consumption was just over 21tcf and accounted for 24 percent of domestic energy consumption. Gas consumption is expected to grow 1.8 percent annually from 1998 to 2020—faster than any other major fuel source, mainly because of the growth in gas-fired electricity generation. Domestic gas production is expected to increase a bit more slowly than consumption over the forecast, rising from 19 Tcf in 1998 to 26 Tcf in 2020. Growing production reflects rising wellhead prices, relatively abundant natural gas resources, and improvements in technologies, particularly for producing offshore and unconventional gas.

Net imports are expected to rise to make up the difference between domestic production and consumption, because they are generally expected to be lower priced than competing domestic sources (Figure 6). Net imports are expected to climb from 3.0 Tcf in 1998 to 5.0 Tcf in 2020—somewhat faster than the growth in overall consumption. Projected imports continue to be dominated by pipeline imports from Canada over the forecast period.

Rising Natural Gas Demand

The industrial sector is the largest gas-consuming sector, with significant amounts of gas used in the bulk chemical, refining, and metal durables sectors. Industrial gas consumption is expected to increase by 1.8 Tcf over the forecast—less than 1 percent per year—particularly in the refining and metal durables sectors, because of relatively low and stable gas prices. Combined, the residential and commercial sectors add 1.8 trillion cubic feet from 1998 to 2020. Gas demand in the residential and commercial sectors is driven by increasing population and declining consumer prices for delivered gas. The declines in prices paid by the consumer reflect expected gas distribution efficiencies in an increasingly competitive market.

Projected gas consumption by electric generators, not including industrial co-generators, increases more than two and one half times during the forecast, from 3.7 trillion cubic feet in 1998 to 9.3 trillion cubic feet in 2020. The significant growth in gas-fired generation is partly driven by electric industry restructuring, but is mainly spurred by the addition of new gas turbines and combined-cycle facilities and increased utilization of existing gas-fired power plants. Lower capital costs, short lead times, and projected improvements in gas turbine heat rates give gas an advantage over coal for new generation in most regions of the United States. In 1998 electricity generators were the third-largest natural gas consuming sector. By 2020, however, the projected enormous growth in gas-fired generation makes electricity generators the second largest gas-consuming sector—rising to within 1 tcf of the industrial sector. Over the entire forecast, natural gas consumption is projected

to grow by more than 10 tcf, and more than half of the increase comes from the electric generation sector.

Through 2020, the share of electricity produced with natural gas rises from 14 percent to 31 percent of the total, while the coal share declines from 52 percent to 49 percent. Nuclear power declines as a source of electric power—from 19 percent to 9 percent of electricity generation as no new nuclear power plants are expected to be brought on line between 1998 and 2020 and 40 percent of the current stock retires.

Before the advent of natural gas combined-cycle plants, fossil-fired baseload capacity additions were limited primarily to pulverized-coal steam units; today, however, combined-cycle plants cost about half as much and are about 40 percent more efficient than new coal plants. The lower capital costs and higher efficiencies of combined-cycle plants offset their higher fuel costs (Figure 7).

To meet the new demand growth, utilities can be expected to use existing plants more intensively, import power from Canada and Mexico, and purchase power from cogenerators and wholesale generators. Even so, 300 gigawatts of new capacity will be needed from 1998 to 2020 to meet projected demand. Of that new capacity, 90 percent is projected to be combined-cycle or combustion turbine technology fueled primarily by natural gas. In other words, more than 900 of the 1,000 new power plants—assuming an average plant capacity of 300 megawatts—that are expected to be built between now and 2020 are projected to be gas-fired. New coal plants are not projected to be cost-competitive until 2010, when rising natural gas prices exceed the price of coal by \$2 per million BTU, leading to the projected construction of new coal-steam power plants in some regions.

Many of the new gas-fired plants built over the next 20 years will replace nuclear power plants. In AEO2000 about 40 percent of the existing nuclear capacity is expected to be taken out of service by 2020. No new nuclear units are expected to become operable by 2020, because natural gas and coal-fired plants are projected to be more economical.

Growing Natural Gas Supply

Over the forecast period, increased U.S. natural gas production comes primarily from lower 48 onshore conventional nonassociated sources. Conventional onshore production accounted for 35 percent of total U.S. domestic production in 1998 and is expected to increase to 41 percent in 2020. Offshore production, mainly from wells in the Gulf of Mexico, also rises. Innovative, cost-saving technology and large finds, particularly in the deep waters of the Gulf, have encouraged interest in this area. Lower-48 offshore Gulf Coast natural gas production increased to 5.7 tcf in 1997—the highest yet recorded—and dropped off slightly in 1998 to 5.6 tcf. Unconventional gas production increases at the fastest rate of any other source over the forecast period, largely because of expanded tight sands gas production in the Rocky Mountain region.

The Rocky Mountain (primarily unconventional sources) and offshore Gulf of Mexico regions are expected to account for just over half of the incremental natural gas production between 1998 and 2020, as improvements in both unconventional and offshore technologies continue. Increased production from the offshore Gulf Coast and onshore Southwest regions account for almost one-third of the total increase in the same period. Alaskan gas is not expected to be transported to the lower 48 States through 2020, because projected natural gas prices are not high enough to support the required transportation system.

One of the key activities in producing natural gas is drilling. With rising prices and generally declining drilling costs, drilling in 2020 is expected to reach 22,600 wells in the reference case and result in 16,900 successful natural gas well completions. This level of drilling is below the level reached in 1981 of more than 29,000 total wells drilled (just under 20,000 successful), but represents approximately a 15-percent increase over current levels. (Figure 8)

Technological Development

Technology improvements have both reduced effective exploration and development costs, and increased the recoverability of in-place resources. Major advances in data acquisition, data processing, and the technology of displaying and integrating seismic data with other geologic data—combined with lower cost computer power and experience gained using new techniques—have exerted downward pressure on costs.

Uncertainties about the pace of technological development are one of the key factors that could affect natural gas production and prices. Alternative cases were used to assess the sensitivity of the projections to changes in success rates, exploration and development costs, and finding rates as a result of technological progress. The

assumed technology improvement rates were increased and decreased by approximately one-third in the rapid and slow technology cases.

Changes in production in the alternative technology cases reflect the benefits of lower costs and higher productivity for conventionally recoverable gas, as well as an array of technological enhancements for unconventional gas recovery. The changes in supply lead to price changes that affect new investment in gas-fired technologies, especially in the industrial and electricity generation sectors. Rapid technology improvements yield benefits in the form of both lower prices and increased production to meet higher consumption requirements.

Production from unconventional gas resources (tight sands, shales, and coalbeds) is particularly responsive to changes in the assumed levels of technological progress. Whereas the reference case projects total U.S. natural gas production in 2020 at 26.4 trillion cubic feet, the rapid technology case projects 28.1 trillion cubic feet of production in 2020, with the increase coming primarily from offshore and unconventional sources.

Offshore gas production in the Gulf of Mexico is expected to grow from 5.5 trillion cubic feet in 1998 to a peak of 6.7 trillion cubic feet in 2015 in the reference case. In the rapid technology case, however, offshore Gulf of Mexico production peaks at 7.7 trillion cubic feet in 2017, and projected cumulative offshore production between 1998 and 2020 is 148.3 trillion cubic feet, compared with 137.1 trillion cubic feet in the reference case. The rapid technology assumption has a similar but less dramatic effect on unconventional gas recovery (UGR). Cumulative UGR production between 1998 and 2020 is projected to be 132.9 trillion cubic feet in the rapid technology case, compared with 129.5 trillion cubic feet in the reference case. Changes in production in the alternative technology cases reflect the benefits of lower costs and higher finding rates for conventionally recoverable gas, as well as an array of technological enhancements for unconventional gas recovery.

Slowly Rising Natural Gas Wellhead Prices

Wellhead prices for natural gas in the lower 48 States increase on average by 1.7 percent a year in the reference case to \$2.81 per thousand cubic feet in 1998 dollars (Figure 9). The increase reflects rising demand for natural gas and the impact of the progression of discoveries from larger and more profitable fields to smaller, less economical ones. The natural gas price projections are highly sensitive to changes in the assumptions about technological progress. Over the projection period, lower 48 wellhead prices increase at an average annual rate of 3.0 percent in the slow technology case, rising fairly steadily to \$3.74 (1998 dollars) per thousand cubic feet in 2020. In the rapid technology case, average natural gas wellhead prices remain below 1997 level of \$2.39 through 2020.

Natural Gas Imports

Net natural gas imports are expected to grow slightly in the forecast from 14 percent of total gas consumption in 1998 to 16 percent in 2020. Most of the increase is attributable to imports from Canada, primarily from western Canada, although some new gas is also expected from Sable Island in the offshore Atlantic. Gas trade with Mexico is expected to consist primarily of exports. Conversion of power plants from heavy fuel oil to natural gas, in compliance with Mexico's environmental regulations, is expected to gain momentum and it is uncertain whether indigenous production can be increased enough to satisfy rising demand. LNG provides another source of gas imports, and gross LNG imports are expected to grow at a rate of 7.2 percent a year, reaching a level of 390 bcf by 2020.

Summary

In summary, over the next 20 years petroleum consumption in the United States is expected to be driven primarily by the demand for "light products" in the transportation sector. Petroleum consumption is expected to rise to over 25 million barrels per day in 2020, and domestic petroleum supply—including refinery gain and natural gas plant liquids—is projected to decline slightly to just over 9 million barrels per day in 2020. Net imports are projected to increase to 16 million barrels per day in 2020. Continued dependence on petroleum imports is projected, reaching 64 percent in 2020. Although imports are projected to grow, the United States is one of the largest oil producing countries in the world, and domestic production is expected to remain a significant source of petroleum supply.

Over the next 20 years the U.S. natural gas market is expected to be largely driven by the demand for electricity. From now through 2020 gas consumption by electricity generators is expected to increase more than two and one half times. Total gas consumption is expected to rise to more than 31 tcf in 2020, and U.S. production is expected to increase to 26 tcf. Net imports, primarily from Canada, are projected to increase to 5 tcf by 2020. In spite of this increase, technically-recoverable natural

gas resources are believed to be adequate to sustain growing production volumes for many years without dramatic price increases.

Figure 1. Petroleum Supply, Consumption, and Imports, 1970-1998 (million barrels per day)

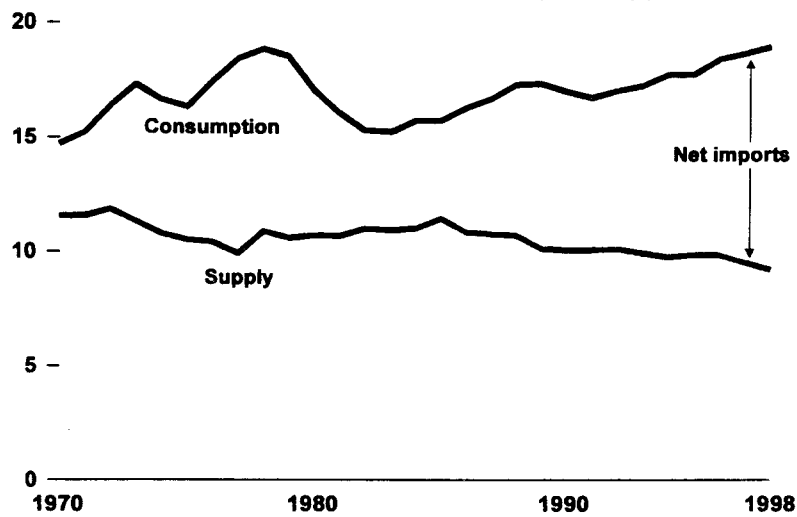


Figure 2. World Oil Prices in Three Cases, 1970-2020 (1998 dollars per barrel)

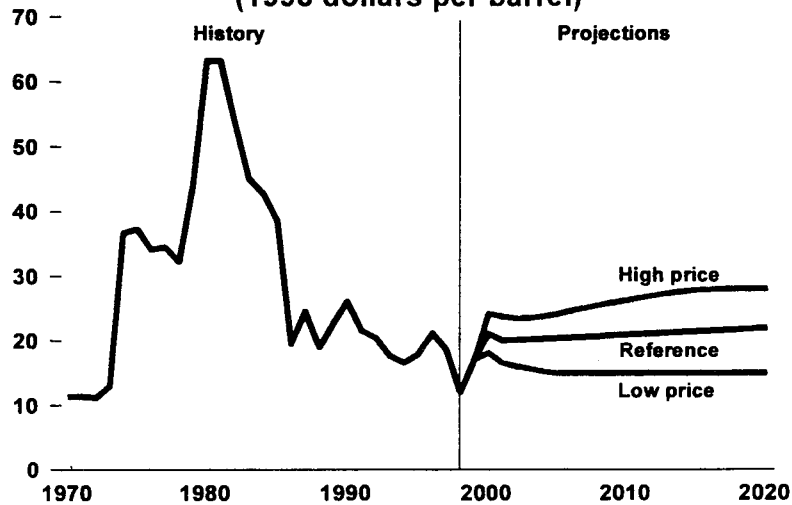


Figure 3. Petroleum Supply, Consumption, and Imports, 1970-2020 (million barrels per day)

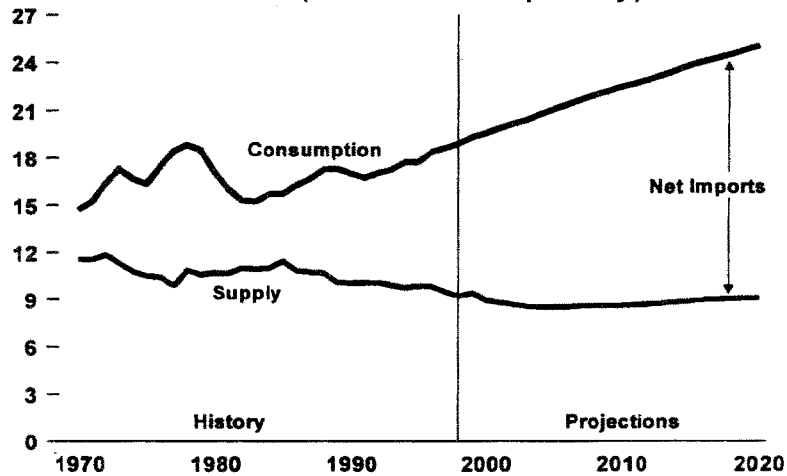


Figure 4. Top Six Crude Oil Producing Countries, 1970 and 1999 (million barrels per day)

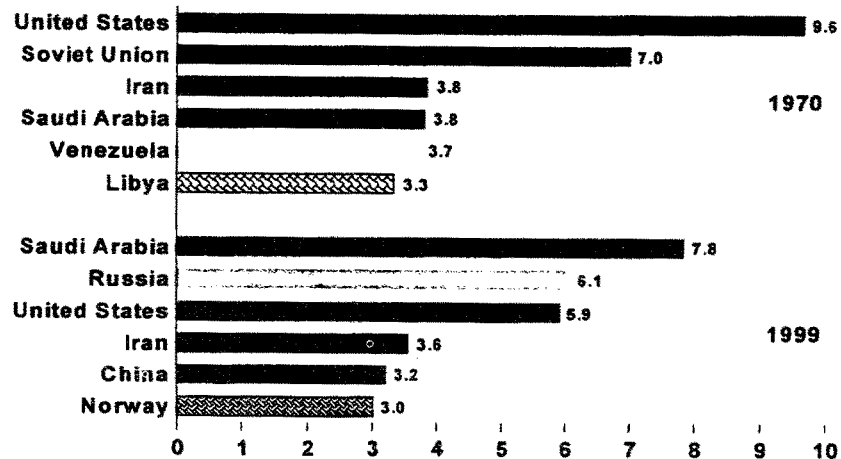


Figure 5. Strategic Petroleum Reserve Crude Oil Stocks, 1977-1999 (million barrels)

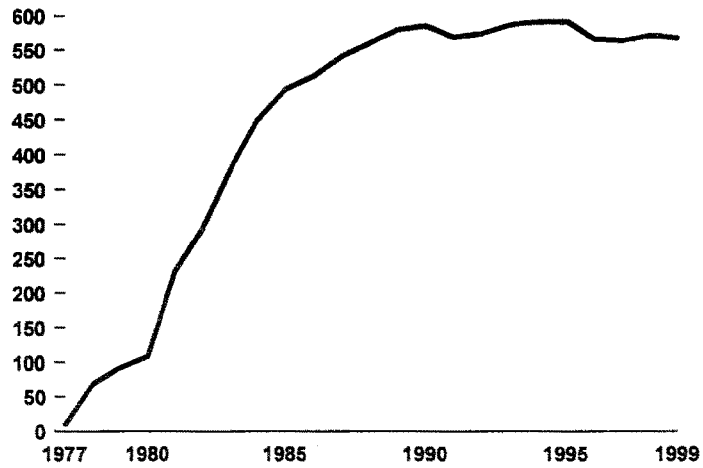
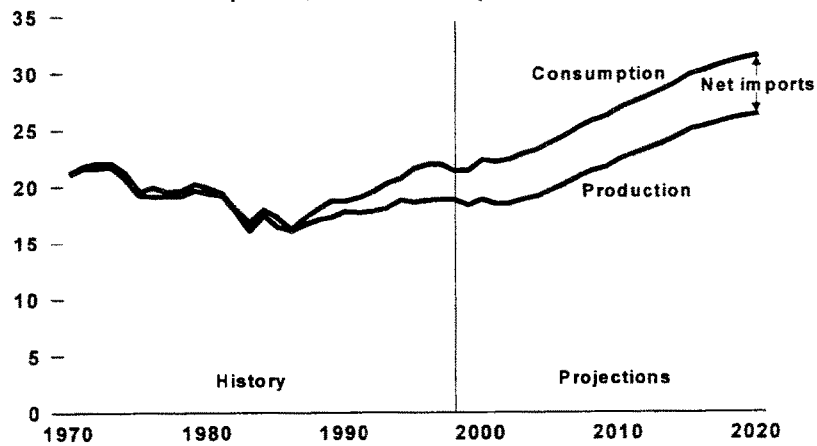
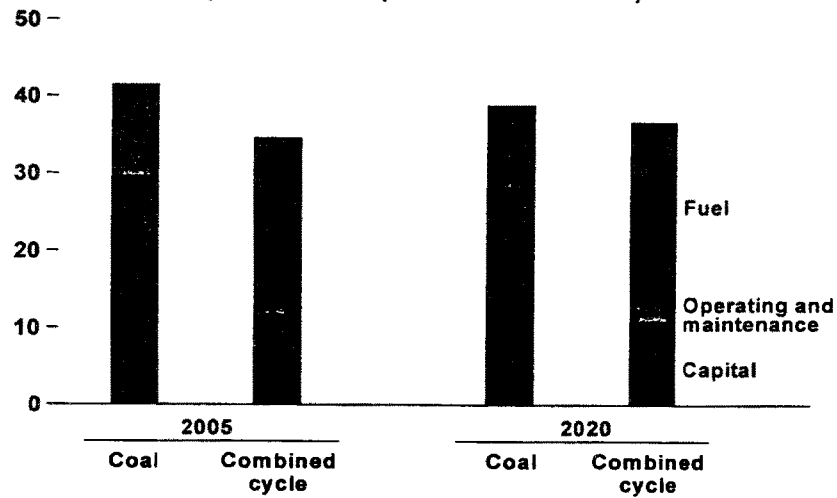


Figure 6. Natural Gas Production, Consumption, and Net Imports, 1970-2020 (trillion cubic feet)



**Figure 7. Electricity Generation Costs, 2005 and 2020
(1998 mills per kilowatthour)**



**Figure 8. Total Natural Gas Wells Drilled, 1970-2020
(thousands of wells)**

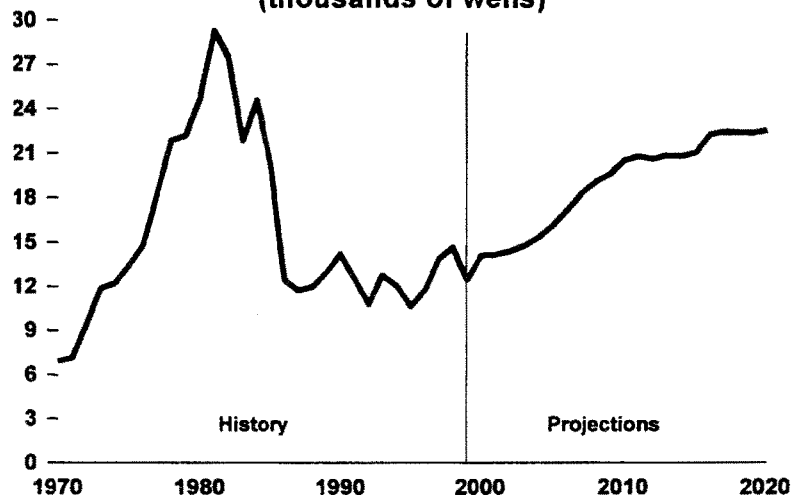
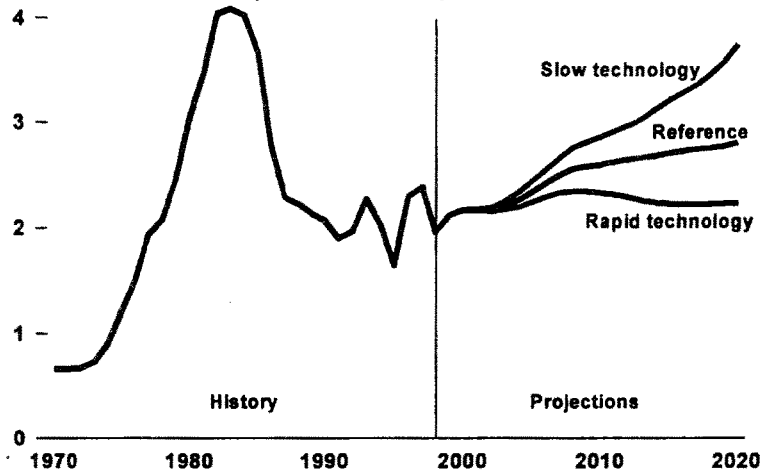


Figure 9. Lower 48 Natural Gas Wellhead Prices in Three Cases, 1970-2020 (1998 dollars per thousand cubic feet)



Mr. BARTON. We thank you Mr. Administrator.

Our last witness, but certainly not least, on this panel, the Honorable Melanie Kenderdine, who is the Acting Director of the Office of Policy, Department of Energy, which is the office that I was in when I was a White House Fellow. I am used to seeing Ms. Kenderdine out in the audience as she gives the right answers to whomever the political appointee happens to be who is testifying before our subcommittee. So it is good to have you here. So we are going to get the expert at the table instead of in the audience. We recognize you for whatever time you may consume, hoping it is going to be in the neighborhood of 7 minutes.

STATEMENT OF MELANIE A. KENDERDINE

Ms. KENDERDINE. Thank you, Mr. Chairman. On that note, prior to becoming Secretary Richardson's senior policy advisor on oil and gas, I was the Deputy Assistant Secretary in DOE's congressional office. I saw firsthand what happened to many DOE witnesses when their testimony was late. And it was an inspiration to me, and I hope to always be on time.

Mr. Chairman and members of the subcommittee, thank you for the opportunity to discuss the administration's energy policy. The fundamental importance of energy to the Nation's economic and environmental health has warranted investments by the Clinton/Gore Administration in a set of policies in a portfolio of technologies to encourage energy production to use energy more efficiently, to reduce its impacts on the environment, and to develop alternative sources of supplies.

The administration's first principle in energy policy is reliance on market forces as the best means of informing supply and demand and getting the most for the American consumer. Our commitment to this principle has contributed to the longest period of sustained economic growth in modern times. At the same time that the econ-

omy and energy consumption have been steadily growing, energy use has been reduced. And if you look over at Chart 1, that is what we are demonstrating there.

As you can see, since 1990 the economy has grown by 35 percent. I think you all also have these charts with you. Since 1990, the economy has grown by 35 percent, yet sulfur dioxide emissions have been reduced by 20 percent. Also the energy intensity of our economy, the amount of energy used per unit of economic output, has declined by 40 percent since the mid-1970's. The point of all this is that we can have a robust economy, increased energy consumption and a cleaner environment at the same time.

The administration's policy is supported by two national energy strategies, two scientific reviews of our energy R&D portfolios, numerous R&D road maps and two extensive energy portfolio characterizations and analysis which I will talk about shortly. We are also in the process of updating our 1998 energy strategy and it will be done shortly.

Our energy policy focuses on these challenges, which I would like to briefly discuss. Our first challenge, challenge number 1, is maintaining America's energy security in global markets. To address this challenge, the administration over the last 7 years has supported, taken, or proposed measures to do the following: .

Spur domestic oil and gas production through the support of tax incentives such as the expensing of geological and geophysical costs and delay rentals; addressing the generally high cost of U.S. exploration and production through technologies—Mr. Hakes just alluded to how important that is to help lower costs of production and produce mature fields, which many fields in the United States are; ensure that we are not overly reliant on imports from a single region of the world; encourage the world to develop its oil resources and increase productive capacity; privatize the Elk Hills Naval Petroleum Reserve in order to put that reserve into the hands of private industry and extend the life of the field; increase the size of the petroleum reserve by 28 million barrels; provide deepwater royalty relief, which has increased oil and gas production in the last 5 years in deep water by over 250 percent; lift the ban on Alaskan North Slope oil; simplify royalty collection on public lands; reduce the AMT and percentage depletion tax relief for small operators; promote the creation of a guaranty loan program for small domestic oil and gas producers and the reauthorization of EPCA.

We can also reduce net imports of oil by focusing on the demand side of the equation. Sixty percent of our oil is used in the transportation sector. If you look at chart number 2, you will see that in the last 10 years, vehicle manufacturers have increased horsepower as opposed to miles per gallon. That is exactly the opposite of what we saw in the 1970's, which is the bars on the far right, where you see miles per gallon down; increased mile per gallon up; horsepower way down. And then you go over and look at the far right and you see the opposite.

Mr. BARTON. Would the gentlelady yield just a second? We have got a vote on the rule for PNTR. Congressman Shimkus is on the floor. He is supposed to come right back. So we are going to try to continue the hearing. If the members present want to go vote and

come back, I will wait until Mr. Shimkus gets here so we can try to continue. Please continue.

Ms. KENDERDINE. Increasing the average fuel efficiency of America's automobiles by just 3 miles per gallon would save us almost a million barrels of oil per day. This demonstrates the value of fuel-efficient vehicles and why we have focused a great deal of effort on our PNTB program to produce a prototype 80-mile-per-gallon vehicle by 2004.

Our second challenge is harnessing the force of competition and restructured energy markets. Comprehensive electricity restructuring legislation is the centerpiece of the administration's energy policy. The Clinton/Gore Administration encourages Congress to pass comprehensive electricity restructuring legislation this summer before the peak electricity use season.

Our third challenge is mitigating the environmental impacts of energy use. DOE invests in technologies to reduce the environmental impacts of energy by producing cleaner fuels, increasing the efficiency of energy use and developing alternative sources of energy.

Domestically, our lead challenge is further reducing environmental impacts of energy use in the transportation and power generation sectors. Internationally, we believe our greater environmental challenge today is climate change.

And finally our fourth challenge, ensuring a diverse, reliable, and affordable set of energy sources for the future. And again technology development plays a very strong supporting role in the Department's pursuit of all of its energy policy objectives.

Chart number 3 summarizes our portfolio effort in which we matched our energy R&D investments against key energy objectives. This is a significant document, Mr. Chairman. I have one here and actually used it liberally when I was preparing my written testimony and it is very informative. I think it is a very important document and shows exactly how we are investing about \$2 billion, maybe a little more than \$2 billion, in lining those up against our strategic energy goals.

And what you see in that document is our strategic objectives are reliable and diverse energy supply—we are spending about \$170 million in that area; clean and affordable power, \$542 million; and efficient and productive energy use, \$437 million. And in addition, the Department has a basic science portfolio of about \$1.2 billion. These are our requests for 2001, by the way, which supplies the foundation for the applied energy R&D.

At this point in my written testimony, I take direction well, Mr. Chairman, and limit at the end my oral statement to 5 minutes. But since everyone has taken 7, I will go to my written testimony here where I did talk a little bit about natural gas. Other people at the table have also spoken about natural gas, and I would like to associate myself with their remarks.

The administration is a very strong supporter of natural gas and we bear significant supply issues and significant distribution issues that I think we need to work on in a bipartisan fashion in the days ahead in order to meet the demand for natural gas. Jay Hakes and the EIA Office predict that we are going to need 1,000 new power plants in this country by 2020, and 900 of them will be powered

by natural gas. And there is a lot of work to do on a whole lot of issues, and we would like to work with the committee on that.

These policies and investments of the administration have paid big energy economic and environmental dividends. As Mr. Yergin pointed out, even with current high prices in today's dollars, we are paying substantially less for a gallon of gasoline than in 1980. We have diversified our supplies of imported oil; three out of four of our top importers are in the Western Hemisphere. I just looked at a list that I pulled off Reuters news service today of our top 11 importers of oil. Only four of them are OPEC nations.

Royalty relief on the OCS, as I mentioned, has increased deep-water oil and gas production by over 250 percent in the last 5 years. Significant technology improvements have lowered oil and gas exploration and production costs and reduced the environmental footprint of energy production to one-tenth the size it was 20 years ago.

The rapid development of energy efficiency and renewable technologies has enabled the United States to dramatically decrease its energy use per dollar GDP; wind energy, energy interest in biomass and other renewables, show tremendous promise for some cost-competitive power generation from alternative energy sources.

Despite this track record, the potential for increased savings in energy demand in the U.S. economy remains enormous. And to meet growing energy demand, it remains essential.

Much remains to be done. Secretary Richardson has called on the Congress to work with us in a bipartisan fashion to pass legislation for those energy incentives and programs which require congressional action; namely, comprehensive electricity restructuring; tax incentives for oil and gas production; energy efficiency and alternative fuels; the reauthorization of EPCA; the creation of a home heating oil reserve in the Northeast; and the supplemental appropriation to replenish emergency LIHEAP funds.

The Clinton/Gore Administration is proud of its progress in achieving the Nation's energy goals. Thank you, Mr. Chairman.

[The prepared statement of Melanie A. Kenderdine follows:]

PREPARED STATEMENT OF MELANIE A. KENDERDINE, ACTING DIRECTOR OF POLICY,
U.S. DEPARTMENT OF ENERGY

THE CLINTON/GORE ADMINISTRATION'S ENERGY POLICY

The Administration's "First Principle": Reliance on Market Forces

Mr. Chairman and members of the Subcommittee, I am pleased to be here today to discuss the Administration's National Energy Policy with the Subcommittee.

Sound energy policy is not only important to the day-to-day functioning of our society, it is essential to the continued improvement in our standard of living. Energy is a key economic driver and a strategic global commodity. Energy has significant impacts on the environment at the same time it offers real market opportunities.

The "first principle" of the Administration's energy policy has been a reliance on free markets as the best means of informing supply and demand, and getting the most for the American consumer. Our commitment to this principle has contributed to the longest period of sustained economic growth in modern times.

The unprecedented economic expansion under this Administration has pushed the overall unemployment rates to 30-year lows, led to increased labor productivity, generated extraordinary gains in the nation's stock markets, given us the first federal budget surpluses in several decades, and helped to significantly reduce poverty rates, all while maintaining low levels of inflation.

This does not mean market failure will not occur. When markets are insufficiently flexible to address critical national challenges...market transformations require

market pushes and pulls...or groups of individuals or businesses are threatened by market disruptions or dislocations...this Administration has not hesitated to take appropriate action. Examples of interventions in the energy arena include: the release of emergency LIHEAP funds during last winter's home heating oil crisis; support for a home heating oil reserve in the Northeastern United States and support for tax incentives for renewable energy or to increase domestic oil and gas production.

Economic Growth, Energy Use and Environmental Protection are Not Mutually Exclusive

At the same time that the economy has been steadily growing, many of the environmental consequences of energy use have been reduced—this point is clearly made by Chart # 1 which plots growth in GDP against certain emissions associated with energy use. There is good news:

- Since 1990, at the same time the US economy has grown by 35 percent, sulfur dioxide emissions have declined by around 20 percent.
- The energy intensity of our economy—the amount of energy used per unit of economic output—has declined by 40 percent since the mid-seventies.
- In 1974, we consumed 15 barrels of oil for every \$10,000 of gross domestic product—today we consume only eight barrels for every \$10,000.

Energy use, while increasing, has been out-paced by the economic growth achieved by the Clinton/Gore Administration. Also, increased energy efficiency—in homes, businesses and manufacturing —has helped insulate the economy from short-term market fluctuations in energy prices. Through wise policy choices and informed, targeted investments of public dollars, we can have an extremely robust economy fueled by relatively inexpensive energy, and protect the environment and the health of our citizens.

Policy Framework for our Energy Strategies

The Clinton/Gore Administration has published two statements of its national energy policy in the last several years: *Sustainable Energy Strategy* (July 1995) and *The Comprehensive National Energy Strategy* (CNES, April 1998). Both documents provide a guide to energy policies proposed and implemented by the Administration, and seek to ensure that energy policy is well integrated into the Nation's economic and national security policies. We are currently in the process of updating the CNES and should be releasing this update shortly.

In addition, the President's Committee of Advisors on Science and Technology has completed two scientific reviews of energy related technology development, *Federal Energy Research and Development for the Challenges of the 21st Century*, in 1997 and, more recently, *Powerful Partnerships* in 1999. These two documents provide an analysis of energy technologies being developed by the Department, and make recommendations on how to best utilize these technologies both domestically and internationally.

Finally, the Department over the last several years, has engaged in numerous roadmapping exercises with industry, government, and academic stakeholder groups, and two extensive energy portfolio exercises, in which we matched our energy R&D investments against larger strategic goals of the CNES. This process, followed by an analysis of the portfolio, has helped us to identify gaps in our portfolio and opportunities for additional investments in energy technology.

The *Comprehensive National Energy Strategy*, which DOE released in 1998, identified five overarching energy goals:

- Improving the efficiency of the energy system;
- Ensuring against energy supply disruptions;
- Promoting energy production and use in ways to protect human health and the environment;
- Expanding future energy choices, and;
- Cooperating internationally on energy issues.

The Nation's Energy Challenges

In addition to identifying five energy goals, the CNES highlighted three major energy challenges for policy-makers. These are:

- Maintaining America's energy security in global markets;
- Harnessing the forces of competition in restructured energy markets, and;
- Mitigating the environmental impacts of energy use

While each of these challenges warrants different Government actions, there is a need to invest in the development of alternatives and longer-term technologies to meet our future energy needs. We have added an additional long-term energy responsibility to the three CNES challenges:

- Ensuring a diverse set of reliable and affordable energy sources for America, now and in the future.

I now want to summarize how the Clinton/Gore energy policy utilizes market forces, policies, and investments in research and development to address each of these challenges.

Challenge #1: Maintaining America's Energy Security in Global Markets

The United States remains heavily dependent on crude oil. Since 1985, domestic crude oil production has declined by 34 percent, while domestic oil consumption has increased by more than 22 percent. In 1974, net imports of crude oil and products supplied about 35 percent of U.S. consumption. In 1999, net imports supplied about 50 percent of U.S. consumption.

The Administration's response to the important role of oil in our economy and the increase in net imports recognizes the following:

- Consumption of oil continues to grow.
- The cost of oil production in the U.S. is high relative to other producing nations.
- The price of oil is a *world* price. High or low prices of oil worldwide will mean high or low prices domestically.
- Reducing volatility in oil prices will spur investment and match supply to demand.
- Global capacity must be increased if we are to meet domestic and international demand for oil.
- Increasing net imports are not only an indicator of flat or declining domestic production, but also a reflection of increased *domestic* consumption.
- Almost two-thirds of our oil is used for transportation.

To spur domestic production and lower the costs of doing business—without imposing quotas on imported oil, which would raise costs to consumers—the President has proposed tax incentives for 100 percent expensing of geological and geophysical costs (G&G), and allowing the expensing of delay rental payments. G&G expensing will encourage exploration and production. Delayed rental expensing will lower the cost of doing business on federal lands.

The Administration has also supported and promoted virtually all significant energy legislation enacted by the Congress over the last seven years. This includes legislation for: Deepwater Royalty Relief; lifting the ban on the export of Alaska North Slope Oil; Royalty Simplification; privatization of the Elk Hills Naval Petroleum Reserve; the transfer and lease of Naval Oil Shale Reserves One and Three for production; Alternative Minimum Tax (AMT) and percentage depletion tax relief for small operators; and creation of a guaranteed loan program for small domestic oil and gas producers. The Administration has also proposed legislation to transfer Naval Oil Shale Reserve Two to the Ute Indian Tribe for production; USGS estimates that there may be as much as 0.6 tcf of gas on this property.

To address higher US exploration and production costs compared to other countries, we have invested in a portfolio of technologies designed to lower the costs of exploration and production, and to produce hard-to-find oil in more mature fields. In large part because of the joint R&D efforts of government and industry, the U.S. petroleum business has transformed itself over the past three decades into a high-technology industry.

The United States is a mature oil-producing region. While an estimated two-thirds of all U.S. oil remains in the ground, much of it is located in deep, complex reservoirs or environmentally-sensitive areas. Development of advanced oil and gas technologies is essential to efficiently maximize the production of domestic resources while preserving the environment.

A single project in DOE's five-year, \$118 million government/industry Oil Reservoir Class Program has already added 2.4 million barrels of oil from one field and produced an additional \$12.7 million in taxes and royalties. The final outcome of this project is expected to produce an additional 31 million barrels of oil and \$160 million in federal revenues.

The Department of Energy conducted the initial design of the polycrystalline drill bit, now used in about 40 percent of drilling worldwide, with annual industry sales in excess of \$200 million. Innovations such as horizontal drilling have revitalized oil production from the Austin Chalk region of Texas to the Dundee formation of Michigan.

New imaging technologies developed by DOE labs are revealing large hydrocarbon supplies beneath the ocean floor salt formations in the Gulf of Mexico and 3D seismic is now standard in the industry. Secondary gas recovery technologies have led to new gas production from south Texas and the mid-continent. In Alaska, oil is now being produced from wellpads that are one tenth the size of those 30 years ago. Industry and the Department of Interior estimate that new discoveries in the Gulf of

Mexico may yield as much as 18 billion barrels of oil—more than Prudhoe Bay. Technological innovations in subsalt imaging, reservoir characterization, and drilling technologies will enhance our ability to economically produce these reserves.

To ensure that we are not overly reliant on imports from a single region of the world, we have diversified our sources of supply. Although our oil imports have increased, our sources of these imports have changed significantly over the last two decades. Last year, we imported 4.85 million barrels of oil per day from OPEC nations, down 22 percent from the 6.19 million barrels of oil per day in 1977. Our imports now come from over 40 countries.

During this same period, OPEC's share of the world market has dropped from 49 to around 41 percent. In 1970, the top six producers in the world controlled 68 percent of the world's production; this figure is now down to 45 percent.

I note that just recently, a significant oil find was made in the Caspian Basin which is thought to have potential reserves equaling or surpassing the North Sea. The Administration has invested in a significant diplomatic effort to encourage oil development in this region, as well as to encourage the investment of U.S. energy firms in the Caspian.

To help the world develop its oil resources and increase world capacity, Secretary Richardson has actively promoted investment and development of the world's energy resources. Most notably, Secretary Richardson has held two international energy summits—the Western Hemisphere Energy Ministers Summit in New Orleans and the African Energy Ministers Summit in Tucson, to discuss energy issues and plot a course for global energy development and future uses. In addition, the Secretary has traveled to virtually all the major energy producing regions of the world—the Caspian, Russia, the Middle East, Nigeria, Norway, Mexico, and Venezuela—to encourage energy production and business for U.S. energy companies.

To increase the coverage provided by our "national energy insurance policy," the Strategic Petroleum Reserve, we are adding 28 million barrels of oil to fill the Reserve back to the 590 million barrel level, its approximate size prior to the revenue-raising sales directed by the Congress in 1996 and 1997. The replacement of this oil in the Reserve was also done through a unique royalty-in-kind payment, with no outlays for the government. In addition, we have completed upgrades for the Reserve—to make it safer and to extend the useful life of the facility. This seven-year project was completed ahead of schedule and under budget.

To address volatility in world oil markets, we have strengthened our ties with the world's oil producing nations, worked closely with oil consuming nations through organizations such as the International Energy Agency, and launched a campaign to improve the collection, dissemination and understanding of world oil supply and demand data. Last January, prominent industry analysts and data experts met at a DOE-sponsored forum in Houston to discuss how the quality, timeliness and availability of oil data might be affecting volatility in oil prices. DOE will be co-hosting an international conference in Spain this summer as a follow-on to the earlier meeting. There is significant international interest in this issue and growing consensus that the world needs better data for producers and consumers to more accurately gauge oil supply and demand.

We are also investing in reducing net oil imports by focusing on demand side technologies and policies. More than 60 percent of our oil consumption is for transportation, making vehicle fuel efficiency a ripe target for reducing the consumption side of the net import equation. Specifically, the Department's transportation program is:

- developing an 80 mile-per-gallon (mpg) prototype sedan by 2004 through our Partnership for Next Generation Vehicles Program;
- improving light truck fuel efficiency by 35 percent while meeting newly issued EPA Tier 2 emission standards by 2004;
- developing technologies to increase fuel economy of the largest heavy trucks from 7 to 10 mpg (nearly 50 percent) by 2004;
- increasing domestic ethanol production to 2.2 billion gallons per year by 2010;
- develop production prototype vehicles that will double the fuel-efficiency of tractor trailer truck and triple the efficiency of heavy-duty pick-ups; and
- supporting tax credits for hybrid vehicles.

Let me illustrate just how important these investments are. As you can see on Chart #2, over the past decade, vehicle manufacturers have focused on increasing horsepower at the expense of miles per gallon, the exact opposite of what occurred in the 1970's when auto manufacturers were more focused on fuel-efficient vehicles.

Increasing the average fuel economy for cars and light duty vehicles by just three miles per gallon would save almost *a million barrels of oil per day*. This represents over 15 percent of current U.S. daily production. Investing in fuels and more fuel-efficient vehicles could substantially reduce our reliance on imported oil at the same time it contributes to a cleaner, healthier environment. Without minimizing the im-

portance of increased oil production, it is clear that even a small commitment to greater vehicle efficiency will net significant gains in reducing net oil imports, without compromising pristine onshore or offshore environmental ecosystems.

Challenge #2: Harnessing the Force of Competition in Restructured Energy Markets

As I have noted, the Clinton/Gore approach to energy policy is built around the principle of market-oriented approaches to energy supply and use. A reliance on markets is not unique to our Administration—it spans both Republican and Democratic Administrations.

Natural gas is a clear area of success for market-driven energy policies for recent Administrations. With deregulation, natural gas has emerged as a plentiful, national energy resource. In the mid-1970's, a labyrinth of outdated and counter-productive pricing regulations had handcuffed America's natural gas industry, stifling exploration and production and conveying the false impression that America's natural gas supplies were on the wane.

Today, the onerous natural gas regulations which started in the 1950s, have been replaced by a restructured and highly competitive gas market, and natural gas is now one of the most plentiful energy resources available to meet the Nation's future energy and environmental needs. The decontrol of natural gas prices, the advent of competition in interstate gas transportation, and the ability of industrial customers (and increasingly residential consumers) to contract directly for their own gas supplies has clearly provided major benefits to both producers and consumers.

Electricity restructuring is the biggest prize of all. Over 40 percent of the nation's energy bill goes for electricity. With over \$200 billion in annual sales, electricity is the lifeblood of our economy, and the reliable supply of electricity is vital to our economy and to the health and safety of all Americans. The Clinton/Gore Administration is seeking, with Congress, to extend the role of markets and competition into the electricity sector.

At one time, the debate surrounding electricity restructuring focused on the pros and cons of doing away with the vertically-integrated monopoly utility that generated, transmitted and distributed the power consumed in a state-designated monopoly service territory. That debate is over. As a result of the Energy Policy Act of 1992 and the efforts of the Federal Energy Regulatory Commission (FERC), utilities are now buying power from competing generators and marketers at competitive rates rather than building plants on their own, and independent power producers are gaining an increasing share of the generation market.

Restructuring and competition are not, of course, limited to the wholesale markets. Twenty-five states have now adopted electricity restructuring proposals that allow for competition at the retail level. Almost every other state has the matter under active consideration.

These are positive developments—competition, if structured properly, will be good for consumers, good for the economy and good for the environment. Companies that had no incentive to offer lower prices, better service, or new products are now being required to compete for customers. Consumers will save money on their electric bills. Lower electric rates will also make businesses more competitive by lowering their costs of production. By promoting the use of cleaner and more efficient technologies, competition will lead to reduced emissions of greenhouse gases and conventional air pollutants.

Securing a Competitive Future Requires Both State and Federal Action. We believe that the full benefits promised by electricity competition can be realized only within an appropriate Federal statutory framework. What we do at the Federal level, and when we do it, will have a profound impact on the success of wholesale competitive markets, as well as on state and local retail markets. Federal action is necessary for state restructuring programs to achieve their maximum potential. Electricity markets do not respect state borders. Electricity markets are becoming increasingly regional and multi-regional. Actions in one state can and do affect consumers in other states.

States and the Federal government must work together. States alone can't ensure that regional power and transmission markets are efficient and competitive. They can't provide for the continued reliability of the interstate bulk power grid. And states can't remove the Federal statutory impediments to competition and enable competition to thrive in the regions served by Federal utilities. Clearly, some states are considering retail competition proposals at a less rapid pace than others. Nevertheless, Federal action is equally important to all states. If wholesale markets, which transcend state boundaries, are not working efficiently, the impediments to the flow of power between states will cause rates to go up and reliability to be endangered.

The Clinton/Gore Administration encourages Congress to pass comprehensive electricity restructuring legislation. In 1998 and again in 1999, the Administration pre-

sented the Congress with a comprehensive legislative blueprint of changes needed for updating the federal statutory framework to support the advent of competition in electricity markets. Indeed, this bill was a featured element of the Comprehensive National Energy Strategy the Administration sent to Congress in April, 1998.

A well-structured electricity bill is a centerpiece of the Administration's energy policy, and we look forward to working in a bipartisan manner with both the House and Senate to pass this or similar legislation. Mr. Chairman, we recognize the efforts of this subcommittee, which reported an electricity bill last October. We urge this Congress to replicate the earlier bipartisan successes with natural gas and oil deregulation and pass a comprehensive restructuring bill this summer.

Ensuring the reliability of the energy grid is a growing focus of the Administration's R&D efforts. While the electricity system powers other infrastructures, it will also be increasingly dependent on natural gas as a fuel source for both central power stations and small, distributed generation. EIA's *Annual Energy Outlook, 2000*, projects the annual growth of 4.3 percent for the use of natural gas for electricity generation through 2020.

In addition, our energy delivery systems are becoming increasingly reliant on telecommunications and computing systems for fast, efficient operation. These trends will likely result in increased efficiencies and a range of new consumer products, but can also potentially increase physical and cyber threats to our energy infrastructure.

To ensure the reliability and security of the electricity and natural gas infrastructures, the Administration has proposed a new Energy Infrastructure Reliability initiative with three components:

- electric reliability which will focus on regional grid control, distributed resources and microgrids, information system analysis, possible offsetting of peak summertime electric load with distributed generation and natural gas cooling technologies for example, and high capacity transmission;
- natural gas infrastructure reliability to include storage, pipeline and distribution R&D, and;
- secure energy infrastructures, vulnerability assessments, interdependency analysis, risk analysis, and the development of protection and mitigation technologies.

Challenge #3: Mitigating the Environmental Impacts of Energy Use

The production, transport and conversion of energy is fundamental to our way of life and continued economic prosperity, but energy has more significant effects on the environment than any other economic activity. To reduce these adverse effects, the federal and state governments have imposed environmental restrictions on energy, from production to end-use.

These restrictions have, as noted earlier, resulted in reductions in energy-related pollution and environmental damage, and have been achieved without substantial increases in energy prices, disruptions in energy supplies or other adverse economic impacts. This achievement is due, in part, to the constructive role that the Department of Energy has played in the development of environment-friendly energy technologies and the adoption of regulatory policies that have enabled the energy industry to minimize costs and avoid supply disruptions.

We cannot, however, stop with the successes achieved to date. Domestically, one of the leading challenges facing us now is further reducing the environmental impacts of energy use in the transportation and power generation sectors. We want to minimize the negative effects of fossil fuel combustion in ways that do not increase prices or price volatility, or decrease reliability. Other domestic environmental challenges that will require careful monitoring include: assuring the continued access of the energy industry to new resource areas, in a manner that protects our natural heritage; and ensuring that any further regulation of the energy sector is based on good science and is cost-effective.

Internationally, responding to the threat of climate change is the greatest challenge facing the energy sector. To provide the technologies that reduce greenhouse gas emissions, and to preserve U.S. competitiveness and economic growth, President Clinton has proposed an aggressive \$4.1 billion FY 2001 climate change package. The package includes: the International Clean Energy Initiative, Clean Air Partnerships, Climate Technology Initiative and other programs that preserve jobs and the climate. This includes R&D and deployment initiatives for a broad range of technologies including those using fossil fuel. For example, the President's plan contains a significant request for Clean Coal technology funding and for carbon sequestration to offset the carbon emissions from fossil fuels.

We are working with other countries to elaborate rules and guidelines for the flexibility mechanisms identified in the Kyoto Protocol—emissions trading, the

Clean Development Mechanism and Joint Implementation. Only through the full use of market-based emissions trading and related mechanisms, can we substantially slow or halt the growth in global greenhouse gas emissions without imposing unacceptable costs on the United States. Many different economic analyses done both in the private and the public sectors, indicate that the cost savings from full implementation of the Kyoto Mechanisms could reduce costs in excess of 50 percent from more regulatory approaches.

We have a historic opportunity to complete the elaboration of an internationally unprecedented market-based approach to climate protection that will lower costs and spur U.S. technology exports. The anticipated use of these mechanisms will also provide the economic incentive for developing countries to make meaningful commitments to greenhouse gas emissions reductions.

Sound science is the cornerstone of DOE's work on energy-related environmental issues. The Department has been a partner with EPA and other regulatory agencies in developing science-based regulations. This was seen recently in DOE's work with EPA on coal ash; and last year in our work with EPA on coal combusters of fossil fuels containing cobalt or vanadium. These are two examples where it was demonstrated, through science and interagency cooperation, that regulations of the energy industry were not needed.

Our work on climate change on the other hand, is part of the substantial body of scientific evidence that demonstrates the impacts of carbon emissions on the global environment, supports the Administration's commitment to mitigating the impacts of greenhouse gas emissions on the atmosphere and human health, and strongly suggests that significant and timely action to mitigate climate change is needed.

Cost is a key consideration. The costs and benefits of alternative approaches must be weighed. To the extent feasible, the costs of reducing adverse environmental impacts should be shared fairly among all of the contributors to an environmental problem, not borne primarily by a small subset of industries or, in the case of global climate change, a small subset of countries.

Most recently, the Department of Energy helped develop the economic analysis for treating small refiners as a separate class of businesses under the recently released Tier II gasoline sulfur rule. This treatment for small refiners will give them additional time and flexibility in meeting the requirements of the rule. We are similarly engaged with other agencies in the government on proposed low sulfur rules for diesel fuel and for MTBE.

An important element of the Administration's energy policy is support for the development of energy technologies to reduce environmental impacts of energy use by:

- promoting technologies to produce cleaner conventional fuels;
- increasing the efficiency in the use of conventional energy sources, primarily fossil fuels, and;
- developing alternative sources of energy.

Cleaner Fuels. On the transportation side of fuel use, vehicles currently account for a large portion of urban pollution, including 77 percent of carbon monoxide, 49 percent of nitrogen oxides, and 37 percent of volatile organic compounds. The transportation sector also generates one third of U.S. carbon emissions. In coming decades, increasing public health and environmental concerns will likely lead to new environmental regulations that may be difficult or impossible to meet with current fuels.

The President's *Bioenergy and Biobased Products Initiative* is intended to address this growing need. Recent scientific advances in bioenergy and biobased products have created enormous potential to enhance U.S. energy security, help manage carbon emissions, protect the environment, and develop new economic opportunities for rural America. This nation has abundant biomass resources (grasses, trees, agricultural wastes) that have the potential to provide power, fuels, chemicals and other biobased products. The President has set a goal of tripling U.S. use of biobased products and bioenergy by 2010, which would generate as much as \$20 billion a year in new income for farmers and rural communities, while reducing greenhouse gas emissions by as much as 100 million tons a year—the equivalent of taking more than 70 million cars off the road.

DOE has also launched a new initiative this year, the Ultra-Clean Fuels Initiative, to address the need for cleaner fuels within the context of the current refining infrastructure. The Ultra-Clean Fuels Initiative will mobilize industry and DOE's national laboratories to develop and demonstrate new technologies for making large volumes of clean fuels from our diverse fossil energy resource base. In the nearer term, ultra-clean transportation fuels can be produced by upgrading refinery technology, and using new bio-fuel blends. In the mid-to-longer term, ultra-clean transportation fuels can be developed through biotechnology, or from natural gas and

coal, which enjoy high levels of compatibility with the existing infrastructures and could provide environmental benefits due to their suitability for use in advanced, high-efficiency vehicles.

On the power side, fossil fuel-fired power plants emit about one third of the nation's carbon dioxide and significant amounts of NO_x , SO_x and particulates. These plants also account for 70 percent of all U.S. electricity generation and are projected to dominate power generation for the foreseeable future.

Technologies for coal-fired power plants, developed by DOE, have resulted in improved performance at a fraction of the original cost. Coal is used to generate almost 52 percent of the nation's electricity and scrubbers are now deployed on one-third of U.S. coal plants. Our partnerships with industry have resulted in rapid development of low cost NO_x technologies to address both near term needs and future environmental challenges. The near term challenge has been met by the addition of low- NO_x burner technology to virtually all coal-fired boilers, and even more stringent technologies will be installed on a substantial portion of coal units. These technologies are 50-90 percent cheaper than options available just 10 years ago.

To address pollution from coal and natural gas power systems, DOE has a program—*Vision 21*—with a goal of near-zero emissions from power generation and 60 to 70 percent generation efficiencies. The fleet of large, high-efficiency power systems envisioned by this program would produce emissions well below New Source Performance Standards for SO_x , NO_x , and particulates, with most advanced systems achieving near-zero emissions for regulated pollutants.

DOE's *Carbon Sequestration Program* is designed to develop technologies and practices to sequester carbon that: are effective and cost-competitive; provide stable, long-term storage; and are environmentally benign. Increased carbon emissions are expected unless energy systems reduce the carbon load to the atmosphere. Accordingly, carbon sequestration—carbon capture, separation and storage or reuse—must play a major role if we are to continue to enjoy the economic and energy security benefits which fossil fuels bring to the nation's energy mix.

Increasing Efficiency in the Use of Conventional Energy Sources. It is particularly important to develop and deploy higher efficiency technology for fossil energy power generation since 85 percent of America's energy currently derives from oil, gas and coal. In electricity generation alone, energy efficiency potentially could be doubled through cogeneration and the application of advanced technologies.

DOE's advanced turbines—fueled by natural gas or biomass, and capable of reducing NO_x emissions and producing steam together with low-cost electricity—are already approaching efficiencies of 60 percent. High efficiency electric power systems, where fuel cells are joined with combined cycle plants, could improve efficiency to as much as 70 percent. Industrial resource recovery could be dramatically improved with the development of technologies such as an integrated gasification combined power technology, which would convert coal, biomass and municipal solid wastes into power and products.

The U.S. uses 94 quads of primary energy a year. The nation's 100 million households and 4.6 million commercial buildings consume 36 percent of the total. Buildings also use two thirds of all electricity generated nationally. Energy consumption in buildings is a major cause of acid rain, smog and greenhouse gases, representing 35% of carbon dioxide emissions, 47 percent of sulfur dioxide emissions and 22 percent of nitrogen oxide emissions. Clearly, more efficient buildings will pay big dividends in reduced energy use and a cleaner environment.

Research and development areas for buildings include: heating, ventilation, and air conditioning; building materials and envelope; building design and operation; lighting; appliances, and; on-site generation. To use energy more efficiently, we are working to develop "intelligent building" control systems, more efficient appliances, and fuel cells to power commercial buildings. Standards to improve the energy efficiency of fluorescent lighting in commercial and industrial applications, proposed this March, are expected to save between 1.2 and 2.3 quadrillion BTUs of energy over 30 years, enough energy to supply up to 400,000 homes per year over the same time period. We have recently proposed an update to the efficiency standards for water heaters, and expect to issue proposals for clothes washers and central air conditioners in the near future—each of which are likely to produce even greater energy and environmental benefits.

The industrial sector consumed almost 35 quads of primary energy in 1997—about 38 percent of all energy used in the United States. The industrial sector contains extraction industries, as well as materials processing and product manufacturing industries. Over 80 percent of the energy consumed in manufacturing (including feedstocks) occurs in only seven process industries: aluminum; steel, metal casting, forest products, glass, chemicals, and petroleum. These major process industries

are becoming more capital-intensive. Markets are continuing to become more competitive globally.

Reducing energy costs and waste, and reducing or eliminating environmental emissions upstream (closely related to energy use) are recognized, controllable costs that can increase productivity and competitiveness of U.S. businesses and decrease costs.

The Department's primary program for industrial efficiency is *Industries of the Future*, which focuses on these seven most energy-intensive and supports collaborative research, development, and demonstration efforts to accelerate efficiency in U.S. industries.

If the Department's energy efficiency programs were fully funded, we could likely:

- reduce industry energy consumption per dollar of output;
- increase the average fuel efficiency of new cars and light trucks by 20 percent by 2010;
- reduce the annual energy consumed by buildings; and
- by 2010, reduce energy consumption in federal facilities by 35 percent relative to the 1985 consumption level, saving taxpayers \$12 billion from 2000-2010.

These reductions in energy demand will result in comparable reductions in greenhouse gas emissions, as well as reductions of other environmental impacts associated with energy use. Of course, none of this can be achieved without the active support of other agencies, industry and consumers. DOE looks forward to working with the Congress to develop and fund programs to increase the efficiency of our transportation, commercial, manufacturing and building sectors in order to save energy, increase the competitiveness of U.S. industry, and reduce our reliance on imported oil.

Investing in Renewable Power Sources. Renewable resources such as wind, solar, photovoltaics, geothermal, biomass, hydrogen, and hydroelectric, are abundant. These alternatives are used for power generation and their primary advantage is that they produce virtually no emissions or solid wastes. Their primary disadvantages are the cost of producing power (except hydro) compared to coal and natural gas, and the need to create an infrastructure required to deliver this power to market.

To take advantage of the environmental benefits of renewable power, the Department has focused on decreasing its costs and tackling infrastructure issues. The most feasible approach to lowering cost and delivering renewable power appears to be through distributed generation—alternatives to central power stations, where power is generated locally or on-site. Distributed generation technologies are a major R&D focus at DOE.

In addition, *the Department is working on improving the performance of specific kinds of renewable energy.* The growth for wind power, for example, is the highest of all sources of energy in the world. Dramatic improvements in wind turbine technology has helped spur a 25 percent increase in wind-generating capacity over the last decade. Costs of wind generated power have dropped dramatically to between four and six cents per kilowatt hour. Photovoltaic costs are down from one dollar in 1980 to between twenty and thirty cents today. Geothermal costs are almost competitive with conventional power generation costs, coming down from fifteen cents to between five and eight cents today.

Last year, the President issued an *executive order directing agencies to expand their use of renewable energy.* Meeting the goals of this order will reduce greenhouse gas emissions by 2.4 million tons and save taxpayers over \$750 million a year. It will also expand markets for renewable technologies, reduce air pollution, and serve as a powerful example to businesses and consumers who can reap substantial benefits from environmentally-friendly energy sources.

The Government's Commitment: Ensuring a Diverse, Reliable and Affordable Set of Energy Sources for the Future

The energy options within our portfolio are oil, gas, coal, energy efficiency, renewables, hydropower, fission, and fusion. We must strategically manage energy R&D with this understanding about the energy world as we know it: there is no single silver bullet which will solve all our energy needs, making science and technology—and a broad-based energy R&D portfolio—key to meeting our long term energy needs.

Without energy technologies, a ton of coal, a barrel of oil, a cubic foot of natural gas, a ton of uranium ore, a stiff breeze, or the sun's warmth cannot directly contribute to the prosperity of modern society. With the very best technologies, however, society can use energy resources efficiently and responsibly and with great economic and environmental gain. While economic and security challenges continue to demand investment in a robust energy research and development (R&D) program,

environmental challenges provide additional impetus for increased focus on energy-related science and technology during the coming years.

Technology development plays a strong supporting role in the Department's pursuit of all of its energy policy objectives. It supports improvement in the competitiveness of the energy system; the development of more efficient transportation, industrial and buildings technologies as a key objective; our goal of reducing the environmental impacts of the energy sector, and; the further development of technologies that reduce the environmental impacts of energy production.

The requirements for near term returns on investment, limited resources and the risk averse nature of many industries warrant a special role for government in the support of technology development, especially when new technology can help address national concerns not fully reflected in the marketplace. Consequently, the development of new energy technologies has been a central mission of the Department of Energy's since the late 1970's. At DOE, we focus on maintaining a strong national knowledge base as the foundation for informed energy decisions, new energy systems, and enabling technologies of the future, and developing technologies that expand long-term energy options.

Ensuring the success of the Department's research and development efforts has been a constant challenge, especially during periods of stable or declining energy prices, when market incentives for technology development and adoption are at their lowest. In addition, the unpredictability of technology development process and the continual changes in scientific knowledge, social priorities and market demands pose additional challenges to government efforts to effectively spur technology development.

I have already discussed many of DOE's energy technologies and technology investments and successes. I would now like to discuss our energy portfolio more broadly, and then focus specifically on natural gas as a transition fuel.

DOE's energy resources R&D portfolio is organized in three broad strategic areas: reliable and diverse energy supply (\$170 million, FY01 request); clean and affordable power (\$542 million, FY01 request), and; efficient and productive energy use (\$437 million FY01 request). In addition, the Department has a basic science portfolio (\$1.2 billion FY 01 request) which supplies the foundation for much of the applied R&D in the energy areas.

A number of reviews and studies have been conducted that provide valuable information on the adequacy and focus of this portfolio. Overall, these studies have confirmed that our energy portfolio is generally well-focused on the nation's strategic energy goals. However, the studies also have identified a number of deficiencies in how fully these goals are addressed by the portfolio and made a number of recommendations for important portfolio changes or additions, including:

- Significantly enhanced R&D funding
- Renewed emphasis on electric power systems reliability
- A Nuclear Energy Research Initiative
- Carbon management R&D
- Increased bioenergy R&D
- Methane hydrate R&D
- Hydrogen R&D
- Clean fuels R&D
- Integration of fuel cell R&D efforts
- An international RDD&D effort

The Administration strongly supports the increased use of natural gas. Several of these recommended changes or additions to our portfolio relate directly or indirectly to natural gas—power systems reliability, carbon management, methane hydrates, clean fuels, and fuels cells all involve the development of technologies to increase the supply, improve the delivery of, or improve the environmental performance of natural gas.

Also, as I mentioned earlier, because it is abundant and relatively clean, natural gas will be the fuel of choice to meet the nation's future power generation needs. Of the 1000 powerplants the Energy Information Agency (EIA) projects the U.S. will need by 2020, 900 will probably be natural gas power plants. If we are able to produce the gas to meet this need, we will need the means to distribute it safely and efficiently. Right now, there are 85 proposed pipeline projects *just* for the years 2000 through 2002, at the same time significant impediments exist for pipeline and storage siting.

Investments in natural gas R&D are critical to meet future energy needs. The Clinton/Gore Administration has invested roughly \$1.5 billion in natural gas R&D. DOE's joint efforts with industry have helped produce the fuel cells, microturbines, reciprocating engines, and other enabling technologies to power the gas industry of the future. DOE's request for natural gas R&D funding in FY 2001 is around \$215

million and, as I mentioned earlier, includes an initiative for energy infrastructure reliability. The natural gas portion of this initiative specifically focuses on methane leakage, aging and corroding pipelines, and natural gas storage, to improve the safety and reliability of the natural gas distribution network.

Last December, Secretary Richardson established *DOE's newest national laboratory—the National Energy Technology Laboratory*, co-located at Morgantown, WV, and Pittsburgh, PA. This laboratory is dedicated to providing the nation with clean and affordable fossil energy and will house a new *Center for Natural Gas Studies*, in order to give added focus and emphasis to natural gas policy and “bore hole to burner tip” research and development.

Presidential Decision Directive 63—*Critical Infrastructure Protection—establishes safety and security of the natural gas infrastructure as a national security priority*. In addition, the Administration also envisions a substantial role for natural gas as the transition fuel for a cleaner environment, and in reducing greenhouse gases. The President's *Executive Order on the Greening of the Government* promotes efficiency in federal buildings, acknowledging that there are substantial efficiency gains to be made by measuring energy from the source, not just at the site. Natural gas is a winner in this scenario.

The Administration's *Comprehensive Electricity Restructuring bill* will benefit natural gas as well by providing for more rapid market penetration of innovative technologies on both sides of the customer's meter. End-use distributed generation technologies, for example, have a critical role to play in a restructured energy future. Along with new uses for natural gas, these technologies promise relatively high efficiencies, low emissions, increased flexibility and reliability, and cost-effective alternatives to the traditional utility grid infrastructure.

To further develop natural gas power systems for the 21st century, DOE will be focusing on advanced combustion science and technology; interconnect devices and parameters for standard interconnect designs to enable distributed generation; low temperature catalysts for emissions control; inexpensive sensors for emissions monitoring, and; carbon dioxide separation and sequestration technology. For natural gas storage, we will be investing in developing non-damaging fluids for drilling, and methods for controlling reservoir damage caused by drilling and perforating fluids.

We need to encourage increased natural gas supply. The National Petroleum Council's recent study on natural gas projects increased consumption for natural gas of 29 trillion cubic feet (TCF) in 2010 and 31 trillion cubic feet (TCF) by 2015. At the same time, EIA estimates that in 1998, reserve additions of natural gas were only 83 percent of production. To meet this demand, we will need to ensure that we have an adequate supply of natural gas.

Several pieces of legislation I described earlier—specifically the deep water royalty relief and the guaranteed loan program for small oil and gas producers—will benefit natural gas production, as will the G&G and delayed rental tax credits supported by the President. In addition, our energy supply R&D programs, designed to lower the costs of oil and gas production, will help add to the nation's supplies of natural gas. These include:

- a *Diagnostics and Imaging Program* to cost-effectively locate and produce oil and gas reserves;
- the *Advanced Drilling, Completion and Stimulation Systems Program* which focuses on the development of sophisticated drilling technologies and methodologies;
- the *Gas Hydrates Program*, a long term R&D effort to help turn potential methane hydrates into gas reserves, and;
- the *Low Quality Gas Upgrading Program* to purify gas reserves containing high levels of contaminants.

Clearly, much remains to be done if we are to meet significant increases in demand for natural gas over the next two decades. We look forward to working with Congress in a bipartisan effort to increase the nation's supplies of natural gas.

PROSPERITY AND SECURITY ARE “ENERGY DEPENDENT”

Energy plays a vital role in our economy. Somewhere between six and seven percent of our Gross Domestic Product—about \$600 billion per year—is attributable to energy consumption. Over \$200 billion per year is spent on transportation fuels. Approximately \$200 billion per year is spent on electricity—to power our factories, to light, heat, and cool our homes, offices and schools, and to increasingly power the electronically-based New Economy. The electric bill for the nation's industrial sector alone is around \$100 billion annually.

Clearly, energy is the engine that drives our economy. At the same time, it represents a substantial cost to consumers and businesses—its fundamental importance

to the nation's economic and environmental health has warranted investments by this and previous Administrations in a set of policies and a portfolio of technologies to produce more energy, to use it more efficiently, to reduce its impacts on the environment, and to find alternative sources of supplies.

These policies and investments have paid big dividends. Over the 20-year history of the Department of Energy, we have made a great deal of "energy progress." In today's dollars, we are paying substantially less for a gallon of gasoline than in 1980. We have diversified our suppliers of imported oil—three out of four of our top importers are in the Western Hemisphere.

We have, by far, the largest strategic petroleum stockpile in the world. Relatively recent policy changes and technological advances have spurred oil and gas production on the Outer Continental Shelf and extended production on Alaska's North Slope. Significant technology improvements have lowered oil and gas exploration and production costs dramatically and reduced the environmental footprint of energy production to one tenth the size it was twenty years ago.

In addition, the rapid development of energy efficient technologies and practices and the restructuring of our industrial sector has enabled the United States to decrease its energy use per dollar GDP by around 40 percent since 1973, representing an annual energy cost savings of over \$400 billion. Between 1970 and 1990, the average fuel efficiency of automobiles went from 13 miles per gallon to 20 miles per gallon. The efficiency of combined cycle gas turbines for electric power generation exceeds 60 percent and wind energy and biomass show tremendous promise for cost-competitive power generation from alternative energy sources.

Despite this track record, the potential for increased energy savings in the U.S. economy remains enormous—and to meet growing energy demand, it remains essential. In the utility industry for example, only one third of all thermal energy from coal or gas is actually transformed into electricity in a typical power plant. In the transportation sector, which accounts for 60 percent of the nation's demand for oil, the fuel economy of passenger vehicles has actually declined in recent years due to the increasing market share of SUVs and minivans. Net imports of oil continue to increase and domestic oil production has declined.

The Clinton/Gore Administration is proud of its record on energy policy and on our progress in achieving the nation's energy goals. Clearly, however, much remains to be done. Secretary Richardson has called on the Congress to work with us in a bipartisan fashion to pass legislation for those energy incentives and programs which require Congressional action, namely comprehensive electricity restructuring, tax incentives for oil and gas production, energy efficiency and alternative fuels, the reauthorization of EPCA, the creation of a home heating oil reserve in the Northeast, and a supplemental appropriation to replenish emergency LIHEAP funds before we enter the summer power season.

We look forward to working with you in the days ahead. If we are going to meet the nation's energy needs of the 21st century, we have neither the time—nor the energy—to waste.

Mr. BARTON. The Chair will recognize himself for 5 minutes of questions. Admiral Watkins, I will ask you to elaborate a little bit on your comments about being able to environmentally safely produce some of the oil and gas that we think is in the Arctic National Wildlife Refuge.

Mr. WATKINS. We went through this in agonizing depth 10 years ago. Members of Congress, as well as myself, went to Prudhoe Bay, inspected the pads that were there. They have been refurbished and returned to the tundra. We went over to the Arctic National Wildlife Refuge, we looked at the footprints that were required to do the horizontal drilling, used the technologies to be able to go from small pads, convert them in, say, 20 years back to tundra. We felt very comfortable that we could do this with modern technology, with all the things that we had learned at Prudhoe Bay, in a sensible way environmentally. I agree it is a treasured area.

On the other hand, we have a lot of treasured areas like the Gulf of Mexico. We seem not to put that off limits. We don't mind exploiting that. What is it about? Is Alaska still a territory? Eighty-three percent of the Alaskans, including the legislature, wanted to

do this. Is it the wisdom of this Congress that that State—we like State's rights on other things—closes it down when in fact we have demonstrated that we can do it in an environmentally sound way?

The ramp that you see in the decline in supply is adjusted by just the Arctic National Wildlife Refuge alone. Not a great deal, but 1 million or 2 barrels a day is a lot. It keeps us going a little bit longer and has a little bit better contribution to energy security than not. So we believed both we could do in an environmentally sound way, that it did make sense over time as we transitioned out of the oil problem and demand in this country. And we talked about oil prices and the fact that it is down in real dollars to its lowest ever.

Tell that to the little people out in the West who have the car as their only source of enjoyment in life. But we tried to raise the price of gas 5 cents—remember that in 1982—and the hue and cry was incredible. And the Congress wouldn't stand for a nickel.

We raised it 40 cents now. Because of OPEC, there is a little whimper, but everybody is still driving. It is a fascinating set of rules. But the Arctic National Wildlife Refuge and these other offshore for gas places are environmentally sound, much more so than shipping oil and importing oil. We have already seen the Exxon Valdez situation and we know that the contamination generated by oil in these bottoms moving across the world are far more deleterious to the environment than drilling offshore and doing so competently.

Mr. BARTON. I will ask one more question, then I am going to have to go. Mr. Martin in his testimony talked about the efficiency of natural gas being converted directly to electricity through some of these microgenerators that are coming online.

Congressman Sharp, you have studied some of these issues. I remember you were a leading proponent of some of the appliance efficiency standards that I voted against actually when they were before your subcommittee. Do you have a comment on what Mr. Martin said in terms of the overall cycle efficiency of direct—

Mr. SHARP. I can't speak to the specifics of some of the problems, but there is no question about the higher efficiency and environmental soundness if you don't have to go through the loss in transferring into electricity, and then lost lines, even though we expect newly improved efficiencies there if we can get a marketplace working. But I don't think there is any doubt that there is a great deal of efficiency to be gained by the use of natural gas.

Mr. SHIMKUS [presiding]. Thank you, Mr. Chairman. Now I will recognize myself for such time as I may consume or the ranking member gets back. And I do that because I like to get the gavel and I like to get some of these questions. You all were here on opening statements.

Let me address a question. Part of the price equation right now a lot of you have referred to is the environmental issues or the regulatory. Can you—Dr. Yergin, I know that is in your testimony—can you address what some of those environmental issues are that are we are projecting as being an increased portion of the cost?

Mr. YERGIN. Over about the past decade and a half, the refining industry in this country has made about \$22 billion of investment to meet environmental considerations. What is striking is the de-

gree to which that part of the industry has continued to push down its other costs so that in effect it has absorbed a lot of that investment. Right now we are seeing some switchovers for environmental reasons to new gasoline for summer driving. And that is one of the factors. It is one of the four factors that is an element in the higher gasoline prices we are seeing right now.

Mr. SHIMKUS. But percentage-wise, I think your initial response was the cost of producing at the refinery and the emission requirements is the cost of doing business today. Is that—

Mr. YERGIN. It is a substantial cost.

Mr. SHIMKUS. Percentage-wise?

Mr. YERGIN. I will have to go through my papers here.

Mr. SHIMKUS. We know there have been accusations about numerical superiority or lack thereof. Mr. Martin, do you have a response? I know you are natural gas.

Mr. MARTIN. They might have a better feel on this.

Mr. HAKES. We have done some detailed studies on what this cost is for the remaining industry. I can't cite them off the top of my head but we can make them available to the committee.

[The following was received for the record:]

EIA has done some detailed studies on the expected cost of Phase 2 reformulated gasoline (RFG). The cost of manufacturing this new gasoline varies from winter to summer and from North to South. For many refiners, no additional cost is expected to produce Phase 2 RFG in the winter months as Phase 1 RFG already meets the required emissions reductions. Producing summer-grade Phase 2 RFG, however, will require additional investments and changes in gasoline blending at refineries that will increase costs.

As with any analysis, the results of this study are influenced by the premises and assumptions underlying the analysis. This analysis of the cost of Phase 2 reformulated gasoline was released in the spring of 1999 when oil prices were at much lower levels than today. The added energy costs as a result of the sharp rise in oil prices over the past year would increase the cost estimates. (For example, the price of crude oil has almost doubled and the costs of producing RFG could be assumed to increase proportionally. In addition, the spot price of MTBE, a major gasoline blending component, more than doubled from \$0.74 per gallon in May 1999 to \$1.55 in June 2000.) In addition, some simplifying assumptions related to gasoline production and blending were made to facilitate the cost estimation. For example, in estimating the cost of reducing Rvp to the lower levels needed for Phase 2 RF6, a linear extrapolation of the price spread between two types of gasoline that have higher levels of Rvp was used. However, costs are likely to rise at an increasing rate as gasoline specifications become tighter. Furthermore, this study did not analyze the cost of producing Phase 2 RFG using ethanol as the oxygenate blendstock rather than MTBE. The estimates presented are average cost estimates for producing the new gasoline. The marginal cost of producing the new gasoline (i.e., the cost of producing the last barrel) may be higher which could affect prices at the pump.

Given the caveats stated above, EIA estimated that the increase in cost from Phase 1 to Phase 2 RFG in the summer months is expected to be approximately 1.0 to 1.5 cents per gallon. Phase 2 RFG is expected to cost 2.5 to 4.0 cents per gallon, on average, more than conventional gasoline, depending on the region of the country and the time of year.

Like RFG Phase 1, the fuel economy (miles per gallon) of Phase 2 RFG is about 1.5 to 2.0 percent lower than conventional gasoline. There is no need for new equipment to transport or distribute Phase 2 RFG, beyond that needed for Phase 1 RFG. However, in the past, the introduction of new types of fuel has led to supply problems and attendant price spikes.

For more detailed information, see Tancred Lidderdale and Aileen Bohn, *Demand and Price Outlook for Phase 2 Reformulated Gasoline, 2000*, <http://www.eia.doe.gov/emeu/steo/pub/special/rfg4.html>.

Mr. HAKES. I would agree with Dr. Yergin that the refining industry has done an incredible job to keep these costs from being passed on much to the consumer because the refining margins in

this country are very, very low. It is rather a small part of the overall price.

Mr. YERGIN. If I could just give you over the last couple of years the averages. If you look at the gasoline price, 35 percent of it actually reflects crude oil costs. About 35 percent represents tax. And the rest would be the refining, the marketing costs, including the environmental.

Mr. SHIMKUS. The reason why I bring this up, I just have an article here from the Sun Times, to no one's surprise, that I am a big renewable fuel proponent of ethanol and biodiesel; because of the high escalation of prices, I think the oil industry is going to try to attack the oxygen standard, the clean air positive aspects of that, and say that is one of the major environmental components for the increase in costs.

In fact, I will quote from the Sun Times today from a Phillip K. Velleger Jr., an oil expert from a Boston-based group, which says, "I wouldn't be surprised if consumers pay \$2.50 this weekend," which has seen gas—and then that is his quote. And then in the analysis, they have seen the gas prices rise faster than the national average, talking about the Chicago and Minnesota market, because of the increased use of ethanol in the blending process.

Would you agree that that is a major component of the increased prices seen in the price of gasoline across the Nation, the oxygenate standard and renewable fuel portion?

Mr. YERGIN. We are switching over to summer gasolines right now and there are new specifications. But the bulk of the increase in gasoline prices, although not all of it, that we have seen over the last 4 months reflects the rise in crude prices on the world market.

Mr. SHIMKUS. That mirrors the testimony pretty much across the board. I just wanted to put that on the record for our consumption.

Admiral, I have a question on the SPR. Not just from your experience in the Department of Energy but from your military background, which I have a limited one myself, and there is always an assault on the SPR when the prices are high. We do use it, as was in the testimony, to jimmy the market and the supply and demand and try to affect prices. Why do we have a SPR?

Mr. WATKINS. We certainly don't have it to jimmy prices. It was never designed for that. It was designed for security purposes, so in the event of a turnoff, something we might have had during the Gulf War, it was there to use—rather low grade crude, as a matter of fact—but for a period of time. And we have tested it and moved it into the pipelines and got it to refineries to be able to live for a few months supplying our ships, aircraft, and so forth with refined products and cut back on the urgency of dealing with the transportation of oil primarily by sea. So it was designed from a national security point of view.

And every time we have a gas price increase, somebody raises the issue, why don't you use the SPR? It is a classic one. I talked to Secretary Richardson when I was over there finding the new nuclear czar. He said, we got it again. I said, don't play around with it. It is not to be used to influence the market. In the first place, it is not that deep of a reserve, the pockets are not deep there. That should not be used.

What we did in the Gulf War to show how important it is to national security is, in the fall of—and I am going to say it was 1990, I can't remember now but I think it was the fall of 1990, we tested the SPR. Well, you can imagine the hue and cry I got from within the administration itself. Just to test the SPR, you are fiddling with the market.

Well, that was the an extreme position. We were trying this test just to see if it would work. The fact that we tested it was extremely important. If you can remember what happened in the Gulf War, in a very short period of time we spiked to \$40 a barrel and it came right back down. One of the reasons, in my opinion, is we demonstrated that we were serious about that SPR for national security purposes and we were not going to allow the Iraqis to interfere with that process.

That is what it is important for. And it did the job then. And the preparation before that wasn't to keep quiet and keep all our data in DOE. We had a whole task group, including the futures market from New York, come down and participate with us. We set up special systems to the Saudi Minister of Energy that I had a private circuit with. I wanted to know what was going on in the Gulf all the time, whether it was fact or fiction that was being reported by CNN and other things. We had everybody connected with us and we knew that we had to do that so that the market wouldn't be spooked.

But it had nothing to do with using that for those purposes that many want to use it for and mal-use it. It was never decided by Congress that we should use that for market manipulation, nor should it ever be.

Mr. SHIMKUS. Thank you. Congressman Sharp, I know you have a point.

Mr. SHARP. I want to very strongly reinforce what Secretary and Admiral Watkins had to say. While we did have a bit of a political dust-up at the time, it really is quite irrelevant to the proposition that we tested at that point. And the President announced he would use it if he needed to, and it was designed to deal with the enormous speculation going on in the marketplace at a time when we thought the Saudi fields could well be threatened by missiles out of Iraq. So it may have had some clear justification for use.

That is the only time, the only time it has been used. And it should not be used just to quell the marketplace.

First of all, you don't know that it will work. Second of all, you don't know if you are really trying to fight the cartel. They still might be in a position to totally undermine what you are doing in terms of prices. And, third, you will have a disruptive effect within the U.S. market as to where things flow because you will suddenly glut certain parts of the U.S. market. It is just not an easy, clean thing to do.

But it is, from a security point of view, as long as we have got the world oil situation as it is, an important thing to have. And we have it, by the way, people forget, in conjunction with international agreements with a number of other of the consuming nations to also have reserves.

Mr. SHIMKUS. Let me move to Ms. Kenderdine.

Ms. KENDERDINE. I just want to say for the record that the Clinton Administration has never advocated selling SPR oil to manipulate prices either. That is not allowed under the statute that authorizes the Strategic Petroleum Reserve. You are only allowed if the criteria are anticipated or actual supply disruption.

In the situation in December Y2K, no one knew what was going to happen about our imports of oil, and so we were prepared with the documents to start a process to sell oil if an actual problem did occur or if we saw something weird, if Mr. Hakes had seen something early on in December out there that was going on in the markets because of that, but we have never advocated using the SPR for to manipulate prices.

Mr. SHIMKUS. Then let me take this premise what we, the SPR for national security purposes, shouldn't use it to manipulate the market. It is limited, though. We all agree that is limited. And to really supply the fuel for a theater war, it takes time. And, again, it is limited.

Do you not think that it is in our national interest, our national security interest, since we have an SPR that is limited, that we continue to move to prepare for longer conflicts of duration and continue to operate and work off the premise of making sure our marginal wells are operating, address the other fuel locations and also continue to help develop our renewable fuel opportunities, ethanol and the biodiesel options? Admiral.

Mr. WATKINS. I would only say that I would have to put the answer to that in the context of what else in the energy strategy? I don't believe you can decide whether you want to have an expanded SPR, for example. That has been debated time and time again. It has never looked economically sound. If you decide you are going to closeout all new oil exploration and production, you are going to closeout new technologies being applied to existing wells or existing fields, if you are going to do those kinds of things, then I think the answer is probably yes. But I think you have to balance off do you want to increase SPR or do you want to increase our production of oil in this country.

I would do the latter first. I don't think the SPR is a great investment to go beyond just about what it is today. I have never seen an argument that is well laid out that says we have such an enemy out there such as the former evil empire that would demand that kind of a larger SPR. So I would say no.

The ethanol issue I think, while it is related, is quite different. And we certainly were proponents of pushing that component of the energy supply system very hard during the Energy Policy Act preparation in 1992 and still feel very strongly about it.

We have helped other nations as well. DOE would go to Brazil and show them how to better produce the ethanol. They are 95 percent fueled in their transportation sector by ethanol. They do it through the various reconstitution of their crops and so forth. We help them do that.

That is what we should be doing worldwide. That is the kind of thing that ought to be in AID. That is the kind of thing that the State Department ought to be worrying more about on S&T and foreign policy, which they don't do. There are a lot of things to do on the ethanol front that have not been exploited well in terms of

policy, execution of those policies, monitoring, getting into the foreign policy issue and so forth.

So I put ethanol aside from SPR. It is hard for me to link those two.

Mr. SHIMKUS. Anyone want to venture into——

Mr. MARTIN. On the SPR, really I think Ronald Reagan got this started with a lot of help from this committee in the early eighties. It was not only an SPR for us, it was an SPR for everybody. To the extent we show leadership other countries join us, because our SPR is only as good as the SPR in Japan or Amsterdam or Germany or whatever. Because we coordinate these through the IEA. We always have to keep our mind on that. It would have been very bad from a leadership point of view if we start to use our SPR for market mechanisms.

I agree with the Admiral on the ethanol point. That is really quite long-term energy policy. That is infrastructure. That is the need to put in place an adequate distribution system for the next 10 years so we are less reliant on oil. But we still need the SPR, and it still has to be part of the IEA.

Mr. HAKES. I would like to make two comments that I think might be helpful. One is that I think there could be a tendency to have a false sense of security about the international situation in the sense that Saudi Arabia has intentionally had a policy over the years of having excess capacity available that they could bring on-line immediately, and under some circumstance that has, in effect, been almost a petroleum reserve. I think that has been helpful to the world market in a couple of instances. But I think there is the question of whether one would just assume that into perpetuity. So I think that some of the things like the reserve and other policies that are kind of insurance policies are important.

I would say, on the ethanol issue, that this is even a better example of where technology matters. The current state of distilling ethanol from corn is not terribly competitive, but if you look at some of the less mature technologies that can be used on cellulose, there are dramatic changes that could be made.

And, again, I would refer to another EIA study that I think is helpful that looks at the long-term potential for ethanol. And if you had a very crash program with these new techniques that would use things like switch grass and other forms of cellulose, you could conceive a situation in which ethanol might be cost competitive with petroleum.

I know that we are a conservative agency in making those kind of estimates, but I would commend that argument to you. But that wouldn't happen with today's technology. It would require a very strong effort to invest in those technologies.

Mr. SHIMKUS. I appreciate the comment because you are mirroring my comments on the ethanol research plant that I have been diligently fighting for and I hope to have some success this year.

Ms. KENDERDINE. I would just like to say that the Clinton Administration is a strong supporter of biofuels. And, you know, when over 60 percent of your oil use is in transportation, 97 percent of your transportation runs on oil, looking at alternatives such as ethanol is very, very important.

The President put out an executive order a couple months ago to triple our investment in biofuels and biodiesel technologies—not biodiesel, biomass technologies. And also with what is happening with MTBE in the marketplace and the environmental groundwater problems that are associated with MTBE, we are projecting large increases in demand for ethanol. We already have delivery problems, infrastructure problems with that that we need to work on; and that will take time. But it has a good future.

Mr. SHIMKUS. The administration is going to have an opportunity within the next couple months—we do see a disparity between the DOE and the EPA and working together. Of course, they are not here, but we are also talking about the environmental effects of this supply and-demand equation. And they really should be here.

I have taken much more of my time. But that is what I get for being diligent and moving rapidly to the vote.

I would like to now turn to the ranking member, Mr. Boucher, for his questions.

Mr. BOUCHER. Thank you very much, Mr. Chairman.

Mr. Martin, I was rather taken with your hopeful projections for the energy circumstance for the year 2020 premised on a 60 percent increase in natural gas consumption with a corresponding increase in coal consumption and a decline in petroleum imports. And I wonder if you could tell us a little bit about where you see the natural gas that would fuel that 60 percent increase in consumption coming from? Is it purely domestic sources? Does it anticipate having access to the Outer Continental Shelf, production from which has been under moratorium since the 1980's and there is no immediate sign that that is about to change? Where do we get the natural gas that would fuel this 60 percent increase in consumption?

Mr. Yergin says we are making quite a bet on relying to that great extent on natural gas in the future. Is he right about that? Can we with some comfort assume that the gas will be there for that significant increase? What will be the effect, in your opinion, on natural gas prices and what will be the effect on the price of other fuels?

So it is a fairly comprehensive question about some of the more general effects of this hopeful future that you predict, but premised, first of all, on where we are going to get the gas.

Mr. MARTIN. That is a good question. Thirty quads of that come from the United States and five from imports from Canada. None of this presumes gas from Alaska, although that is certainly an option. I think perhaps if you ask Senator Murkowski or some Alaskan they might say the likely market conditions in Asia may prefer that gas to the lower 48.

Mr. BOUCHER. And the Outer Continental Shelf?

Mr. MARTIN. Here I have come here—

Mr. BOUCHER. I am not asking whether it is a good idea or not. I am—

Mr. MARTIN. I think we probably will have to drill to achieve that level. I say this as an environmentalist. I am on the board of World Resources Institute, and I am one of the two Republicans, I guess a couple tokens, on that.

I am always trying to point out to the Board you cannot achieve a clean future, you cannot achieve, if you want to meet your Kyoto targets, you cannot achieve lowering SO₂ and NO_x without greater use of gas. And yet to do that you have got to drill in places which are presently off limits from the environmental community.

You also have to, by the way, have nuclear power, if we are really serious about national security and keeping those oil imports low—and I should say my oil import number was, for 2020, around 11 million barrels a day. So part of this challenge is putting together a mosaic which achieves nationality security economics and environment.

And there are going to be some tradeoffs. And drilling in presently restricted areas is going to be one of those areas.

As a guy from an Oklahoma oil and gas family, I can tell you that there is a lot of gas out there. Nobody wanted gas originally. They just wanted oil. They kept finding more and more and more gas. So I guess I come from that Oklahoma optimism about the supply side.

Also, the cold methane, Alaska, in fact, we are very lucky in this country that we have so many accessible areas of gas, including Canada which has enormous gas reserves. If we were in Japan or Europe we would have to think about long distance pipeline, we would to think about LNG, which again would increase the cost.

Final point on price, and at Harvard they are much more expert in price than I am, because I have learned to be very humble. It is a very interesting dynamic. Natural gas consumption has actually been rising quite rapidly in the last 10 years, and natural gas prices have been going down. And if you couple that with the new technology, as EIA pointed out, I am not so sure we have to see a significant increase in the price of gas to achieve that. Yes, it will be difficult, but so is expanding coal and meeting environmental targets. So is expanding nuclear power. So is reliance on oil imports. As we look across the range of things I think the gas perhaps is the most optimistic part of the energy strategy, as I see it, in the future.

Mr. BOUCHER. Mr. Yergin, I would be very interested to hear your comments on this optimistic scenario.

Mr. YERGIN. First of all, I think all these good things that have happened to natural gas over the last 10 years we should obviously attribute to the subcommittee and its wisdom.

Mr. BARTON. Of course. Mr. Sharp.

Mr. YERGIN. As I said, it is a bet that we are making. It is a good bet that we are making. It is a bet we have to make in terms of natural gas.

Because if you look at our overall energy picture, there is so much discussion about the new economy that we are going to have is very much an electricity-based economy. It depends on the quality of electricity, and that is going to depend a lot on gas. But we have, over the last couple of years, had an industry that produces gas, exploring for it that has been injured a lot by what has happened to it with very low prices which most people didn't notice. And so that there is a big agenda there in terms of investment, in terms of access, in terms of infrastructure. It does mean look to the north, look to the frontiers.

To some, a subject that we in our company, Cambridge Energy, have been very concerned about, and I hope maybe by September in the work we are doing that we will have some answers on the future of natural gas supply because it really is an absolutely critical question for our overall economy. And September is our target for that.

Mr. BOUCHER. Thank you.

I have one additional question, Mr. Chairman, if I can indulge the subcommittee for that.

Mr. BARTON. Sure. It is just you and I for that right now.

Mr. BOUCHER. If I could indulge you for that.

It is not within the jurisdiction of this committee to legislate with regard to taxes, but I think this discussion this morning would not be complete if we didn't address the question of the section 29 tax credit. And I would be very interested in hearing from this panel of witnesses your opinion with regard to the affect that the section 29 tax credit has had in terms of encouraging the production of oil and natural gas from unconventional sources and the importance of that tax credit going forward to encourage that very kind of production. And also any recommendations that you might have for ways in which the tax credit could be modified to better enhance our potential for oil and natural gas production from unconventional resources in the future. The credit expires at the end of 2002, at the end of the next Congress.

And the final part of this question is, would it be helpful to have the credit reauthorized earlier, perhaps even this year? We will have a variety of tax measures, no doubt, to consider this year and would it be helpful to have it done this year as a way to give confidence to producers that the credit will be in place and encourage them to begin oil and gas production from nonconventional resources in the near term?

Anyone? A mouthful of silence.

Mr. WATKINS. I am not an expert in this area, Mr. Boucher. I would just say this. I think it makes a lot of sense politically, from a public policy point of view, to let our great independents that are out there working these problems in the field know ahead of time that you are not going to let them down. So I can't tell you how important it is.

Let's don't let it run to the wire and then shock them either one way or the other. They have got to know now so they can keep their pitiful investments going, whatever it is. So give them some hope with this.

I only hope by saying that, however, that that doesn't become the national energy policy of this Congress. The trouble is, we come in to simple fixes like that which are wonderful and absolutely essential. We were on this same issue in the Energy Policy Act. By the same token, it isn't the answer to everything. It is very helpful, though. Because, you know, it is the little mom-and-pop outfits in Oklahoma and Texas and so forth that really are giving us the oil production in this country. The big boys have gone overseas. So we really do have to give them incentives as much as we possibly can to take us through this transitional period until we get our act together on oil and gas.

Mr. BARTON. The gentlelady from the Clinton Administration. We hope you will support your ranking member in wanting to do this.

Ms. KENDERDINE. Absolutely, sir. That is just from me, not from the administration.

Mr. BARTON. We will take it.

Ms. KENDERDINE. We recognize that section 29 has been a very successful tax incentive. And from a committee that doesn't write tax law to an agency that doesn't do tax law either, I think our tax law would be very different if the Department of Energy were directly responsible and in control of it. But we would be happy to examine this further.

I know that Bob Gee, our Assistant Secretary for Fossil Energy, has met with industry on many occasions on this and talked to the National Economic Council experts about this and discussed the impacts and possibilities.

Mr. BOUCHER. Thank you for that. While we don't legislate on the subject, we can certainly talk about it—

Ms. KENDERDINE. And we do all the time.

Mr. BOUCHER. [continuing] what, if any, changes might be helpful. And to the extent that your department can give us advice on that subject we would welcome it.

Ms. KENDERDINE. Absolutely. We have some very good tax people in our Fossil Energy office. Happy to have them come talk to you.

Mr. BOUCHER. Thank you, Mr. Chairman.

Mr. BARTON. I only have one final question for this panel. Then I want to welcome our second panel. I would like the staff to put up the EIA chart that shows the outyear gap between production and consumption. It is one of the last charts that Mr. Hakes referred to. It is right behind that. It is not that one. It goes out to the year 2020. That is the one.

Now, I am looking at the Energy Information Administration energy info card, which is really excellent. And it shows on one side, I guess the backside, that the total primary energy production is 73 quadrillion btus in the United States and the total consumption is 97 quadrillion btus. So there is a gap of about 24 quads. And that is, I guess, in 1998 or 1999 you look at this chart, and this is really—show how old I am—the \$64 question. Does anybody in the audience remember the quiz show that the big question was the \$64 question? That shows.

Ms. KENDERDINE. No, sir.

Mr. BARTON. So the \$64 question of these hearings is, what do we do in the outyears, which means we need to act as soon as possible so that that net import gap is minimized?

Now there are a lot of things we can do. If we wanted, I don't think we would eliminate imports. But if we made a massive move to nuclear power like France has done, if we made a massive move to coal, if we really maximized our production of oil and gas resources in the OCS and up in Alaska, we can do significant things to minimize that import gap there, that delta.

So my last question—and you may want to think about it and submit it in written terms for the record—but this is really what the whole purpose of these hearings is about: What is a baseline supply for this Nation? I mean, how much energy are we capable—

within our existing political environmental regulations capable of producing and what mix should it be? Should we move massively into nuclear? Should we really make a major political effort to open ANWR and the OCS? You know, what should that supply line be in terms of quads and what is the mix in terms of supply?

[The following was received for the record:]

We believe we need to rely on market forces to be the primary determinant of our energy future, with government intervention only to ensure that energy markets are competitive, energy supply systems are secure and reliable, the Nation is prepared to respond to energy emergencies, and the environment is protected.

While government policies can influence energy sector trends, they cannot, and should not attempt to, determine our energy future. For this reason, our key long term objective is not to ensure that the success of any particular energy resource or technology, but rather to provide diverse energy technologies for the future. If we can help ensure the availability of a broad array of competitive energy technologies, we believe the Nation and the energy sector will be prepared to meet future energy challenges, whatever they may be.

Mr. BARTON. I will just open that up to the panel. Mr. Martin.

Mr. MARTIN. I had a chart on that—let me just mention it—on page 12. I gave this a lot of thought myself. Because you need a balance. Not everything is going to be a great solution here.

I think we can keep our oil imports to 11 million barrels a day and our gas imports to about 6. Gas primarily from Canada. And the way you do that, first is you use some energy more directly. You don't electrify everything in sight. You have some electrification, but you don't go massively toward an electric solution. Coal, nuclear power, certainly gas would fuel most of your electricity. You use a lot of gas directly. That is how we get to our 35 quad. You need renewables, and you need energy efficiency.

But I can get us to a scenario which is below the EIA reference case on energy demand, which I thought was pretty good for a Republican. On here, they have 121 quads. I can get us to 115, for example, through energy efficiency.

It is interesting, by enhancing your energy security you also enhance your environment interestingly enough, because you are using less fossil fuels, in theory, if you are using less energy. So you get a nice hit with lowering CO₂.

But this is exactly the sort of debate this committee should be involved with. I don't think there is an easy solution. I think it should be market based. But I do think there are things the Congress can do to enhance what I call a low energy import future, and it is really relying on our domestic import base.

Ms. KENDERDINE. Mr. Chairman, the Department of Energy supports a very diverse portfolio of energy R&D technologies. But the issue of oil imports is—you are not going to have much effect on oil imports by increasing nuclear power or increasing natural gas. Our oil imports go primarily for transportation, and we can't run our cars on nuclear power. And so the—

Mr. BARTON. Isn't it about half?

Ms. KENDERDINE. I think it is 66 percent.

But so if you are going to affect the oil import piece of this equation, you either produce more oil at this point in time through 2020—I mean, you are talking about our current fleet of vehicles is essentially what you are talking or even future until we develop different alternative ways to power our automobiles. And so if you

are—you either have to increase your production of oil or decrease your consumption.

And as I mentioned to you earlier that you can—if we increase the efficiency of our automobiles, the average efficiency of automobiles by just 3 miles per gallon, you would save a million barrels of oil per day. That is a lot of oil. And that is why we are working on an 80-mile-per-gallon vehicle because that I think is the most feasible way at this point in time to decrease the net imports of oil. I mean, we are also working, as I mentioned, on increasing production of oil. That is your tax incentives and lowering the cost of production.

There are some very fruitful areas. And the Outer Continental Shelf, OCS, and the Gulf is very fruitful and also diversifying our sources of supply.

There was a huge find in the Caspian. They are estimating that that might be as large as the North Sea. I think that the estimates of possible reserves in the deep Gulf are about 18 billion barrels of oil. So there are places to go to increase our domestic production. But also we—if you want to affect that equation, we very much need to look at the demand side as well.

Mr. BARTON. Does anybody else before we recognize Mr. Largent? Mr. Sharp and then Mr. Yergin.

Mr. SHARP. When we look at the import question that is very important because it gets our attention to a bunch of issues that probably need to be resolved.

But let me be a little bit of a skunk at a garden party. I think if we are not careful we get so overfocused on imports we make a lot of foolish and costly decisions, as we did in the 1970's. Because everything has got to be judged whether it is economic or not. Remember the fundamental facts of the oil market are it is cheaper to produce it somewhere else, that the really cheap stuff is in the Middle East. So you are always fighting the marketplace hard when you go to high-cost fuel sources or alternative sources or something of that sort.

The truth is, we can adjust and moderate that through tax incentives, through various things to get more fuels on the market, but the reality is that world market will come crashing in on Republicans and Democrats and everybody else again and again and again.

So I would be very careful about the concept that our whole goal is to get down to 4 million barrels a day. Because we can design a policy. We can also wreck the economy doing it. The truth is, if we drive up the cost of energy in this country we can become less dependent. Of course, we won't export a lot of our products, and our consumers will be angry, and a lot of things will be inefficient in our country, and will we have achieved the goal of import? I don't mean to overstate this except that it really distorts our thinking if we are not careful.

I think I am in a dilemma because I think you are right to be focused on this. I think we ought to be examining those other places to produce in the United States if they are efficient places to get gas. The moratoria are politically powerful in both political parties. That is why they are on. That is why they stay on through Republican and Democratic presidents. I wish it weren't so. I think

it is ridiculous in Florida and California we can't do more with newer technologies.

Mr. BARTON. Well said by the man from Indiana.

Mr. SHARP. It was easy for us in Indiana. But I think you have got to work on both ends, and you have to work on the automobile, too. The truth is, much as we don't like it, and I came from a district where we manufacture automobiles, that we are not headed in a very good direction at the moment the way we are building.

Mr. BARTON. I am really asking for the balance point. I probably didn't do it as efficiently. But I am—

Mr. SHARP. It is very hard to balance that. I think the Secretary is right, because that was the direction he tried to take back in the early 1990's, which was to recognize you got to do multiple things and in order to sell them on Capitol Hill or anywhere else you have to package those up together. It is awfully hard to get one or the other kind of proposition. With this election I suspect in both political parties we are hard to get that between now and the fall.

Mr. BARTON. Let's let Dr. Yergin answer the question.

Mr. YERGIN. Really quickly, I think it is a question of balance and getting the different elements together.

I think, on the foreign policy side, the reality is that whatever the number is going to be, a large importer and good relations with the importer is extremely important, diversification is extremely important, an interweaving of interests so that the exporters see that their interest is, among other things, a very healthy economy. We talked about the needs to facilitate domestic production, and I think that is part of the answer.

Certainly, listening to the discussion about cars, one of the things in our study is that we now as American each of us drives almost 35 percent more than in 1980. We are driving a lot more. Of course, we are driving different kind of vehicles. One out of two vehicles now is a sports utility vehicle or minivan, and they get about 21 miles to the gallon; the car gets about 27 miles to the gallon. Fixing that is a contribution.

The emphasis on technology. I think one of the lessons I came from writing this book, *The Prize*, was how technology really does have such a powerful force that you don't see it. And continuing as the Department does, this subcommittee is encouraged to continue to push technology different directions, is ultimately going to when we get out to the year 2020, and there are lots of surprises there, that technology will deliver a lot of them.

Mr. BARTON. We are going to recognize Congressman Largent for 10 minutes, because Mr. Boucher and I both took at least 10 minutes. Then we are going to excuse this panel, unless another member shows up before Mr. Largent leaves, to go to our second panel. So Mr. Largent is recognized for 10 minutes for questions.

Mr. LARGENT. Dr. Yergin, I wanted to talk to you about your book a little bit. I read this book, and I really commend it to members of this committee. I felt like it was a very helpful resource in giving some history of oil. The title—in fact, the reason I ask for this, is that the title says, *The Epic Quest for Oil, Money and Power*. What I find missing from the discussion, and I think this strikes at the heart of what Mr. Sharp just said, what I want to take issue with, one of the things that I found very fascinating in

particular was some of the historical views of World War II and the demise of the Japanese and the Germans and its relationship to the lack of supply of petroleum products.

And one of the things that I found missing on this particular panel is the discussion of our dependence on this importation of oil as it relates to our national security. And I would just like you to make some comments about if there are some parallels that we need to be aware of what occurred to Japan, of what occurred to Germany to a lesser extent, in terms of their national security and the lack of a consistent, reliable energy source.

Mr. YERGIN. Thank you. It was for me one of the kind of amazing revelations, in terms of many years I spent researching that story, to look at World War II differently and to see the degree in which oil had been among the triggers of the war. I mean, why did Hitler invade the Soviet Union? Partly was to get the oil, of all places, Baku and the Caspian that is so much in attention now.

And our embargo against the Japanese, embargoing them on oil prior to the Second World War, was connected to the Japanese march toward what became Indonesia. And of course the conduct of the war and you look at it and you see that ultimately, in many ways, both the Japanese and the German military machines were immobilized by lack of fuel. And it was a great strength that we had that Congressman Hall had the vitality and the creativity and the energy of the U.S. oil industry in terms of really supplying the entire Allied effort.

So I think your remarks tie into what Admiral Watkins said. When we talk about what the SPR is about, it is not a long-term answer, but it is one that provides very important time in a moment of crisis. And I think that underlying oil considerations and imports—and I think this maybe goes back to Congressman Barton's point, too. There is a continuing underlying national security consideration that depends—

You know, the security issues, much of the time are not there. Some of the time, they are there; and they can come as a surprise. In 1990, 1991 things had tilted a little differently. If the world oil market had been a little bit tighter we would have seen a different kind of repercussion in the Gulf crisis.

So I think that the security consideration is not always at the forefront, but it always has to be part of our thinking about something that is this vital to our well-being and the well-being of the countries that are our critical partners around the world.

Mr. LARGENT. I guess maybe to focus my question a little bit better would be to say at what point does the red light on the dashboard go off in terms of national security issues? As we see these forecasts going from 52 percent to 64 percent, at what point does the light go off and say, wait a second; this is a real problem. What are we going to address this problem? Where is that line?

Mr. YERGIN. That is talked about a lot. Basically, that line keeps moving up as our imports keep moving up. A lot of it has to do with how you assess the relationship with the countries that are major suppliers of oil. If Iraq had not only kept Kuwait and was dominating the Gulf we would have looked at any of these numbers as very alarming. So I think it has to be seen within the context of overall relationships.

I would look at the case of Mexico which gets 40 percent of its government revenues from oil, very vulnerable to that, but Mexico is equally or even more aware of how much it depends on the health of the U.S. economy. So that part of the security picture is their sense of their interrelationship and interdependence with us. But I don't know other people might maybe see where the red light flashes more clearly.

Mr. LARGENT. I will go to you in just a second.

I had one other question before I leave you, Dr. Yergin. That was, one of the comments that you made in your open statement was to caution Congress about making short—or doing short-term intervention. What kind of things are you talking about when you say that?

Mr. YERGIN. Well, I think, and I think Phil Sharp referred to it, there is a propensity when prices are up in these market situations to talk about some kind of direct or indirect price control interventions in the market. We saw that even this winter where there was legislation where any time the price got above \$25 a barrel the administration was supposed to report to the Congress as to why they are not using the SPR to bring down the price.

I am concerned this summer, because we could see spikes in natural gas prices, given how tight this market is, that if we had that kind of intervention that came in even discussions of price caps of some kind or another that we would see—as Admirable Watkins said, it would affect the whole investment environment, and it would work against what we need, which is to see more investment flowing rather quickly into the natural gas sector maybe out of the Internet sector so that we do have the supplies that we need to meet our national needs. So it was really talking about market intervention of the kind that recurs whenever prices are in the upper frame.

Mr. LARGENT. Thank you. I am looking forward to watching the video series. I haven't gotten to see that yet, but I am planning to watch that this summer.

Mr. Martin, you had a comment.

Mr. MARTIN. Very shortly, on the red line. The red line is an international number I think. I think it involves all of the countries' dependence on the Persian Gulf. And I think we are getting very close to that red line. If we just look in isolation at the U.S., that really doesn't do much. Indeed, this is an international strategy we are involved with.

That, again, is why the IEA is so important. I spent 4 years in the IEA during the second crisis, the Iranian revolution. We may have it all right here, but if other countries are demanding more and more oil then we lose, too.

I note, for example, that it is remarkable how much Asian demand is increasing on the Persian Gulf, far more than us at the moment. So what do we do with the Japanese, the Koreans, even the Chinese? And why are the Chinese sending missiles to Iran when they are getting oil from the Gulf? These sorts of questions. It is really a foreign policy point.

And, honestly, the best way we can get our energy agenda through, which nobody seems to be interested in when you go to Cabinet meetings or in the public, but if you go with the national

security argument at a Cabinet table, then you have got some other people fighting for the domestic oil producers in, for example, in this country. You broaden the base of support for a rational energy policy based on national security.

Mr. LARGENT. Well, I obviously have colloquial interest, being from the State of Oklahoma and Tulsa, which is the oil capital, but I still view this from a national security perspective first, because I think that is the fundamental responsibility that I hold as a representative in Congress; and I think that that has to dominate local interests or otherwise. So I appreciate your comments.

Ms. KENDERDINE. I wanted to ask you a question. You talked about the administration encouraging domestic production. I want to know what specific proposals has the administration been promoting and initiating and proposing to increase domestic production?

Ms. KENDERDINE. Well—

Mr. LARGENT. All the folks back in Oklahoma are really interested in this answer.

Ms. KENDERDINE. I was out in Oklahoma with the Secretary. We met a lot with your producers.

Mr. LARGENT. I was there. They are still waiting to hear.

Ms. KENDERDINE. The President on I think it was March 18th announced support for delay rentals expensing. I know that there are a lot of marginal oil producers in Oklahoma and in other places; and, as always—I mean, you get into a discussion on support for marginal wells, as to whether it is cost effective. And you get into the types of discussions we have been having here.

Because while the Department of Energy is very much interested in preserving marginal wells, the domestic base we are concerned about—we are concerned about shut-ins. We know what a shut-in means, but then have you other players in the administration who are very concerned about tax policy and cost, as they well should be. That is their jobs. And it is not monolithic. We would like to continue to work with people within the administration to see what we can do on marginal well production.

As I mentioned earlier, we have supported and I have personally—I have been at the Department for 7 years—worked on a lot of oil and gas issues, lifting the ban on the export of A&S oil, supporting production and NPRA, the National Petroleum Reserve in Alaska, royalty relief in the Gulf of Mexico, and that has been a wildly successful program in the last 5 years, dramatic increases in oil and gas production in deepwater Gulf.

And I believe that this is not our area. It is Interior Department relief for royalty payments for marginal producers on public lands. So there are a list of things that we have done. It is—

But, again, the administration is not a monolith, just like the Congress is not a monolith; and we are working through a lot of issues. I feel really good about the tax incentives for G&G and delay rentals and hope that the Congress will pass those.

Mr. LARGENT. Let me just say in closing—I am sure I am approaching my time—that to those who would question the cost effectiveness of addressing stripper wells and marginal wells let me say, first of all, it is much less expensive to enhance production

from an existing well than to shut it in. Second of all, it is much more environmentally friendly to do that.

What I would just say and hope that you will argue for as well is that we need to see, I think, an increase in research to enhance production from existing wells which is taking place and is an environmentally friendly—it is efficient, it is a less expensive way to go, as opposed to just, you know, turning off the tap and closing the wells.

Ms. KENDERDINE. Most of our oil supply R&D money is targeted for smaller producers because they are the ones who cannot afford what is expensive, is R&D. So we have invested a lot of our R&D money in marginal well production.

Mr. LARGENT. Unfortunately, R&D budget is shrinking; and we are trying to address that in this appropriation process that we are in right now. But particularly targeting that research would be important. Thank you.

Thank you, Mr. Chairman.

Mr. BARTON. I was going to release this panel, but the Honorable Phil Sharp is dying to have the last word.

Mr. SHARP. I just wanted to respond to Congressman Largent because I wouldn't want to be misunderstood that I think that imports are not significant. The question is, it is not the only measure of our national security.

I was trying to articulate—which Mr. Martin articulated somewhat better—which, even if we got our imports down we have major stakes so we must not forget there what happens in this world oil market. So I am a strong promoter of trying to get them down.

But we sometimes make huge mistakes to raise the cost. Throughout the synthetic fuels corporation, which finally the Reagan Administration and the Democratic Congress repealed, was all driven by national security arguments, all driven by production and imports arguments, and it was a big mistake.

Mr. BARTON. Now the Honorable Admiral Watkins. Absolutely the last time.

Mr. WATKINS. Everybody went to the right. It was wonderful when I was in the Navy.

But let me just try something on you here now. I think this committee could take a look at the DOE Organization Act. It requires a submission biennially of a national energy policy plan. Look at that thing, straighten it out, get it harder. The EIA, Mr. Martin runs a very good quasi-independent agency. They are great. They have good data.

Mr. MARTIN. No, I don't.

Mr. WATKINS. Mr. Hakes does.

Mr. BARTON. Mr. Martin is quasi-independent.

Mr. WATKINS. He has already gotten a good track record and good report cards on his data.

The Congress should demand that models be prepared on the integration of all these various aspects of energy. Those should be looked at by the private sector. Everybody else, they should have access by everyone. We ought to play our advocacy against those models, and we should demand with each administration that they come forward with recommended changes to the existing laws. If

they think it is important, come up with the analytic data to base up those advocacies. They will either win or lose, but at least we will know what the new starting point is.

We ought to be doing that with every session of Congress, in my opinion. I think that is something this committee can demand is a better system so we go between one administration and the next without discarding everything and saying that the Republicans did a lousy job but just listen to our advocacy. We shouldn't allow that in this business. We ought to get analytically sound.

And people like Dan Yergin and Phil Sharp that work in this continuously can be participants in that process and demand it. Don't let the energy policy atrophy the way it has.

The good things that we hear about DOE doing, who knows about it? Have they recommended changes up here to the various acts? Have they fought—are they up here pounding the table, saying this is best? Here is the analytic data. Look at these outfits that have assessed this.

The IEA has looked at it in Paris. These are the things that ought to be demanded in this committee. Then we will get this thing going. Then the DOE may have some relevance.

Mr. BARTON. I appreciate the tongue-lashing that the former Secretary just gave this subcommittee, and I will try to honor some of those requests. Because they are well taken.

We are going to release this panel. Before we do, though, I want to personally tell you how much I appreciate each of you changing your schedule. The only two we could force to come would be Mr. Hakes and Ms. Kenderdine, but the rest of you made a real effort to be here voluntarily.

And this is going to result in something. I can't tell you what yet, because we still have a hearing on coal, and we have a hearing on renewable and alternatives. But I think at the end of the summer as we look back on the hearing record it is going to be a great record, whatever the administration is next year, to begin to build a comprehensive and I hope bipartisan energy strategy for this country. So I want to give each of you my personal appreciation and release you from purgatory. So you are released.

Before we start the second panel I will suggest that we take about a 7-minute personal convenience break because the second panel has sat in the audience for 3 hours straight, and I don't want them fidgeting. So about 12:55, I want all my second panel to be back here. We are in recess until 12:55.

[Brief recess.]

Mr. BARTON. If our panelists could take their seats, we will try to get started with the second panel. I think we have everybody. The subcommittee will come to order again.

We now want to continue with our hearing. We have a very distinguished panel of witnesses on the second panel.

We have Mr. Red Cavaney, who is the President and CEO of the American Petroleum Institute.

We have Mr. Michael Johnson, who is Vice President of Natural Gas and Gas Products for Conoco. He is here on behalf the Natural Gas Supply Association.

We have Ms. Cathy Abbot, who is President and CEO of Columbia Gas Transmission, and she is here on behalf of the Interstate Natural Gas Association of America.

We have Mr. Roger B. Cooper, who is the Executive Vice President for Policy and Planning of the American Gas Association.

And last but certainly not least, Mr. Barry Russell, who is President of the Independent Petroleum Association of America, and he is representing, in addition to IPAA, the National Stripper Well Association.

Lady and gentlemen, we appreciate you being here.

We are going to recognize Mr. Cavaney for 7 minutes. We want to set the record straight before we do that.

There are some in Texas that are not sure that Tulsa is the oil capital of the world, but we are not going to get into a long-winded debate about that in this subcommittee. Your statement is in the record in its entirety, Mr. Cavaney; and we would recognize you for 7 minutes to elaborate on it.

STATEMENTS OF RED CAVANEY, PRESIDENT AND CEO, AMERICAN PETROLEUM INSTITUTE; MICHAEL L. JOHNSON, VICE PRESIDENT, NATURAL GAS AND GAS PRODUCTS, CONOCO, INCORPORATED, ON BEHALF OF NATURAL GAS SUPPLY ASSOCIATION; CATHERINE GOOD ABBOTT, PRESIDENT AND CEO, COLUMBIA GAS TRANSMISSION CORPORATION, ON BEHALF OF INTERSTATE NATURAL GAS ASSOCIATION OF AMERICA; ROGER B. COOPER, EXECUTIVE VICE PRESIDENT, POLICY AND PLANNING, AMERICAN GAS ASSOCIATION; AND BARRY RUSSELL, PRESIDENT, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, ON BEHALF OF NATIONAL STRIPPER WELL ASSOCIATION

Mr. CAVANEY. Thank you, Mr. Chairman.

My name is Red Cavaney. I am president and CEO of the American Petroleum Institute. I appreciate the opportunity to offer our assessment on the state of the U.S. oil and natural gas industry and on how we can work with you to forge an energy policy that is global in nature and helps ensure that America's future energy and security needs are successfully met.

I request that the statement of the Alaska Oil and Gas Association be included as part of my testimony.

Mr. BARTON. Without objection.

[The statement follows:]

PREPARED STATEMENT OF JOSEPH H. HEGNA, ARCO ALASKA INC. ON BEHALF OF THE ALASKA OIL AND GAS ASSOCIATION

For the record, I am Joe Hegna from ARCO Alaska, Inc. I have spent over 20 years working in the oil industry—designing, building, and operating facilities. For the last 12 years I have been involved with various environmental management functions.

The focus of these written remarks will be on the use of new technology to minimize environmental impacts for arctic oil and gas development. In Alaska, we call this “doing it right”.

Before we get into a discussion of “doing it right” using new technology, I would like to put things into perspective by describing the North Slope of Alaska. The North Slope is a flat treeless plain, or tundra, which covers 88,000 square miles, an area slightly larger than the state of Idaho. It stretches from the Canadian border to the Chukchi Sea. It is 600 miles north of Anchorage, and about 1200 miles south of the North Pole. Winter temperatures are typically minus 30 to minus 40

degrees Fahrenheit with 30 to 40 mile per hour winds. Summers are generally a balmy 40 degrees.

Prudhoe Bay, the largest oil field in North America, was discovered in 1968 and went into production in 1977. Currently, there are 12 separate oil producing fields. These fields occupy less than 2% of the total surface area. Since Prudhoe first went into production, over 12 billion barrels of oil have been produced on the North Slope. These are some of the best facilities in the world—in design and operation. I think they are the “best of the best”.

Extensive research indicates that oil field activities have had no adverse effect on the North Slope's fish and wildlife populations. For example, the caribou move freely through the oil fields and have generally been unaffected by our facilities. In fact, the number of caribou in the Prudhoe Bay area has grown from 3,000 in 1972 to about 20,000 today.

Air quality is consistently better than required by state and national standards. Emission sources are closely regulated by state and federal agencies. The largest quantity of air emissions from North Slope oil operations comes from turbines that power production facilities. These turbines are fired by natural gas, one of the cleanest burning fuels available.

All North Slope operators have a goal of zero spills. In operating these complex fields, however, some spills will occur. Most are from a pint to 10 gallons. And the vast majority of spills never reach the tundra or surface water because they are contained on the gravel pads on which the facilities are constructed, where they are easily cleaned up. All spills, no matter how small, are reported and cleaned up immediately.

These existing facilities are very well designed and operated. Operating excellence, with regard to the environment, has been recognized by others including recently the Environmental Protection Agency (EPA) and the Interstate Oil and Gas Compact Commission (IOGCC). In 1999, the EPA's Region 10 gave Kuparuk its “Evergreen Award” for pollution prevention. In 2000, the IOGCC gave Kuparuk the Stewardship Award for large oil and gas facilities.

Let's look at how new technologies and new approaches are making it possible to find, develop and produce new fields with even less impact on the environment. In the arctic, we can now explore for oil without leaving a footprint on the land. And when we do find new fields, we're able to develop them in ways that have even less impact on the land and the fish and wildlife that inhabit it.

The acquisition of 3-D seismic data is a key step in the exploration process. It's how we identify and map the prospects we're interested in. Onshore seismic acquisition on the North Slope occurs only during the winter after the federal, state and local governments issue permits authorizing tundra travel. Tundra travel doesn't begin until the tundra is frozen and there is six inches of snow cover. We use specialized low-impact tundra travel vehicles which weigh more than 10 tons. However, the tracks are long and wide, spreading the pressure over a large area... protecting the tundra from damage.

Onshore exploration is conducted only in the winter. We use ice roads to move drilling rigs, camps, men and material to remote locations. We build ice roads with water from lakes chosen with the assistance of the Alaska Department of Fish and Game. The volume taken from each lake is determined based on water depth and whether a lake contains fish. Ice roads are generally six inches thick. It's not unusual for us to build 60 to 70 miles of ice road a year to support remote drilling operations. In the spring, these ice roads simply melt away.

The best illustration of how we are “doing it right” is by a real example. I have brought a brochure on the Alpine Field—“Setting The Standard For The New Millennium”. On the cover is a drilling rig.

A drilling rig weighs several million pounds and is moved to its location via ice road. The rig is set on an ice pad more than 12 inches thick. When drilling operations are complete, the rig and support facilities are removed, and all drilling wastes are transported to existing facilities for disposal or injected back downhole. The final step is to take a front end loader and shave the ice pad down to pure ice. Scraped material is hauled out and disposed of in approved facilities. Pads melt, leaving no trace.

On the inside page is a photograph of an exploratory well at Alpine taken the summer after it was drilled. Six months before this picture was taken, a 160-foot tall, 3 million pound drilling rig stood on an ice pad where the well was drilled to an 8,000 foot depth. Prior to drilling we acquired seismic data over this entire area. You can see how much impact we've had.

The only visible sign of our presence is the well tree. And this remains on location because we are developing the field and will one day produce from this well. If the

well had been unsuccessful, we'd have plugged and abandoned it below grade, leaving virtually no trace.

The thing that's amazing about ice-pad technology is that the vegetation adjacent to this well is completely undisturbed. We can explore without leaving visible footprints.

Producing oil requires infrastructure and a permanent presence for the life of a field. Our goal is to design, build and operate fields in a way that minimizes impact on the land, the water, the air and on the fish and wildlife that use a given area. To see how, let's look at the Alpine field which is now being developed and which will begin production in 2000.

The first step is understanding the environment. We began environmental studies of the Colville area in 1991, three years before we discovered the Alpine field.

We mapped 24 different habitat classifications that were developed with the assistance of the US Fish and Wildlife Service and the Alaska Department of Fish and Game. Baseline studies were designed with the help of these and other resource agencies. We used satellite infra-red photography, ground-truthed by summer field parties to develop the map. We did regional study first, then focused on the Alpine project area when the discovery was made. Different kinds of habitat are important to different kinds of wildlife. Some kinds of habitat are scarce, others are not. To avoid major impacts, you have to know where the high value and low value areas are.

Nuiqsut residents, who use this area for subsistence hunting and fishing, also played a role in this process. We used their input, agency input and this data to locate our facilities in areas where they would allow development of the field and minimize impact. At Alpine, for example, we moved a drill site away from a lake important to waterfowl and subsistence hunters.

Extended reach drilling allows us to drain oil from a very large area from a single location. At the Niakuk field near Prudhoe Bay, where ARCO and BP have developed two offshore oil accumulations from a single, onshore drill site, we've done it by drilling wells with departures of more than 20,000 feet—or four miles. Our drilling targets are 9,000 feet deep and four miles away from our drilling rigs.

To illustrate what this means, I had our engineering department prepare a drilling scenario for Washington, D.C. With today's technology, and a 21,000 foot step out well, we could build a drill site on the front lawn of the White House and produce oil from beneath most of Washington and a big piece of Arlington, Virginia. The world-record step out well is longer than 28,000 feet—or 6 miles. With wells of that length you could produce from beneath the entire District of Columbia, all of Arlington, Alexandria, and a big piece of the Maryland suburbs too.

The evolution of production pads—or drill sites—on the North Slope is a classic example of how we have done it right. A drill site is a central location from which we drill and operate as many as 50 wells. In the early days, they were generally 65 acres in size. Wells were spaced 120 feet apart, and the pads included large reserve pits for storage of drilling wastes. Today wells are 15 feet apart and we've eliminated the reserve pits. At Tarn, we have space for 50 wells on a 6.7 acre pad. Pads today are one-tenth the size that they used to be.

Traditionally, drilling muds and cuttings have been placed in surface waste disposal impoundments known as "reserve pits". Today, using grind and inject technology, cuttings are crushed and slurried with seawater in a ball mill, then combined with the remaining drilling muds and reinjected into a confining formation 3,000 to 4,000 feet underground. This permanent and environmentally sound disposal method isolates the wastes, eliminates subsequent disposal problems and greatly reduces the spaced required for drilling operations.

The Alpine pipeline river crossing is the first of its kind completed in the arctic. We proved the technology, by installing 18" steel pipe in a 4,200 foot bored hole from one side of the river to the other. The pipe passes 100 feet below the river. A cased oil pipeline was then installed within the 18" steel pipe. In short, we will have a pipeline within a pipeline. This design ensures instant containment in the unlikely event of a small leak. A state of the art leak detection system will also let us know if we have a problem.

The Alpine field will be produced from just two drill sites, three miles apart. Pads will be joined by a gravel road that will also serve as an airstrip. Surface impact—gravel footprint—will comprise about 97 acres. From this small footprint we will be able to access the Alpine reservoir, which encompasses some 40,000 acres—more than ten miles long and four miles wide. Less than 0.2 percent of the field will be impacted—that's less than one-tenth the percentage at Prudhoe. Construction is occurring during the winter, using ice roads. The construction will not disturb wildlife.

The Alpine field will not be connected by a permanent gravel road to existing infrastructure on the north slope. The operation will be much like that of an offshore

platform. Drilling supplies and major equipment will be transported in winter using ice roads. Food and personnel will be transported by air, and the number and frequency of flights will be limited for a six week period in June and early July to minimize disturbance of nesting waterfowl.

Our goal is to minimize our impact on the environment and operate oil fields that are sanctuaries for healthy populations of fish, waterfowl, and wildlife. Thousands of caribou still return to our fields to calve and rear their young. The herd is six times larger than it was in the early 70's. Our waterfowl populations are healthy. We have turned our gravel mines into deep lakes that provide crucial winter habitat for fish—a rare commodity because most of the lakes on the North Slope freeze from top to bottom in winter. We've learned a lot over the years. We can explore without leaving footprints. And the footprint required for new developments is a tenth of what it once was.

Alpine—with its new technology—shows you what we mean by “Doing It Right.”

Mr. CAVANEY. It is particularly appropriate that we discuss this topic now because of the convergence of two powerful forces pulling the industry in opposite directions. The first force is the beginning—this weekend, in fact—of the vacation driving season, which offers a clear picture of the continued increase in demand for our products by American consumers.

Gasoline-powered automobiles have been the dominant mode of transport for the past century and there is no evidence that consumers are ready to change. The automobile will remain the consumers' choice for personal transport because the mobility and independence it affords is so highly valued. While substitutes for gasoline may some day become prevalent, any such wholesale change is more than several decades away.

The industry enters the new century with bright prospects for sustained and significant growth for the foreseeable future. Most forecasts anticipate an increase in worldwide demand for our products of 15 to 20 million barrels a day within the next 2 decades, an increase of between 20 and 25 percent.

The second force I referred to is represented by two Federal Government actions, one on diesel fuel, the other on gasoline.

Last week, the EPA proposed to drastically lower the sulfur content of diesel fuel beyond industry's unprecedented commitment to reduce sulfur by 90 percent. Adopting EPA's rule will almost assuredly have negative consequences on our industry's ability to supply petroleum products to consumers.

Concerning gasoline, on June 1, we must begin selling new federally mandated cleaner burning gasoline, RFG Phase 2, it is called, in one-third of the country.

We certainly share government and consumer commitment to clean air. These latest regulations, however, are too much too soon. They represent yet additional layers of uncoordinated government regulatory restrictions being piled on at ever shorter intervals.

Add to this the increasing tendency by government to deny our companies access to Federal lands for responsible exploration and production of oil and natural gas, and the cumulative effect is ever-increasing constraints on this country's energy infrastructure.

A steadily increasing demand for our products simply cannot be sustained over time if government policies are consistently at odds with the practical operational needs of the industry. And let me be clear, our industry is committed to meeting the Nation's energy needs while contributing yet further significant gains in environmental protections.

We are already seeing evidence of infrastructure stress in California where stringent specifications on the type of gasoline sold in the State has led to fewer refineries, all of which are operating at peak capacity. As the General Accounting Office pointed out in its recent report, any supply disruption caused by California refinery outages tends to quickly upset the State's tight balance between supply and demand. Surely the attendant volume and price volatility is not the type of future we want for the rest of the Nation.

Moreover, the current situation in the Midwest, where summer-time reformulated gasoline is in short supply and significant price differences are developing between reformulated and conventional gasolines, underscores the need for regulators to provide refiners the flexibility they need to continue to meet consumers' needs at affordable prices.

As we enter this new century, it is essential that the Federal Government revisit energy policy. No change from the current position is a prescription for more price volatility and increasing concerns over supply adequacy. We urge Congress and the White House to adopt an energy policy that recognizes four very important points: .

First, our industry's flexibility to adapt to the demands of rapidly changing cycles cannot be further eroded by uncoordinated new government restrictions without adverse impacts on consumers.

Second, given our industry's significant technological advances, a vibrant U.S. oil and natural gas industry can coexist with a safe and ever cleaner environment.

Third, our industry is highly globalized, and government actions that damage its efforts to conduct business abroad are also harmful to the Nation's economy.

And, finally, government must begin an earnest effort to reconsider its view of the industry with an eye toward forging an energy partnership to benefit consumers, government, and industry.

Because of its commitment to its consumers, our industry has always found ways to meet the challenges placed before it. Perhaps because of that, some have come to believe that there is no limit to the burdens they can place on our industry. I am here to convey what our experts tell us. There are limits to the stresses that can be endured without resulting impacts on consumers. As the heating oil situation this winter and the recent spike in the gasoline market point out, flexibility is being regulated out, as is the convenience and affordability our customers, your constituents, have come to expect. It need not be this way.

We recognize you are faced with increasing demands to address these matters, and we applaud your efforts to look at an energy policy. To the extent to which we can help in your efforts to better understand the policy effects of the many actions that are under your consideration, we are here to help you.

Thank you, Mr. Chairman and members of the committee.

[The prepared statement of Red Cavaney follows:]

PREPARED STATEMENT OF RED CAVANEY, PRESIDENT AND CEO, AMERICAN PETROLEUM INSTITUTE

The American Petroleum Institute (API) is pleased to have the opportunity to present a statement on the state of the oil and natural gas industry in the United States. We are also pleased to offer our thoughts on how industry and government

can work together more effectively in implementing an energy policy that is global in nature and helps ensure that Americans' future energy and security needs are met.

API represents nearly 500 companies engaged in all aspects of the U.S. oil and natural gas industry, including exploration, production, refining, distribution and marketing.

THE STATE OF THE INDUSTRY

It is particularly appropriate that we discuss this topic today because, as we all know, this weekend is the beginning of what is traditionally known as America's vacation driving season. Perhaps nothing better illustrates how the products produced by our industry serve American consumers, how important those products are to consumers, and how they affect their everyday lives.

It is important to emphasize that America's oil and natural gas industry is committed to supplying American consumers with a reliable and affordable supply of energy for all their needs. Meeting this goal has not been easy, particularly these last few years that have seen the industry through countless twists and turns, peaks and valleys. Last year, for instance, we experienced some of the lowest crude oil prices in this century, and this year we've seen some of the highest in a decade. Nevertheless, despite the industry's penchant for rapidly changing cycles, we have managed to continue fulfilling our mission—supplying consumers with the petroleum products that they need.

While there have been many cycles in the industry's history, and surely more in its future, we should not let these temporary booms and busts obscure some clear long-term trends that are essential to understanding the industry. In fact, discerning the difference between these short-term cycles and long-term trends is likely to be one of the most serious challenges to energy policy in this new century.

OIL AND NATURAL GAS AND THE COUNTRY'S ECONOMY

First, and most important, there is a clear link between the use of petroleum and economic development. Through all the changes that have occurred in our industry, one constant has been the growing use of our products by our customers. Gasoline-powered automobiles have been the dominant mode of transport for the past century. There is no evidence that consumers are ready to change that.

Regardless of fuel, the automobile—likely configured far differently from today—will remain the consumer's choice for personal transport. The freedom of mobility and the independence it affords are highly valued. While substitutes for gasoline may someday change this reality, any such wholesale change is more than several decades away—the amount of time required to fully retire the existing and still-growing fleet of automobiles powered by gasoline and to deploy any replacement fuel source throughout the world.

As a consequence of this, the industry has entered the new century, not with fading hopes, rather with the bright prospect for sustained and significant growth in demand for our products for the foreseeable future. Most forecasts anticipate an increase in demand for our products worldwide of 15 million to 20 million barrels a day within the next two decades. That is an increase of between 20 and 25 percent.

It is fair to ask, then, if the industry is up to the daunting challenge of supplying these products. The evidence suggests that we are. The remaining question, then, is whether Congress and the White House can demonstrate the vision and foresight to adopt an energy policy that assists in our efforts, or whether we will see a piecemeal energy strategy that extends encouragement and support with one hand but creates bureaucratic obstacles with the other.

A successful energy policy must recognize four very important points:

- Our flexibility to adapt to the demands of these rapidly changing cycles cannot be eroded anymore than it already has been by impractically conceived and uncoordinated new government restrictions.
- Given the great technological advances we have made, a vibrant oil and natural gas industry can coexist with a clean and safe environment.
- Our industry is highly globalized and any legislation that would damage its efforts to conduct business abroad would also be harmful to our nation's economy.
- The government must begin an earnest effort to reconsider its view toward the industry with an eye toward forging an energy partnership to benefit all stakeholders: consumers, government and industry.

I am pleased to say we have already seen evidence of this last point, in the Department of Energy under Secretary Richardson, in some sectors of the Minerals Management Service of the Department of the Interior, and in several other areas of the federal government. Unfortunately, the same cannot be said for all of the fed-

eral government. In all too many places, the oil and natural gas industry is viewed, not as a partner, but as a force to be controlled and regulated every step of the way without any full understanding of how such intervention will affect the industry's ability to meet its responsibilities to consumers and the nation. In some cases, government agencies even ignore laws enacted by Congress to ensure that multiple use (recreation, preservation and development of natural resources) of government lands is a fundamental consideration in implementing government land policy.

A failure to move toward this kind of sorely needed reform could have serious implications. A steadily increasing demand for our products simply cannot be sustained over time if government policies are consistently at odds with the practical operational needs of the industry.

Additionally, government needs to inform consumers of some of the likely consequences they undertake in dealing with the subject of energy. For example, in the state of California where stringent government specifications on the type of gasoline and diesel fuel that can be sold are in place, this has led to many fewer refineries, all of which are operating at peak capacity. As the General Accounting Office (GAO) pointed out in its recent report, any supply disruption caused by refinery outages tends to quickly upset the state's tight balance between supply and demand.

Why are there fewer refineries? The economics of meeting the state's regulatory requirements all but create a situation where capacity quickly rationalizes to demand levels, eliminating much of the traditional flexibility which benefits consumers.

I suspect this type of volatility is not what any of us wants for the rest of the nation. As we enter this new century, it is absolutely essential that we revisit energy policy in a new light. Circumstances have changed and will certainly continue changing. Given all that's at stake for our nation in the area of energy policy, a closer collaboration between government and industry needs to be fostered. The oil and gas industry is not opposed to regulation; we favor smart, constructive and well-considered regulation, based on sound science and economics, which will benefit consumers.

Moreover, our industry has repeatedly demonstrated its commitment to environmental protection. The lion's share of the progress made in reducing air pollution is attributable to cleaner cars, fuels and industry facilities and operations. Together, they account for approximately 70 percent of total emission reductions nationwide since 1970. The U.S. oil and gas industry spent more than \$90 billion on environmental protection during the 1990s. The industry spent \$8.5 billion in 1998 alone—and that was more than EPA's total budget and more than double the net income of the top 200 oil and gas companies.

MEETING THE COUNTRY'S CONTINUED ENERGY NEEDS

Our long-term ability to supply a wide range of products has been greatly enhanced by continual improvement of processes, technology and human resources. Indeed, the industry is remarkable in its ability to respond to adversity and develop ingenious solutions that keep our products coming to market in ways and at costs that consumers appreciate.

The intensive use of the latest, most advanced technology is making the century-old oil and gas industry an innovative, visionary, and highly efficient new industry. Our industry has been producing, and intends to keep providing, both the fuels and feedstocks that make life simpler and safer, more comfortable and more convenient for society. Our heavy reliance on technology makes us an industry with an exciting future—a flexible, resilient industry that welcomes change and meets challenges.

Our industry has embraced technology in many ways, with many benefits. Daily, the industry explores and operates safely in increasingly remote locations and in the harshest of conditions.

Technology has driven the costs of exploration and development dramatically downward: the cost of finding oil has declined by 40 percent over the past 10 years. Moreover, despite sharp increases in costs due to added regulations, operating costs at U.S. refineries have fallen by almost 20 percent per barrel, as refining has become more energy-efficient and new computer hardware and software have improved the processing of crude oil.

Technology in our industry—and throughout the energy business in general—knows no boundaries.

RECENT DEVELOPMENTS

The recent pricing and supply situation has caused some concerns about our ability to meet the demand for gasoline and diesel. That is understandable, but several important points should be understood about that:

- First, prices at the gasoline pump are determined by the cost of crude oil, and crude oil prices are determined by supply and demand in the international marketplace.
- Second, high crude oil prices have resulted from a decrease in foreign oil production and a greater demand for oil from the recovering Asian economies and a continued growth of Western economies.
- Third, although prices rose rapidly, retail prices, after adjusting for inflation, are generally 40 percent below the prices of the early 80s, and we have seen those prices gradually decrease as the supply of crude oil increases.
- The U.S. oil and natural gas industry is operating its refineries at record production levels—within safety and environmental limits—and will continue increasing through the prime drive season when the demand for gasoline is at its highest.
- The requirements for new federally mandated cleaner-burning gasoline that will be required in about one-third of the country beginning June 1 is creating uncertainties in the markets because of fears that refineries might not be able to supply all the reformulated gasoline necessary. First, this new gasoline is more difficult to make and has required extensive investments by refineries. Second, a recent decision by the U.S. Court of Appeals for the Federal Circuit in a gasoline patent dispute has potentially significant implications for the California and federal reformulated gasoline programs. Last week, the Court denied a petition to rehear this case. If the decision stands, it will likely impose additional costs on the manufacture and importation of fuels without providing any additional air quality benefits to the public. The Federal Circuit decision could also impact supplies of reformulated gasoline, as refiners and importers individually evaluate whether to continue to participate in the reformulated gasoline programs and either pay patent royalties or incur the costs of developing formulations that are outside the scope of the patents. Because of the uncertainty created by the Court's decision, concerns have also been expressed that importers and blenders, in particular, may choose to supply less reformulated gasoline to the market than they would otherwise have done to avoid potentially infringing on the patents.
- Finally—and perhaps this is the most important, the decision by OPEC to increase production in March may have contributed to a premature and irrational exuberance. The OPEC decision brought some short-term relief, but the fact remains that the fundamentals of the world markets still have not changed, and until this country changes its energy policy, we will continue to be faced with the fact that we import over 55 percent of our oil needs.

The price increases we experienced were brought on by short-term shocks that resulted from sudden changes in supply and demand. Just as prices were up for a few weeks, they began to turn down when factors changed.

In a free-market economy, we have seen time and again that price movements ultimately create balance between supply and demand. Leaving the marketplace free to continue working is what allows this balance to be maintained over time.

As has been proven over and over again, the U.S. oil and natural gas industry can best provide American consumers with a steady and affordable supply for all their needs when markets are allowed to function as freely as possible. We are pleased that the federal government took a balanced approach to the current situation by encouraging more foreign crude oil production while refraining from interfering in the marketplace, which is still the best way to get gasoline to consumers, reliably and at the lowest cost.

The past year and a half has seen us go from a period of extremely low prices to a peak where crude oil prices have reached levels that were three times those of the previous year. This dramatic change in crude oil prices contributed to increases in the prices for petroleum products. These changes made it difficult for consumers to plan and budget for expenditures and have absorbed a larger share of family incomes.

These changes were brought on by increases in world demand for petroleum due to robust growth in world economies and reductions in supply by foreign oil producing nations. World petroleum stocks have been drawn down, and prices have been driven up.

Despite the limitations on world supplies, our companies are working hard to produce all the gasoline and diesel fuel that our customers will need during the coming months. Refinery output of gasoline and distillate oil have set many records this year.

How we got to this point is relatively simple: We have experienced 20 years of more and more overlapping regulations that have left our nation's petroleum distribution system with minimal flexibility. Restrictions on producing petroleum in

this country have led to declines in domestic production by one third over the past three decades. We now import over 55 percent of our petroleum needs. This large demand on foreign supplies leaves us at the mercy of world supply and demand conditions and open to the volatility that we have experienced over the past year.

THE ENORMOUS COST OF VOLATILITY

While historically our industry and our nation have been able to survive the disruptions and nervousness brought on by market volatility, they have done so at a price. Volatility is in no one's best interest. Our companies suffer because it is much more difficult to undertake the types of long-term planning and investment needed for sustainability. When crude oil prices are rock-bottom, as they were last year, companies simply do not have the resources needed to invest in projects that could cost billions of dollars over many years. When oil prices are higher, as they are today, companies are reluctant to take the kind of risks necessary for future growth because they have no guarantee that prices will not plummet again. As one pipeline supply company executive told us recently, "Uncertainty leads to paralysis."

Our suppliers—companies that make pipeline and other equipment needed for exploration and production—have to put their own interests first, so when producers quit buying their products because of low crude oil prices, they have to search elsewhere for customers. By the time our companies are ready to buy equipment again, those suppliers may no longer be making those products because they've found more reliable customers.

Similarly, both producers and their suppliers are too often forced to lay off many of their employees and those employees get other jobs—many in other industries—and are thus unavailable when the producers are once again ready to expand. In the highly specialized area of petroleum engineering, the number of students entering those programs at our universities has steadily decreased.

In addition, if the hard times last long enough, many of our smaller producers and their suppliers will simply close up shop, never to return.

But there are other casualties as well. The first is the confidence Americans have always had in our industry to provide them with the products when they need them at a reasonable cost. Our companies have strived hard to live up to that trust, and for the most part they have succeeded. However, there can only be so much of this volatility and its resulting uncertainty regarding supply and prices before that confidence is brought into question.

And perhaps even more important are the national security implications of this volatility. As the world's only remaining super power, the United States has inherited a tremendous burden, at home and abroad. The question we must ask is this: how dependent on a reliable source of the products our companies make are our armed forces and those of our strategic allies?

The answer, of course, is extremely dependent. Any serious disruption of any segment of our industry—from production to transportation to refining to delivery—could place severe strains on our armed forces' ability to do their jobs. Without a sound energy policy that encourages greater domestic production and lifts the stifling effects of over-regulation, we place too much at risk.

It is important to point out that despite the obstacles, our companies are striving to supply products to consumers:

Refinery processing of crude oil is above average and set a record in 1999.

Refinery production of gasoline and distillate oil have set many records for this year.

Refinery utilization is currently above average for this time of the year, exceeding 93 percent last week.

These measures indicate that our industry is working as hard as possible to safely deliver the products that consumers need. It is also important to note that while world supplies are reduced, there are no shortages today.

How we can meet the challenges: An effective energy policy

Government can and should also take steps to strengthen our domestic oil and natural gas producing industry. Because the United States imports over 55 percent of the oil Americans consume, the ebbs and flows of the world oil market impact the industry's ability to continuously provide consumers the fuel they need at fully affordable prices. We can reduce rapid swings in prices by providing greater diversity in where companies get their supplies of crude oil, both at home and abroad.

We can reduce our reliance on foreign supplies and also potentially exert downward pressure on international crude oil prices by opening our most attractive domestic oil and natural gas prospects to responsible exploration and development.

One hundred years ago, scientists were predicting the demise of both coal and oil. Now, they are no longer forecasting the end of our coal supply, but we still hear the question asked: "When are we going to run out of oil?"

The fact is that oil is in plentiful supply—and is likely to remain so for the foreseeable future. According to the Oil & Gas Journal, the U.S. Geological Survey's 2000 World Assessment (to be released at this June's World Petroleum Congress) estimates that, excluding the United States, the world's undiscovered, conventionally recoverable reserves amount to 649 billion barrels of oil and 4,669 trillion cubic feet (TCF) of natural gas.

The USGS assessment shows that U.S. undiscovered conventionally recoverable reserves total 83 billion barrels of oil and 527 TCF of natural gas.

Looking to the future, technology could well permit the economic development of the largest known source of hydrocarbons—methane hydrates—methane frozen in ice. Located in deep water under intense pressure, methane could provide the world with several more centuries of available clean energy. The U.S. Geologic Survey has estimated that the United States has 320,000 TCF of methane in hydrates, which is 200 times the size of conventional gas reserves.

However, our industry cannot draw upon our vast remaining hydrocarbon reserves unless access is provided for responsible exploration and development.

Currently, many of these areas have been placed off-limits by the federal government. Since 1983, access to federal lands in the western United States—where nearly 67 percent of our onshore oil reserves and 40 percent of our natural gas reserves are located—has declined by 60 percent.

Our search for new domestic offshore oil and natural gas is limited to the Gulf of Mexico and Alaskan waters because of the congressional moratoria that have placed off-limits most of the rest of our coastal waters. Onshore, the President has repeatedly used his executive powers to limit oil and gas activity on vast regions of government lands. Congress has refused to authorize exploration on that small section of the Arctic National Wildlife Refuge that was specifically set aside by law for possible exploration in 1980. And most recently, the U.S. Forest Service moved to make it more difficult for our companies to explore for natural gas and oil on government lands when it announced a plan to bar road building in virtually all of the large areas in the forest system, spanning a total of 43 million acres in 39 states.

Our industry supplies the energy to keep America going strong, but to continue to produce domestic oil and natural gas, we must have improved access to federal and state lands.

Old arguments about the incompatibility of access and a clean environment have been disproved. Technology has revolutionized how oil and natural gas are found and produced. For example, geophysicists use three-dimensional seismic equipment to locate oil and natural gas with greater precision so that more oil can be produced with fewer wells. Fewer wells mean a smaller environmental impact. Improved drilling techniques allow companies to branch out underground to reach a variety of oil and gas reservoirs from one location. Offshore wells can now safely capture oil and gas in ocean depths of thousands of feet in areas far offshore.

Much has been made recently about the advantages of natural gas, and indeed they are many. Natural gas is a clean-burning fuel and there is no shortage of it, domestically. The National Petroleum Council, in its most recent report on natural gas demand, reported that it expects that U.S. gas demand will grow from 22 trillion cubic feet (TCF) in 1998 to about 29 TCF in 2010 and could rise beyond 31 TCF in 2015. But the fact that seems to be lost on some is that natural gas comes from the same place as oil does, from reservoirs buried deep beneath the ground. There is no magic fountain spewing natural gas, ready to be harnessed and delivered to our nation's homes, factories and electrical generating plants. We must look for it in the same manner we look for oil, and to do this, we need to be allowed access to the areas where it is likely to be found.

In addition to denying access for oil and gas development, the federal government has imposed layer upon layer of regulations on U.S. refineries without sufficient regard as to how these regulations impact refiners' ability to meet the full range of needs of American consumers. In many cases, companies have simply given up attempting to meet the increasing regulatory demands and shut down their refineries altogether, to the point that today we have about half the number of refineries we had just 20 years ago.

Over-regulation reduces the flexibility that refineries need to respond to the fast-paced changes in today's world. This is particularly true in the "balkanized" distribution system that we already have in place as a result of federal and state government mandates for different types of fuels for different sections of the country as a result of clean air regulations.

In the past, any refinery or distribution system disruption could easily be overcome by simply switching to another refinery or another pipeline. Today, with different refineries producing different grades of gasoline for different regions, such source switching has become extremely difficult, leaving the system vulnerable to serious supply problems.

Little effort is made by the government to explain to consumers why this balkanized distribution system means that people in some states or regions of the country pay more for their fuel than do people in other areas. The result is too often unjustified suspicion of and anger toward our companies and the industry.

The EPA's proposed regulation, announced last week, to drastically lower the sulfur content of diesel fuel is an example of a government action that could have significant, negative consequences on our ability to supply heating oil and diesel fuel. We share the government's interest in further cleaning the air. But emissions reductions beyond the 90 percent we have already proposed stand a good chance of further driving up fuel manufacturing costs unnecessarily, imposing yet additional burdens on our nation's truckers and farmers. We do not believe it is unreasonable to ask for a one-year moratorium on the implementation of these regulations—until sufficient studies of this extreme policy can be performed. We all share the same goal of emissions reductions but getting there sensibly without significant adverse impact on the industry and our nation's consumers is the smart way to go.

Even with greater access and flexibility, the United States will continue to need to rely on foreign oil supplies. Thus, it is important that we maximize the diversity of those supplies to help ensure the reliability of a continuous flow of oil imports. Unfortunately, U.S. unilateral trade sanctions and the constant threat of sanctions narrow our sources of supply, frustrating achievement of this important objective.

In recent years, unilateral economic sanctions have increasingly become the policy tool of choice in the conduct of U.S. foreign policy. One of the favorite targets of these recent sanctions has been major oil-producing countries. The U.S. currently has sanctions in place against countries comprising over 10 percent of world oil production and 16 percent of estimated remaining oil resources. There is little evidence that unilateral sanctions produce desired outcomes. There is a better way: working with the governments in which they do business, some of our companies are adopting their own human rights and environmental standards.

In short, U.S. policymakers face a dilemma. Growing supplies of crude oil will be required to sustain world economic prosperity, and diverse, ample foreign supplies are needed to help ensure our own country's economic growth. The drive to impose unilateral sanctions is an obstacle to both of these objectives.

Any effective energy policy cannot ignore the global aspects of the oil and natural gas industry. Every day we are becoming more and more integrated into a one-world economy and we cannot seek to isolate the United States if we want to remain a leading player in this economy. To that end, we must avoid all policies that make it more difficult for companies to operate abroad, we must encourage free trade and we must seek worldwide standards for technical equipment specifications to avoid duplicity.

Government must also resist the siren song of politically popular short-term solutions that can have devastating long-term implications. For instance, the unexpectedly severe cold spell in the Northeast last winter and the resulting spike in home heating oil prices led to efforts to create a regional home heating oil reserve for New England. We are now hearing similar calls for a 1.5 million-barrel oil reserve for California. In both cases, the motivation behind the proposals is understandable. Public officials have a sincere interest in seeing that their constituents are not inconvenienced or harmed by supply disruptions that could lead to shortages or higher prices. We share that interest. However, we must caution against the creation of such reserves because they would have the ultimate effect of the government becoming a heavy player in the marketplace, something no one wants.

If the federal government is in the marketplace, many operators in the private sector will choose to take their business elsewhere rather than compete head-to-head with the government. We need only look to the 1970s to see the nature of adverse impacts when the federal government plays a direct role in the daily marketplace.

The premise behind a regional reserve is that the government would buy oil and release that oil into the marketplace when prices get to be too high. It may sound like a rational idea, until you stop to look at the details. Who would be responsible, for instance, for deciding exactly when prices are too high and how much oil to release? What guarantees would we have that such a crucial question would not become embroiled in politics, particularly in an election year?

Equally as important are the economic considerations. With its deep pockets and no need to turn a profit, government has the freedom to buy oil at high prices and

sell low to keep retail prices artificially low. Private industry, on the other hand, survives by being able to purchase large quantities of oil at lower wholesale prices and holding it until it can sell the oil at higher retail prices. With the government as a player the hope of making a fair profit evaporates and companies have no incentives for buying and holding large inventories. The result would be lower total inventories than we'd have without the government reserves.

CONCLUSION

In closing, we share your concern for the future of the industry and the security of our nation. America's oil and natural gas companies have a long and proud history of providing this country's consumers—including our armed forces—with a reliable and affordable supply of energy to make their homes comfortable and take them where they need to go, when they want to go. Through good and lean years, U.S. suppliers of natural gas and petroleum products have kept America's armed forces mobile, its factories running and have provided the fuel to move goods from manufacturers to retailer and, ultimately, into America's homes and offices.

To the extent to which we can help in your efforts to better understand our industry and our government can best work together to forge a sound and workable energy policy, we are here to assist you.

Mr. BARTON. Thank you, Mr. Cavaney.

We would like to hear from Michael Johnson, who is here on behalf of the Natural Gas Supply Association.

STATEMENT OF MICHAEL L. JOHNSON

Mr. JOHNSON. Thank you, Mr. Chairman; and greetings from the great State of Texas where it is hot today. I would like to thank you for this opportunity to discuss the important role natural gas can play in strengthening our economy and improving our environment.

I am Michael Johnson. I am Vice President of Conoco, and I look after the gas and gas liquids business. As you know, Conoco is a major domestic and international oil and gas producer. I also represent the Integrated Independent Producers of the Natural Gas Supply Association.

I would like to address four topics in my remarks, and then expand those for the record.

I will discuss, first, the supply of natural gas; second, the ways that supply meets potential demands; and, third, the ways our industry is changing to reduce costs and increase investments in technology. And, last, I would like to discuss government policies that raise the cost of natural gas and, in the process, damage our economy and our environment.

First, let me address supply. Producers are highly optimistic about the long-term supply of natural gas. A recent National Petroleum Council study estimates the recoverable natural gas resource space in the lower 48 States is 1,400 trillion cubic feet. That is enough for many decades into the future. Today's estimate is substantially higher than in 1992. That is in addition to the large volume of natural gas we produced between those years.

New technologies are permitting us to increase recoverable gas resources faster than we are consuming them. One reason for this increased resource base is an expansion into frontier areas such the Mackenzie Delta, the Beaufort Sea and the North Slope. Tapping into these resources is not inexpensive, however. Climate and terrain are frequently hostile. We must constantly balance cost, risk, and potential to keep natural gas prices cost competitive.

Today we are winning the battle to keep natural gas prices competitive, and the robust supply of natural gas makes us confident of our ability to meet future market demand, demand that we all agree will increase substantially in response to our Nation's need to fuel our economy.

Natural gas producers are also faced with a significant challenge. That is fueling the majority of new electric power generators that will be added in the next 20 years. We are confident that we can meet that challenge and are preparing to serve that growing demand in addition to the traditional markets that we have always served.

Producers have to bear much of the responsibility to keep prices competitive, and we must do so by competing in the larger energy marketplace that is a global marketplace, and there are traditionally volatile prices in that marketplace. We must also cope with massive regulatory and technological changes that characterize today's international and domestic wholesale and retail markets.

To meet these challenges our industry is undergoing a major consolidation. The companies that emerge will be stronger, better able to compete, better able to invest in new technologies and better able to control the cost of bringing natural gas to the marketplace. But the changes we are undertaking to achieve that end are difficult and quite painful.

It would be nice to think that these wrenching industry changes would be enough to ensure continuing gas supplies at competitive prices to all Americans, but they are only part of the solution. Just as vital is a policy climate that permits our companies to produce resources in ways that are cost effective and efficient. We have the knowledge and the technologies to do that, we have the resource base, but we do not have the Federal policies we need to bring natural gas to the American public long-term at competitive prices.

Mr. Chairman, you have consistently demonstrated your concern for energy costs and competitive markets. Unfortunately, not everyone in government shares your sharp eye for policy consequences.

There are people in positions of power today who are misleading the American public. They refuse to acknowledge our industry's proven ability to produce natural gas in ways that respect and preserve the environment. They refuse to credit our technological breakthroughs. They refuse to respect the Nation's need for natural gas. As a consequence, they are trying to prohibit natural gas exploration and production in some of our richest resource bases both on shore and offshore that continue to be locked up.

There are two inevitable consequences to policies that reduce access to America's rich natural gas resources, and those consequences are either higher natural gas prices or increased switching to higher-polluting fuels, which no one wants. Neither of those consequences would prove beneficial to the economy or to our environment.

In conclusion, Mr. Chairman, we need your help to inform the Americans about the facts; and we need your help to change Federal policies toward natural gas production in ways that benefit our Nation, our economy, and all of our citizens. Thank you very much.

[The prepared statement of Michael L. Johnson follows:]

PREPARED STATEMENT OF MICHAEL L. JOHNSON, VICE PRESIDENT & GENERAL
MANAGER, CONOCO INC.

Thank-you, Mr. Chairman, for this opportunity to discuss the important role that natural gas can play in our future energy portfolio. I am Michael Johnson, vice president and general manager of Conoco, Inc.

Conoco is an integrated, international energy company headquartered in Houston, Texas, and is among the top dozen or so U.S. gas producers. The company had revenues of \$27 billion in 1999 and operates in more than 40 countries. Conoco's natural gas and gas products operations include the gathering, processing, distribution, and marketing of natural gas and natural gas liquids in North America, the U.K., Norway and Trinidad. In 1999, Conoco marketed natural gas volumes in excess of 4.4 billion cubic feet per day in the U.S. and Europe.

This year, Conoco is proud to be celebrating its 125th anniversary.

I am also today representing the producers of the Natural Gas Supply Association. NGSA represents integrated and independent companies that produce and market domestic natural gas. Established in 1965, NGSA encourages the use of natural gas and a regulatory climate that fosters competitive markets.

I would like to address four topics in my remarks today:

- First, I will talk about the supply of natural gas available to U.S. consumers, businesses, and industries.
- Second, I will address the ways supply meets potential demand.
- Third, I will talk about ways our industry is changing and evolving to meet America's need for clean, cost-competitive natural gas.
- Lastly, I will address the government policies that raise fuel costs and unreasonably and unfairly limit our citizens' access to the natural gas they need.

Supply

First, let me address the supply of natural gas.

I want to emphasize producers' optimism about the long-term supply of natural gas.

- Today, we supply about 23 percent of the energy America consumes. That's about 19 quadrillion BTUs (or "quads") of domestic gas, and an additional 3 to 4 quads from independent and affiliated companies in Canada.
- There is no doubt that, in the future, the U.S. *could*—if we chose to do so—dramatically increase the amount of natural gas marketed domestically. The resource is there.

There are many estimates of U.S. natural gas supply. All are highly positive. At the request of the Department of Energy, the National Petroleum Council (or "NPC") undertook a study in 1999 that estimates the recoverable natural gas resource base in the Lower-48 states at 1466 trillion cubic feet (or "tcf"). That estimate is significantly stronger than the estimate the NPC made in 1992. In fact, the new study finds a strong probability of at least 171 tcf more than it found in 1992. That's in addition to the 124 tcf we produced between 1992 and 1999.

The reasons for this growth are the new technologies and new methods of locating resources that the industry has developed and implemented. Our strides in these areas are so rapid that, as the NPC numbers show, we are increasing recoverable resources faster than we are consuming existing reserves.

Part of this expansion of the resource base involves a re-exploration and re-assessment of areas that had been assumed to be in decline, such as California. We are also expanding our reach out of the Lower-48 states to new frontiers such as offshore eastern Canada, where experts predict lie upwards of 45 tcf of natural gas. Western Canada, the Mackenzie Delta and Beaufort Sea, and the North Slope offer additional possibilities, through reservoirs in traditional formations and through our greatly increased ability to tap coal-bed methane.

Tapping into the resources in these frontier areas is not inexpensive. Climate and terrain are frequently hostile. We must constantly balance cost, risk, and potential in an energy market that is frequently unpredictable.

Demand

Despite the risk, however, the robust supply of natural gas makes us confident of our ability to meet market demand. We can, if called on to do so, increase both the volume of natural gas use and the percentage of U.S. energy supplied by gas.

Analysts and experts agree. The most recent *Annual Energy Outlook from the Energy Information Administration*, for instance, shows natural gas production in 2020 at slightly more than 27 quads and imports at about 5.3 quads. On a consumption basis, the EIA sees natural gas as rising from today's 23 percent to almost 27 percent of our total energy market.

Such an increase would make natural gas the nation's fastest-growing fossil fuel. Over the next two decades, as total U.S. energy consumption grows at a rate of 1.3 percent annually, we see natural gas growth at about 1.5 percent.

Growth could, of course, exceed that level substantially. Should the U.S. decide to pursue a strategy of tighter reductions in air emissions, the amount of natural gas needed is likely to grow precipitously. Some models show natural gas use rising as high as approximately 35 percent of the nation's energy supply should the Congress choose to impose stricter pollution-reduction scenarios on U.S. business and industry. And finally, our most significant increase in demand will be in electric generation. The challenge that this poses our industry is significant—but I am confident in our ability to develop and supply natural gas in whatever quantity and price is dictated by the market.

Industry Evolution

At the same time as natural gas demand projections are rising above previous expectations, the entire energy industry is becoming more competitive. Restructuring of wholesale and retail markets in natural gas and electricity is well advanced. New technologies like distributive power are giving residential and business customers new options.

The result has been high volatility in energy prices. It has been difficult for U.S. companies to predict revenue streams accurately and to plan capital investments. Wall Street has at times been wary of our industry, making it difficult for some of our companies to raise the capital required to expand exploration and production. You only need to look at our stock prices to see that.

At the same time, we're finding that reservoirs in some areas, such as the Western Gulf of Mexico, deplete more rapidly than originally projected. That puts additional pressure on our capital budgets.

The volatility of the global oil market has long-term negative effects on our companies because the vast majority of natural gas producers also depend on revenue from oil production. Witness the historically low oil prices in 1998 and 1999. The precipitous drop in revenue forced us to lay off tens of thousands of employees, shut in wells, and ratchet back on exploration budgets.

Revenue volatility also brought on a wave of worldwide corporate consolidations that continues today.

In the long run, these restructuring changes will help our industry recover from the aftermath of low energy prices, keeping prices competitive as we rehire employees and redeploy equipment into the field.

The Policy Climate

Many of the market forces bringing about these changes are beyond the appropriate scope of U.S. government policy. But there are several major policy areas that will, in the long run, determine the price America will pay for the energy on which our economy rests.

Let me put that another way. As I have explained here today, there is no question that the U.S. has vast natural gas resources and that our producers can bring these resources to market. That information does not, however, answer the question: How much will that gas cost?

Will the policies of the U.S. government cause the American people to pay unreasonably high prices for the clean-burning natural gas they need?

Mr. Chairman, you have consistently demonstrated your concern for energy costs and competitive markets. You have supported federal policies for the natural gas industry that have reduced the unreasonable regulatory costs that have burdened our industry—and our customers—in the past. You have moved through your committee a bill on electricity restructuring that shows a deep concern for the budgets of American families and for the competitiveness of American industries.

Unfortunately, not everyone in government shares your sharp eye for policy consequences. There are those in positions of power today who are misleading the American people. They are endorsing a position that locks up increasing amounts of land—to prohibit natural gas exploration and production in our richest resource areas, both on- and off-shore. And they are misleading our citizens into believing that can be done without economic ramifications.

America's richest natural gas resources—the resources we can produce most cost-effectively—lie under onshore and offshore federal lands. Our industry can produce this gas in ways that are environmentally sensitive, and we are committed to that goal. Advances in our industry have reduced the impact of gas production on the environment. And dozens of environmentally sensitive technologies are being employed by the industry.

Yet, we hear constantly from a number of highly placed federal policymakers who oppose domestic natural gas production and transport. I do not know if they are merely misinformed, or if there is some other reason for their statements. What I do know is that they are trying to convince the American people that it is in their best interest to prohibit natural gas production and transport across much of this nation.

It is not.

It is in all of our best interests to ensure that Americans have access to the energy they need at the lowest possible cost—low-cost in terms of price, and low-cost in terms of environmental impact. Domestic natural gas production is the ideal way to meet those conditions.

Thus, Mr. Chairman, denying access to public lands can only lead to two consequences—fuel switching, to the extent that is possible, and higher costs to future generations. We do not think either of those choices are good alternatives. The recent rise in gas prices and the high likelihood of price spikes and supply disruptions this year are consequences of previous policy decisions, its time to change directions before damage is done to the U.S. economy.

Conclusion

Let me conclude my remarks today, Mr. Chairman, by asking for your help in changing federal policies toward natural gas production. We need your help in getting across the facts about natural gas to the American public. And we need your help in devising policies that give Americans responsible access to the clean, cost-effective energy resources with which our nation abounds. We will work with you and your staff to develop any of these needed policies.

Thank-you.

Mr. BARTON. Thank you, Mr. Johnson. We now want to hear from Cathy Abbott, who is here representing the Interstate Natural Gas Association of America.

Again, I just want to say for the record what a pleasure it was when I was in the White House Fellows program to work you with in the Department of Energy; and it was really, really an educational and a personally growing experience for me. And I want to let the audience know that the young baby that was needing a diaper change is now 6'5" and thinking about going to college at Texas A&M. So times do change.

Your statement is in the record in its entirety, and we would recognize you for 7 minutes to elaborate on it.

STATEMENT OF CATHERINE GOOD ABBOTT

Ms. ABBOTT. Thank you, Mr. Chairman. And I think the education was all the other way. You were my one and only White House Fellow that I had the chance to work with while I worked in government.

Mr. Chairman, my name is Cathy Abbott. I am Chief Executive Officer of Columbia Gas Transmission Corporation and Columbia Gulf Transmission Corporation, which are the pipeline units of Columbia Energy Group. I am here to testify on behalf of INGAA, whose members transport 90 percent of the natural gas consumed in the United States.

I am submitting to the record two INGAA studies, one on pipeline and storage infrastructure requirements and the other one on coordinating environmental agency review of new pipeline projects.

As I detail in my written statements, the Nation's natural gas policy has come a long way toward relying on market forces. In addition, we believe that, in crafting energy policy, we should acknowledge three key public benefits of increased natural gas use.

The environment. Natural gas is an environmentally clean fuel and will play an increasingly significant role in improving the Nation's air quality.

Reliability and security of supply. The vast majority of the natural gas used in the United States is produced here in North America.

Safety. Natural gas is delivered to millions of homes, voters, businesses, through underground pipelines which are by far the safest form of energy transportation.

Today, natural gas provides 25 percent of U.S. energy consumption. My colleagues on the earlier panel from the Energy Information Administration project that natural gas will increase from about 22 Tcf today to a little more than 30 Tcf shortly after 2010. That reflects a 36 percent increase in use. The largest area of growth, about 60 percent of this total, is in the electric generation market where natural gas offers an inexpensive, clean solution to improving air quality.

However, to achieve those public policy benefits and to grow the gas market, interstate pipelines will have to construct new facilities. A study conducted for INGAA estimates that 2,100 miles of new pipeline are needed every year between now and 2010 to serve this increased demand.

We can only see the need for additional pipeline capacity from today's market signals. For example, this past winter, during a normal weather period, New York City, natural gas prices delivered to the city gate in New York, normally about \$3, jumped to as much as \$15 for a short period, indicating a lack of transportation capacity, not value going to the producers or the pipelines.

For the coming year, the value of delivering gas to New York City from the producing area exceeds the actual cost of transportation by 50 percent, again, a market signal of insufficient transportation capacity.

Finally, demand in the Northeast is expected to grow dramatically, largely fueled by gas-fired power plants with a load factor of 70 to 80 percent, and we believe that current pipeline capacity is insufficient to serve that load.

Now, with an energy policy that seeks to let markets work where they can, what solutions do we have to offer? INGAA believes three criteria must be met to achieve market-driven growth in gas use: first, an efficient certificate and construction process to expedite the installation of needed pipeline infrastructure; second, increased regulatory flexibility to allow pipelines to serve the needs of a changing market; and, third, regulated return sufficient to reward companies for the risk of building new pipelines and sufficient to attract capital to these projects.

Turning to the first, today the regulatory process for constructing pipelines is overly complex and time-consuming. A good example of regulatory delay is the proposed Millennium Pipeline Project which we are involved in to serve the mid-Atlantic/New York/Northeast market and has more than 90 percent of its right-of-ways in existing utility corridors. Millennium filed its application with the Federal Energy Regulatory Commission in December 1997. Two and a half years later, the FERC has yet to take action.

During that time, Millennium has spent \$40 million for project development, mostly to comply with various legitimate State and Federal environmental regulations and to respond to almost 400 FERC environmental data requests.

In our experience, much of the delay and associated costs are driven by the need to harmonize the often inconsistent requirements by the many State and Federal agencies with a role in the approval process.

I mention Millennium because its experience is not unique, yet it is dramatic. While interstate pipelines are committed to sound environmental practices, we believe the environmental and regulatory review should and can be streamlined and coordinated to resolve tradeoffs among parties and to process contracts much more quickly. We must reduce these excessive delays and permit the timely construction of important new pipeline projects if we are to connect growing supplies with growing markets.

Another critical issue facing pipelines and their customers is the need for more flexibility in structuring and delivering services at fair prices. Today, local gas distribution companies hold about two-thirds of the firm contracts for pipeline capacity. However, in the future, with unbundling and choice at the consumer level, a larger share of pipeline capacity will be held by marketers, producers, power generators, and other players. Because these new customers use capacity significantly differently than our traditional customers, they expect pipelines to respond with new kinds of services and new kinds of pricing packages.

FERC recently approved a rulemaking that provides additional tools to meet these challenges, and we recognize and applaud the progress FERC has made. We urge the Commission to continue to press ahead with regulatory reform to allow pipelines to respond quickly and flexibly with these new services and prices in an increasingly diverse customer base.

Mr. Chairman, while the environmental, economic and energy policy benefits of increased natural gas use are clear, the regulatory challenges facing us in meeting that demand are also clear. I want to thank you and the other members of the committee for providing me the opportunity to testify today. Thank you.

[The prepared statement of Catherine Good Abbott follows:]

PREPARED STATEMENT OF CATHERINE GOOD ABBOTT ON BEHALF OF THE INTERSTATE
NATURAL GAS ASSOCIATION OF AMERICA

Mr. Chairman, my name is Catherine Good Abbott. I am chief executive officer of Columbia Gas Transmission Corporation and Columbia Gulf Transmission Company, wholly owned subsidiaries of Columbia Energy Group. I am here today to testify on behalf of the Interstate Natural Gas Association of America (INGAA). INGAA is the trade association that represents interstate natural gas pipelines in the United States, the inter-provincial pipelines in Canada and PEMEX in Mexico. These pipeline systems transport 90 percent of the natural gas consumed in the United States.

Thank you for providing me this opportunity to testify before you today.

Natural gas today provides 25 percent of the energy consumed in the United States. As you know, natural gas does and will increasingly play a major role in improving our nation's air quality. The chart attached to my testimony clearly demonstrates the environmental benefits of natural gas. In addition to the important clean fuel benefits, the vast majority of the natural gas consumed in the United States is produced in North America; only a tiny portion of our supply comes from imports. Finally, transporting reliable natural gas to fuel millions of homes and businesses by interstate pipelines is by far the safest and most reliable form of en-

ergy transportation. We continuously monitor and inspect our facilities to ensure they operate safely.

I'd like to discuss today the implications of a 30 trillion cubic foot (Tcf) market for our nation and for the natural gas pipelines that will transport that energy to customers across the country. Specifically, I will elaborate on the public policy benefits of increased gas use and the challenges facing U.S. pipelines in meeting this demand.

First, some background on the natural gas industry is helpful in creating a clear picture of where we are today. The history of wellhead price regulation in our country is a dismal one. Ten years ago, Congress took steps to repeal price controls at the wellhead, which led to the transformation of our industry. In 1992, the historic FERC Order 636 ended the regulation of pipeline natural gas sales, but the transportation of natural gas remained regulated and was restructured by FERC.

In the years since Order 636, interstate pipelines operating in a competitive environment have become more efficient, they have reduced their operating costs and created and offered new services. In the period from 1991-1997, volumes flowing on interstate pipelines increased by 13 percent, while operation and maintenance costs were reduced by 42 percent across the industry. Today, the cost of transporting natural gas represents only about 16 percent of the price paid by the end user, down from 23% in 1986.

The numbers show that competition works in the natural gas industry. We are moving more natural gas today than at any time in history. Natural gas pipelines bring the cleanest, most reliable and most efficient fuel source to our nation's communities, and we stand ready to take on a larger role in assuring a plentiful and reliable energy supply for our country in the new millennium.

PUBLIC POLICY ISSUES DRIVE DEMAND FOR A 30 TCF MARKET

The Department of Energy's Energy Information Administration estimates that natural gas use will increase from about 22 Tcf today to 30 Tcf shortly after 2010, reflecting a 36 percent increase in natural gas use. The largest area of growth, about 60 percent of this total, is expected in the electric generation market. In some areas, the anticipated growth is even more significant. In the Northeast, for example, demand for natural gas used for power generation is expected to increase by 250 percent!

The primary reasons for the rapid growth in the power generation sector relate to the relatively low cost of gas-fired generation, and the low air emissions that allow these facilities to comply with stringent clean air standards. Advanced gas-fired combined cycle turbines result in cleaner and more economically priced power that provides equivalent or better reliability compared to other fossil fuels, without the resulting environmental impacts.

Aside from other factors, this would be a positive situation, both for consumers and our industry. But at the same time we are anticipating phenomenal growth in natural gas demand, there is growing concern over weaknesses in the energy delivery system in the Northeast. These concerns were glaringly evident this past winter during the month of January. For a period of just a few weeks, temperatures that were statistically normal led to short-term energy shortages, and significant spikes in energy prices. On January 18, 2000, natural gas prices delivered to the city gate of New York City, normally about \$3 jumped to as much as \$15. Since interstate natural gas pipeline rates are capped under current regulations, these increases did not impact pipeline revenues. The shortages of fuel oil, and resulting price increases, during this same period are also well documented.

This is not just a winter issue. Concerns have also arisen about the ability of power grids to maintain reliability during the coming summer months if temperatures remain high for a significant amount of time. Several areas across the country, including the Northeast, report that power shortages are likely this summer. For example, the New York Public Service Commission noted last week that limited electric generation will have an impact on prices throughout the Northeast. Some Northeast utilities (for example, Consolidated Edison) are predicting significant price spikes as much as 25 percent higher this summer.

With this set of issues before us, our challenge is to maximize the public policy benefits of increased natural gas use in order to respond to the growing needs of the marketplace. As we see it, the following three criteria must be met in order to achieve the ambitious objective of a 30 Tcf market:

- an efficient certificate and construction process to expedite the installation of the infrastructure needed for the future;
- increased regulatory flexibility to serve the needs of a changing market; and,
- the availability of capital.

EFFICIENT CERTIFICATE AND CONSTRUCTION PROCESS NEEDED

To meet the demands of a 30 Tcf market, interstate pipelines will need to construct a significant number of new facilities. A study called "Pipeline and Storage Infrastructure Requirements for a 30 Tcf U.S. Gas Market" was conducted by Energy and Environmental Analysis, Inc. for the INGAA Foundation. This study found that approximately 2,100 miles of new pipeline will be needed every year between now and 2010 to have the capacity necessary to serve this increased demand.

The pipeline construction process has become increasingly complex. As you may be aware, it is simply getting more difficult to build any type of new facility. In the U.S., we must obtain and coordinate multiple state and federal environmental permits. We also must consider the concerns of landowners, who are becoming more interested and involved in our projects. To keep our projects economic, we must keep costs under control. And to keep the costs under control, we must promote more efficient review and approval processes—within our companies and among the regulatory agencies that ultimately decide the fate of the project.

Many new pipeline proposals have encountered delays and increased costs at FERC due to the need to satisfy requirements under various environmental statutes that are administered by a variety of state and federal agencies. While interstate pipelines are committed to sound environmental practices, we believe the environmental and regulatory review of new pipeline proposals should be streamlined and coordinated to reduce such costs, reduce the excessive delays that are now experienced, and permit the timely construction of important new pipeline projects.

As an industry, we have been working to encourage FERC, CEQ and other Administration Departments and agencies that participate in the project review of proposed pipelines, to develop an Interagency Agreement to coordinate this federal agency review. The INGAA Foundation sponsored a study to identify those points in the existing project review process where additional interagency coordination could improve the process for both applicants and participating agencies. We have received indications from CEQ, FERC and others that they are going to go forward with this important effort to seek such an agreement.

INCREASED FLEXIBILITY REQUIRED TO MEET THE NEEDS OF A CHANGING MARKET

The evolving competitive nature of the natural gas industry requires mechanisms allowing existing and new customers to gain access to natural gas pipeline services at fair prices. Currently, gas utility companies hold approximately two-thirds of the capacity on interstate pipelines. But we do not expect gas distribution companies to be our only major customers in the future. Marketers, power generators and other end-users, including producers, will join them. These customers use capacity differently than gas utilities. So we will have to transform the services we sell to meet the needs of these customers.

The challenge of accommodating diverse new customers is both operational and commercial. The load profiles of gas utilities, industrials and electric generators are diverse, and the economic factors that motivate them differ greatly. In order for pipelines to serve all types of customers, changes are required to many pipeline tariffs, which are designed to provide high-quality service for residential customers. Non-utility customers want different services than the standard utility tariffs provide. In addition, some gas utilities want the option to buy less or different service from their pipelines, while others will be looking to non-pipeline sellers of capacity.

Pipelines will need greater flexibility, both to negotiate contracts with old and new players in the capacity market as well as to price services appropriately for different markets. FERC has recently approved a rulemaking that will provide us with some additional tools to meet these challenges by committing to expeditiously process requests to implement new and innovative types of services and to permit new pricing structures. We recognize that the FERC has taken important steps in this area, and urge them to continue to provide the resources and attention necessary to make this a policy priority.

AVAILABILITY OF CAPITAL CRITICAL

As I mentioned earlier, between now and 2010, approximately 2,100 miles of new gas transmission must be added each year to accommodate market growth to 30 Tcf. To accomplish this, the natural gas pipeline industry will need to invest upwards of \$32 billion for pipeline transmission and storage facilities.

Pipelines must compete for investment capital in the marketplace with S&P 500 companies with similar risk profiles for the same capital. In most cases, pipelines also have to compete for capital within their own organizations. A fundamental tenet of this decision-making process is that increasing risk requires a return com-

mensurate with that risk. If returns on pipeline investments are not commensurate with the risks inherent in the pipeline business, less capital will be invested in pipeline projects relative to investments in other businesses that have a better risk/return profile.

Risks for the pipeline industry have increased substantially in this decade and will likely continue. These increased risks include: (1) expiration of long-term gas utility transportation contracts and the prospect of non-renewal; (2) movement to shorter-term contracts with new non-gas utility customers; (3) competition from unregulated marketing firms who can buy capacity at regulated rates and sell it at unregulated rates; (4) state commission restructuring of gas and electric services; and (5) federal electric restructuring initiatives which cause uncertainty in the market that offers our best opportunity for future growth.

FERC's current methodology for setting return assesses each pipeline's risk and sets a range of returns commensurate with that risk. In order for pipelines to compete effectively for capital, this model, which makes the reward commensurate with risk, is necessary.

CONCLUSION

INGAA supports a strong national energy policy, and we believe it begins with a strong natural gas industry from the wellhead to the end user. In today's environment, our ability to meet the anticipated 36 percent market increase is not a given. All segments of the natural gas industry will have to work cooperatively to develop the 30 Tcf U.S. market. While the environmental, economic and energy policy benefits of this market are clear, also clear are the challenges facing those of us in the natural gas pipeline industry who are being called upon to meet our nation's energy needs.

Mr. Chairman, I want to thank you and the other Members of the House Subcommittee on Energy and Power for providing me the opportunity to provide information on the public policy benefits of increased use of natural gas. As I have stated, INGAA believes three things are essential in order for interstate pipelines to help deliver those benefits: an efficient certificate and construction process, the regulatory flexibility to respond to a changing market, and capital at competitive rates.

Comparative Emission Levels From a 300-Megawatt Power Plant

	Existing Coal Boiler	New Coal Boiler	New Gas- Fired Combined- Cycle
NO _x Emissions (lb/MMBtu)	0.50	0.18	0.04
SO ₂ Emissions (lb/MMBtu)	1.20	0.42	0.00058
Particulate Matter (lb/MMBtu)	0.11	0.04	0.0029
CO ₂ Emissions (lb/MMBtu)	205	205	125

Source: Energy and Environmental Analysis, 1997.

Mr. BARTON. Thank you, Mrs. Abbott.

Mr. BARTON. We now would like to hear from Mr. Roger Cooper, who is here on behalf of the American Gas Association.

STATEMENT OF ROGER B. COOPER

Mr. COOPER. Thank you, Mr. Chairman. I appreciate the opportunity to testify.

I am here on behalf of the American Gas Association. We represent 189 utilities that serve over 60 million customers in all 50 States and the District of Columbia.

I am here today to say "ditto," to what much of the other panelists have said. Natural gas has come of age. It is today America's cleanest fossil fuel in abundant supply, as Mr. Johnson discussed.

This is a room where a lot of differences are often aired, and today I would like to point out some similarities. We are at a point where there is one area of energy policy where there is substantial agreement across the board, and that is the use of natural gas will

increase. Cathy Abbott says it will increase 36 percent by the year 2010. Bill Martin says it will increase 60 percent by the year 2020. These are essentially comparable figures.

What will this mean? We have adequate supply. Will we be able to get it out of the ground? Will we have the capacity to move it? Will we have the capacity to get it to the ultimate consumer? Can we do that economically? Can we do that in an environmentally friendly manner?

This morning I would like to talk about the downstream side of the business, some of the new technologies, and what is making gas so valuable to customers. Before doing that, I would just like to note that a number of our member companies were involved with the National Petroleum Council gas study; and we do endorse that study and the views as to what needs to be done to improve the gas picture at the wellhead.

We are looking at a new energy future, and it is a good future. It is one that is primarily market driven. It is not going to need massive government intervention. It is aligned with the current market trends. It is consumer friendly. It is environmentally friendly.

As coal was the dominant energy source for the 19th century, as oil was the prize of the 20th century, so natural gas will be the fuel of the future, will be the fuel to the 21st century.

It is the only fuel out there today that can bridge the gap between the environmental demands and the economic realities. It is the fuel that customers demand today.

Bill Martin talked a little bit about the Fueling the Future Study which his group did for the American Gas Foundation, and I am not going to go through all of those points he made. He gave you a lot of numbers. I will repeat a couple of them: That gas will increase by 60 percent over 20 years, that under that study we would decrease U.S. Energy consumption by 6 percent. We would do this in a very environmentally friendly way, reducing SO_x, NO_x, particulates and CO₂ emissions; and we could back out 2.6 million barrels of oil a day if we did it.

Where we differ at AGA somewhat from some of the other projections, EIA and some of the others, we all look at a growing gas market. We slice up the pie somewhat differently. We see probably a doubling of large-scale, gas-fired electric generation, the big turbines. EIA is probably looking at a tripling of that number. Where we see the growth is going to be in other direct uses of natural gas, primarily distributed generation, cogeneration, fuel cells, microturbines; and these systems are coming on the market today. I think they will be incremental.

Sometimes people fear these sort of changes. Are we going to get rid of all our power plants? No. I think the Fueling the Future Study talks about a future that relies on coal, relies on nuclear, and is going to rely on some of these new technologies.

One of the biggest challenges in energy policy today is the NIMBY issue, "not in my backyard." And what you have with distributed generation is the opportunity for YIMBY, "yes in my backyard," yes, I want those technologies that I can use that are available to me that will give Americans their own sense of energy independence.

We have put together a blueprint which we will be handing out—and I take your cue. Mr. Yergin did not do this. Showing it for cameras that are not on—a blueprint on fueling the future and how Congress should act to implement increased gas use. That would include repeal of the tax on contribution and native construction, which is essentially a tax on hooking up new gas customers; further RD&D for natural gas; and a lot of issues that Cathy and Michael talked about at the wellhead in streamlining permitting.

With that, I will conclude, and I will be happy to take any questions.

[The prepared statement of Roger B. Cooper follows:]

PREPARED STATEMENT OF ROGER B. COOPER, EXECUTIVE VICE PRESIDENT, POLICY AND PLANNING, AMERICAN GAS ASSOCIATION

Good morning, Chairman Barton and members of the committee. I am honored to be here today to present the views of the American Gas Association on natural gas demand in the 21st century.

AGA represents 189 local natural gas distribution companies, which deliver natural gas to 60 million customers in the United States.

As coal was the dominant fuel of the 19th Century and oil during the 20th Century, we believe that natural gas will be the fuel of the 21st Century. That is because natural gas is the only energy source currently available that can bridge the gap between environmental goals and economic imperatives.

Today you have heard the testimony of the author of the American Gas Foundation's study *Fueling the Future: Natural Gas & New Technologies for a Cleaner 21st Century*. Bill Martin described to you a scenario for an increase in gas demand from 22 quadrillion Btus (about 21.4 Tcf) today to 35 "quads" (almost 34 Tcf) in 2020. He told you about the enormous environmental, energy security and efficiency benefits that will result. If gas consumption in 2020 is 60 percent higher than today (35 quads) we can:

- Reduce CO₂ by 930 million tons per year.
- Reduce oil imports by 2.6 million barrels per day.
- Reduce national energy consumption by 6 percent.

Another benefit that may be of particular interest to this subcommittee has to do with reliability. Not only does the gas industry have an unparalleled reputation for reliable service, but also natural gas technologies can be used to support the operations and reliability of the electric distribution system. The recent report issued by the U.S. Department of Energy's Power Outage Study Team emphasized the value of natural gas technologies in easing strain on the electric power generation grid. The report noted that "distributed generation,"—that is, small electric-power generation units that are installed on or near the customer's premises—can help relieve the demand on the electric grid, especially during peak demand. Natural gas fuel cells and microturbines are among these new distributed generation technologies. Substituting natural gas cooling for electric air-conditioning can also help to level summer electric peaks. Since natural gas use typically peaks in the winter months, this is truly a win-win scenario for both the natural gas and electric industries.

Given the key role this subcommittee has in developing a national energy policy, I want to emphasize that the *Fueling the Future* study projects a balanced energy future. The study does not project high natural gas demand at the expense of other fuels. All energy sources—including coal, nuclear and renewables—will continue to play a critical part in supplying our growing energy demands in the future. For example, renewable energy use in 2020 will be greater under this study than the Energy Information Administration's projections. However, natural gas is the one energy source that has the attributes to meet our nation's policy goals and our energy needs for the 21st Century. Using the data from the *Fueling the Future* study as a foundation for a coherent national energy policy would be good for the environment, good for national security, and good for the economy and our consuming public.

AGA is a strong believer in this energy future because we see every day that consumers—industrial, commercial and residential—want to use natural gas. Nationwide, natural gas was the fuel of choice for 70% of the new single family homes built in 1998—a continuation in a 15-year trend of natural gas growth. Residential, commercial and industrial consumers are using gas in a new and innovative ways. Gas fireplaces, for example, constitute a strong new market due to ease of use and envi-

ronmental considerations. An improved generation of gas air conditioners has great potential in the West and the South. Technologies for residential scale fuel cells and microturbines are currently being demonstrated.

Sophisticated and highly efficient combined cooling, heat and power systems (CHP) are being installed around the country, and are especially popular at universities and large conference centers, such as Opryland in Nashville and the huge McCormick Center in Chicago. Texas is one of the leading states in terms of industrial CHP capacity and is fourth behind New York, California and Pennsylvania in commercial capacity.

Let me give you three examples of how natural gas technologies—which are commercially available—will help meet the nation's energy goals.

- In 1994, Thomason Hospital in El Paso, which was undergoing a major renovation/expansion, had to find a way to meet energy needs in a cost-effective manner, while locked into the highest electric rates in Texas. Its solution was a combined heat and power plant that includes gas-fired reciprocating engines, dual fueled boilers, gas engine driver chillers, and single effect absorption chillers. This CHP system provides electricity, low pressure steam (heating and hot water), and cooling for the hospital complex. Benefits to the hospital include reduced electric demand (330 kW), a leveled electric load and \$460,000 in annual savings.
- My second example describes a “save-the-day” situation at the Brookfield Zoo in suburban Chicago. During the winter of 1998, the local electric utility suffered a power failure that could have resulted in suffering or death of 200 creatures ranging from a massive Pacific walrus to the jellyfish. But the Zoo had installed a natural gas cogeneration system that kept the facility running. There's a financial benefit, as well: by operating in parallel with the local utility during peak demand hours, the Brookfield Zoo expects to generate a positive cash flow in excess of \$700,000 during the next decade. That can feed a lot of walruses.
- Our final example comes from the retail sector. A Walgreen's drug store in Chesterton, Indiana, became an energy pioneer last year by installing a natural gas “microturbine.” This unit—about the size of a commercial refrigerator—operates quietly and efficiently, using natural gas as a fuel to turn a small turbine that generates electrical power. The unit is also equipped with a “desiccant dehumidification” system that pulls moisture from the air, keeping customers comfortable while they shop. The biggest benefit is reliability. Because this system runs on natural gas it is independent of the electric grid and therefore is not affected by brownouts or blackouts caused by weather extremes. Imagine how relieved you'd feel if you needed to buy medicine during a local power outage—and the familiar Walgreen's is the only open business you see in a sea of darkness.

I believe that these examples demonstrate why the market will drive natural gas demand in the future. But the *Fueling the Future* study also makes clear that to provide the adequate supply, build out the needed infrastructure, and develop and improve the technologies, the government must play a critical part in assuring that the regulatory and policy environment is conducive to natural gas use.

To achieve the 35 quad future with all of its societal benefits, the study says policymakers at all levels must make a commitment to replace barriers with incentives to increase the production and use of natural gas. In other words, market forces cannot do it all. Congress, the administration and state and federal regulators each have responsibilities.

A number of assumptions must become realities for this growth in natural gas demand to be realized. But what better time than the start of a new century to take action so that future generations will inherit a cleaner environment, improved national security, continued economic growth and greater conservation of natural resources. The AGA Policy Blueprint attached to my testimony discusses in detail eight policy goals and implementation steps that will ensure that the 35 quad *Fueling the Future* forecast becomes a reality. Congressional action will be particularly important in the areas of competitive energy markets; safety and reliability; environmental regulations; federal research and development; tax barriers/incentives and access to federal lands. We are very pleased to see that two of our specific recommendations were included in the National Energy Security Act (S. 2557) introduced last week by Senator Murkowski. These recommendations include a provision that would lower the cost for American families to connect to natural gas and the creation of an Interagency Work Group on Natural Gas to develop a comprehensive policy for the use of natural gas. This is an excellent start and we look forward to working with the subcommittee on other steps to implement the policy goals of *Fueling the Future*.

The goals are summarized below:

Goal I—Energy markets will be free and competitive, and natural gas utilities will be allowed to compete fairly in these markets.

As energy markets are opened to competition, consumers are being given the freedom to buy their energy and energy-related services from whichever suppliers they choose. Gas consumers can benefit from choice and from competition that is open to all competitors, including gas utilities and their affiliates.

Regulators must recognize that consumers benefit when utilities and utility affiliates are allowed to compete and to realize economies of scope and scale, just as other competitors realize efficiencies from affiliation with a parent company. If regulators act to place utilities or their affiliates at a disadvantage in the marketplace, they will thwart the market-expansion potential for natural gas.

Implementation of the following policies will promote fair competition:

- State regulation should permit utilities to offer traditional utility services, allow utility affiliates to participate in unregulated markets and not bar an affiliate's use of the parent utility's name or logo.
- Any uniform business practices adopted by the states to implement retail competition should be consistent with the interests of gas utilities.
- The Public Utility Holding Company Act should be repealed.

Goal II—The historic reputation of the natural gas industry for safety and reliability will not be compromised.

Even though the U.S. natural gas industry operates one of the safest and most reliable gas delivery systems in the world, it continues to look for ways to improve. As a result, safety incidents on the gas distribution system during the past decade have decreased by 38 percent, while the amount of gas delivered to customers has increased by nearly 25 percent.

Because gas pipeline safety regulation involves technical issues, the best way to approach development or amendment of safety standards is for the government to take advantage of all the expertise available within the gas industry. It makes sense that regulators and the gas industry should pool resources to develop the most effective and reasonable measures to meet their common goal of the safe and reliable delivery of gas. In addition, this approach promotes increased knowledge and understanding among all the interested parties—the regulators, the industry and the public.

While the gas industry's strong commitment has been, and will continue to be, a significant factor in ensuring safety and reliability, implementation of the following policies would improve the effectiveness of safety programs:

- Performance- and risk-based pipeline safety regulation and regulatory alternatives should be initiated to enhance delivery system safety.
- Stronger regulatory mandates should be put in place to prevent pipeline damage caused by excavation.
- Regulatory treatment of unbundling programs should not compromise safety or reliability.

Goal III—Energy efficiency and environmental regulations will be comprehensive, equitable and balanced.

Many energy and environmental regulations are flawed and even counterproductive because they are not comprehensive enough. They are too narrowly focused and do not take into account the overall effect of the regulatory decision.

Energy-efficiency regulations that look solely at the efficiency of the energy-consuming equipment, and not at the efficiency of the entire process of providing the energy, can push consumers toward equipment that ultimately wastes energy, emits more pollutants into the air and costs more to operate.

Similarly, environmental regulations can be counterproductive when they are not equitable. For example, some regulations are not "fuel-neutral" but, in fact, are more stringent for natural gas than for dirtier-burning fuels, such as coal and oil. This ends up promoting consumption of dirtier fuels. In a precedent-setting move, the Environmental Protection Agency (EPA) in 1998 issued a fuel-neutral standard for industrial boilers that sets the same emission level for all new boilers, regardless of which fuel the boiler operates on. This precedent should be expanded to all applications in which natural gas is penalized for being cleaner.

Regulations are out of balance when their costs and benefits are not accurately weighed. It is possible, for instance, to set standards for indoor air quality that are so stringent they virtually rule out the use of natural gas. This is foolish because the gains that can be made in improving outdoor air quality often far outweigh small changes in indoor air quality.

The following policy recommendations are designed to remedy these kinds of situations:

- Energy efficiency standards must not discriminate against natural gas.
- Regulations should encourage innovative technologies and approaches to pollution control.
- ASHRAE Standard 90.1 should not be endorsed by the Department of Energy or adopted by the states.
- Federal and state energy conservation programs should reflect the “total energy efficiency” concept.

Goal IV—The federal government will aggressively promote the use of natural gas through its research and development program and by using innovative gas technologies in federal facilities.

Given the significant benefits that natural gas offers the nation as well as its consumers, the federal government needs to promote greater use of the fuel by increasing the funding of the Department of Energy’s (DOE) gas research and development program. In addition, the government should lead by example. Federal facilities should be showplaces for clean, efficient and economical gas equipment and technologies.

Adopting the following policies will help ensure that natural gas is the fuel of the 21st century:

- Federal spending on gas-related R&D should be increased to support end-user equipment advances and enhance gas delivery system safety and reliability.
- Tax credits should be provided for collaborative R&D.
- Executive Order 13123 should be fully implemented.

Goal V—The potential of new technologies will be fully recognized in regulations, codes and standards affecting the natural gas industry.

The federal government and standard-making bodies are required to review existing rules and standards periodically, as well as develop new ones when technological developments merit action. This sometimes involves evaluating the safety performance of natural gas delivery systems and equipment. These standards must be developed objectively, based on technically sound science and credible, accurate performance data.

Adoption of the following policies will further this goal:

- Pipeline safety regulations should reflect new, proven technologies and best practices.
- Building codes and standards should accurately reflect safety performance.
- Regulations that impede promising new technologies, such as distributed generation, must be modernized.

Goal VI—Access to the natural gas resource base will not be unduly restricted.

Today, access to significant portions of the U.S. natural gas resource base is totally or partially restricted. These restrictions inhibit energy exploration and production activities in the eastern Gulf of Mexico, most of the offshore West and East coasts and in parts of the Rocky Mountains.

In general, the restrictions were imposed for environmental reasons and have been in place for decades. Obviously, exploration and production technologies and practices have changed dramatically over these decades. It’s time to reexamine these restrictions in light of today’s technologies and practices that are more environmentally sensitive than those of the past. It’s also time to reassess the restrictions because of the national environmental, economic and energy-security benefits that would accrue from using more natural gas.

Adoption of the following initiatives is recommended to implement the policy goal:

- The federal government should establish an interagency task force capable of balancing the national benefits and costs associated with increased natural gas use.
- The federal government should provide a baseline for consistent land administration among the numerous national and state agencies.
- The federal government should revise its land-use policies to reflect the positive benefits of new natural gas exploration and production technologies.

Goal VII—The cost of providing natural gas service to new electricity generating plants will not be borne by residential, commercial and industrial customers.

Significant amounts of new pipeline capacity will be needed to serve electricity generating plants. Providing natural gas service to power plants requires that gas pipelines and/or gas utilities invest in facilities and make operational changes, such as adding new line, contracting for storage capacity and upgrading the ability to serve severe load swings.

The costs incurred to serve new generating plants must be borne solely by power plant operators and not by other natural gas customers. Otherwise, natural gas demand among residential, commercial and industrial customers will be artificially constrained.

Implementation of the following policies will help ensure that costs incurred for pipeline capacity expansions are appropriately borne by the customers being served:

- FERC's implementation of pipeline rate reforms should not harm local gas utilities.
- FERC should protect the gas utilities' pipeline service from degradation.

Goal VIII—The regulatory environment will facilitate expansion of the natural gas infrastructure.

To provide gas delivery service for the new uses of natural gas that will benefit the nation, natural gas distribution utilities will need to invest almost \$100 billion to upgrade and expand their distribution systems over the next 20 years.

Therefore, regulators should evaluate their policies in light of the fundamental goal of facilitating critical maintenance and expansion of the natural gas delivery infrastructure. The public benefits of increased gas use in terms of economic efficiency, environmental gains and energy security should be weighed fully in determining appropriate rates and permissions for facilities.

Implementation of the following policies will facilitate infrastructure expansion:

- The lead time for obtaining permission to build new pipeline and utility facilities should be shortened.
- The benefits and costs of expanding the natural gas system should be reasonably and comprehensively assessed.
- The tax system should promote rather than impede natural gas system expansion.

Conclusion

Adoption of these recommendations will lead to the greater use of natural gas to meet a part of our nation's growing energy demand. As a result, these policies will lead to an energy future that is safe and reliable, as well as cleaner and more secure than otherwise would be possible.

Natural gas is economical, abundant, clean and reliable. It is the energy solution of the here and now. It is the bridge fuel to the new millennium. It must not be overlooked; to do so would be to ignore what serves the best interests of our nation. We look forward to working with this committee to implement the policy recommendations we have outlined today. These recommendations, if adopted, will serve to ensure a strong, prosperous America—an America fully capable of continuing its role as leader of the free world.

On behalf of the American Gas Association, I thank you for the opportunity to testify today.

Mr. BARTON. Thank you, Mr. Cooper.

Mr. BARTON. We now want to hear from Mr. Barry Russell, who is here on behalf of the Independent Petroleum Association of America and also the National Stripper Well Association.

STATEMENT OF BARRY RUSSELL

Mr. RUSSELL. Thank you, Mr. Chairman.

I am Barry Russell, President of the Independent Petroleum Association of America. Today I am testifying on behalf of IPAA, the National Stripper Well Association, and 32 cooperating State and regional associations. I detail a number of these issues in my written testimony, and I will summarize them here to save time.

First, natural gas and petroleum dominate energy supply in the United States. Currently, they account for about 65 percent of the national energy needs; and they will continue to dominate in the future.

Second, regardless of the changes in world politics, energy supply remains a national security issue. Whether we like it or not, our sources of petroleum come from countries with a history of instability, and our policies must recognize our country's vulnerability.

Third, future domestic natural gas and petroleum exploration and production will increasingly depend on independent producers. The domestic industry has changed dramatically since 1986. Major integrated companies now focus their activities in the deep Gulf of Mexico and overseas. Today, independents drill 85 percent of the wells in the United States. Independents need different policies than integrated companies because their revenues come from one source.

Fourth, domestic natural gas demand is estimated to increase by about 40 percent by the year 2010. But this increase in demand can be met, given the right conditions, through domestic and other North American resources.

In my testimony, I discuss a number of the factors essential to meeting the future demand for both natural gas and petroleum, and I want to focus on two of them: access to capital and access to the natural resource base.

First, the Federal Government needs to take action to improve the flow of capital to this critical industry. The most immediate focus should be on tax reforms. There are a number of specific proposals that have been either endorsed or discussed by President Clinton or have been introduced or passed by Congress within the past year. These include expensing of geological and geophysical costs, expensing delay rental payments, and a number of reforms related to marginal wells, such as the marginal well tax credit and other provisions that would direct more capital to producers.

We are at a rare point in time when both Congress and the administration are moving in the same direction regarding these tax reforms, and now is the time to act on them.

Second, we must address the issue of access to the Nation's resources under government-controlled lands. Recently, successful laws have addressed access like the Deep Water Royalty Relief Act. We believe it is crucial to continue to provide a royalty structure that encourages offshore development, and we are working with the administration to meet this objective.

At the same time, it is equally important to recognize that a larger aspect of access to natural resources involves opening access to areas now not available and halting the trend to further embargoes of western lands. Over 200 trillion cubic feet of natural gas is either off limits or difficult to permit in these areas. It is important to understand that access issues differ between these areas. ANWR and offshore activities are constrained by policy decisions. Access to western land is now limited by a mosaic of regulations. Some involve lands that are completely excluded from natural gas and petroleum exploration production, other involve permitting limitations, and still others indirect actions by Federal agencies.

Let me conclude with two immediate actions that can be taken toward the environmentally sound development of these resources. First, we can determine where the most likely resources lie. Congress should compel the development of such an inventory. Second, we need a clear analysis of the impediments that we are encountering. We need to know which laws, regulations and conflicting management plans are in play.

On balance, future supply of domestic natural gas and petroleum will depend on a clear recognition of the value of these domestic re-

sources. The domestic industry has changed dramatically and will continue to change to a greater reliance on independent producers. It will require a clear commitment from the Federal Government that it is prepared to implement policies to allow domestic exploration and production in order to access the capital, the resource base, the technology and the human resources that are needed to meet the challenges confronting our country.

Thank you very much for the opportunity to speak.

[The prepared statement of Barry Russell follows:]

PREPARED STATEMENT OF BARRY RUSSELL ON BEHALF OF THE INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA AND THE NATIONAL STRIPPER WELL ASSOCIATION

Mr. Chairman, members of the committee, I am Barry Russell, President of the Independent Petroleum Association of America. Today, I am testifying on behalf of the IPAA, the National Stripper Well Association, and 32 cooperating associations of the IPAA that represent state and regional interests. These organizations represent independent petroleum and gas producers, the segment of the industry that is damaged the most by the lack of a domestic energy policy that recognizes the importance of our own national resources. NSWA represents the small business operators in the petroleum and natural gas industry, producers with "stripper" or marginal wells.

Today's hearing addresses a fundamental issue—National Energy Policy: Ensuring Adequate Supply of Natural Gas and Crude Oil. This testimony will focus first on several key factors that influence this issue and second on actions that should be taken to improve the future domestic supply.

FACTORS IN DEVELOPING A NATIONAL ENERGY POLICY

There are many factors that affect the development of a sound national energy policy. This testimony will focus on several key issues in crafting a sound policy to address adequate supply of essential natural gas and petroleum.

1. *Fossil energy—particularly natural gas and petroleum based energy—will continue to dominate energy supply in the United States.* According to the National Petroleum Council's Natural Gas study natural gas and petroleum account for 64.8 percent of national energy needs. Future projections show significant growth in the use of these fuels as domestic energy demand continues to increase. The U.S. economy is driven by the availability of adequate energy supplies whether consumed by manufacturing, by transportation to and from jobs, or by the expanding role of computer use and the Internet. It ignores this reality to suggest that an equally robust economy can be sustained without substantial energy growth. And, it ignores this reality to suggest that natural gas and petroleum will not be the dominant share of this growth.

2. *Regardless of changes in world politics, energy supply remains a national security issue.* A decade ago energy supply from foreign sources would be viewed as a national security risk in the context of the Cold War—supply routes at risk and energy sources subject to control by adversaries. Today's national security issue is different, but it is nonetheless significant. Currently, we import over 55 percent of our nation's petroleum. It comes from diverse sources, but diversity is not security. In 1973 the OPEC oil embargo crippled this country. Yet, we now import over twice as much petroleum on a percentage basis from the OPEC countries that embargoed us—and neither Iran or Iraq participated in that embargo. Whether we like to address it or not, our sources of petroleum come from countries with a history of instability. We are currently importing approximately 500,000 barrels per day from Iraq. Clearly, this is not a reliable source. Saudi Arabia is ruled by a monarchy in a world without ruling monarchs; it is constantly subject to subversion by radical religious elements. Even Venezuela is ruled by a government that has dramatically shifted that country's priorities over the past two years and continues to be difficult to predict. We must recognize that shifts in any of these suppliers can dramatically and adversely affect our nation and our national economic security.

The past three years have demonstrated how susceptible the U.S. energy supply can be to foreign actions. The precipitous drop in petroleum prices in late 1997 through early 1999 posed a catastrophic threat to domestic petroleum production and a substantial threat to domestic natural gas production. As a result of the extended low petroleum prices in 1998-99, capital investment in petroleum production throughout the world declined. Existing production was lost. In the U.S., production dropped from 6.5 million B/D to less than 6.0—million B/D. Natural gas production

suffered as well because the two commodities are linked. This year, the country has seen the inevitable consequences of lost capital in the exploration and production industry—as worldwide demand has increased, worldwide supply capacity has not kept up. This year, petroleum prices have reached levels not seen since the Persian Gulf war. Different segments of the economy have been threatened. In each case, the price and supply issues have largely been defined by the actions of foreign producer nations. Our policies must recognize this vulnerability.

3. *Future domestic natural gas and petroleum exploration and production will increasingly depend on independent producers.* Domestic exploration and production of natural gas and petroleum have changed dramatically since 1986—the time of the last petroleum price crisis and major revisions to the federal tax code. Since that time the role of independent producers has increased. Generally, for example, domestic petroleum production is divided roughly 60 percent from the lower 48 states onshore, 20 percent from the offshore, and 20 percent from Alaska. Since 1986, the share of onshore lower 48 states production by independents has increased from about 45 percent to over 60 percent. Independents are also increasingly active in the offshore. In the aggregate, independents drill over 85 percent of the wells in the U.S., produce 45 percent of the petroleum, and produce over 65 percent of the natural gas.

This is a trend that will continue. The reasons are straightforward. Large, integrated petroleum companies are driven by their need to generate adequate shareholder returns. In the “Dot Com” world we are living in, this requires finding and developing large “elephant” fields. Mature fields that yield more limited quantities of natural gas and petroleum characterize most of the U.S. Many of the U.S. large field prospects such as the Arctic National Wildlife Refuge (ANWR) are not available for development. In the offshore, moratoriums limit many options; those that are left are largely in the “ultradeep” portions of the Gulf of Mexico. So, compelled to fill their refineries, major integrated companies focus their development funds to the deep Gulf of Mexico and overseas. This leaves the brunt of future domestic resource development to independent producers—large and small. Independents need different policies than integrated companies. Independents rely on revenues generated solely in the upstream and are more susceptible to price swings that strip away critical financial resources.

4. *Natural gas is an increasingly important element of domestic energy supply.* The National Petroleum Council *Natural Gas* study concluded that domestic natural gas demand will increase from the current 22 trillion cubic feet per year (Tcf/yr) to 29 Tcf/yr by 2010. Most of this increase will be needed to fuel expanding electricity generation. The study concluded that:

U.S. gas demand will be filled with U.S. production, along with increasing volumes from Canada and a small, but growing, contribution from liquefied natural gas (LNG) imports... Two regions—deepwater Gulf of Mexico and the Rockies—will contribute most significantly to the new supply... U.S. production is projected to increase from 19 TCF in 1998 to 25 TCF in 2010, and could approach 27 TCF in 2015. Deeper wells, deeper water, and nonconventional sources will be key to future supply.

Importantly, this study concludes that these future natural gas needs can be met through domestic resources supplemented by other North American resources. Equally important, it identified key issues that had to be addressed to meet these needs.

ACTIONS THAT MUST BE TAKEN TO MEET FUTURE NEEDS

The NPC *Natural Gas* study identified a series of needs that serve to characterize the key factors to meeting future demand. They also apply to addressing domestic petroleum development. They can be divided into the following four areas: access to capital, access to the natural resource base, access to technology, and access to human resources. Of these, access to capital and access to the natural resource base are highly dependent on federal policy.

Access To Capital

The federal government needs to take actions to improve capital flow into this critical industry. Generally, there are two areas for possible action—tax reforms and federally backed financial instruments. The most immediate focus should be on tax reforms.

Following his recent radio address, President Clinton released documents indicating that he intended to propose legislation to allow expensing of geological and geophysical (G&G) costs and of delay rental payments. These are sound first steps, but more must be done.

He also indicated that he was evaluating proposals dealing with marginal wells. Action regarding these wells is essential to preserve existing production and we believe there are four key elements that should be enacted immediately:

- Creating a countercyclical marginal well tax credit.
- Allowing a 5-year net operating loss carryback for independent producers;
- Eliminating the net income limitation on percentage depletion for marginal wells; and,
- Eliminating the 65 percent net taxable income limit on percentage depletion;

All of these have been introduced or passed in some form over the past two plus years. For example, Senator Kay Bailey Hutchison recently introduced S. 2265 incorporating the expensing proposals and the marginal well tax credit in one bill. Several senators introduced S.2557 last week that includes these provisions.

We are at a rare juncture. Both Congress and the Administration are moving in the same direction regarding tax reforms for domestic natural gas and petroleum exploration and production. Both are looking toward provisions that will encourage exploration. Both are looking at ways to extend the life of domestic marginal wells—our true strategic petroleum reserve. Now is the time to act.

Will these steps guarantee that domestic production will rebound? Nothing is certain, but it will guarantee that more capital will get into this industry when it is needed. And it will avoid the mistakes of 1986 when Congress enacted Alternative Minimum Tax provisions, just as the industry needed capital to rebound from low petroleum prices. This was one of many factors that have resulted in the loss of about 2 million barrels per day of domestic petroleum production from 1986 to 1997.

This is not all that we need to do. We should also look at other tax reforms that can help bring capital to this industry over the next decade and beyond. This industry must compete for capital against high technology and Internet companies that are generating far higher returns than are likely from this mature but risky industry. Investors need reasons to put their capital in domestic exploration and production companies. Other tax reforms that could be addressed include modification of the AMT, expanding the Enhanced Oil Recovery tax credit, considering what tax treatment should apply to the unconventional sources identified in the NPC study like the current Section 29 tax credit, considering a drilling tax credit, inactive well recovery, and reevaluating the elements of percentage depletion including the rate and the number of barrels of production that apply. Decisions on these reforms should be made based on the importance of this domestically produced resource. We must begin treating domestic natural gas and petroleum as a critical element of national economic security.

And, we should look at federal financial instruments like the PADDIE MAC concept that would create a FANNIE MAE-like program to help lower the capital costs to the smaller producers so essential to maintaining the nation's marginal wells.

Access To The Natural Resource Base

Addressing the issues of access to the nation's resources under government controlled lands is complicated. Recent successful laws that have addressed access are the Deepwater Royalty Relief Act, The Royalty Fairness and Simplification Act, and moratoriums on rules for illegally assessing new petroleum royalties. We are pleased to announce that in a recent decision, *IPAA v. Armstrong*, the District Court ruled that in fact the government doesn't have the legal right to require producers to market at no cost to the lessor, a matter at the heart of the petroleum royalty rulemaking. These actions have enhanced the development of federally controlled resources.

The legislative requirements of the Deepwater Royalty Relief Act are expiring. The authority to continue royalty relief will rest in the hands of the Minerals Management Service. IPAA believes it is critical to continue to provide a royalty structure that encourages offshore development. The Deepwater Royalty Relief Act has proven that its approach works. However, while its benefits have largely flowed to the major integrated petroleum companies, independents are now moving more aggressively into the offshore generally and the deepwater more specifically. Major integrated companies are moving toward the ultra-deep water where their cutting edge technologies are allowing them to go. IPAA and other associations, and companies involved in the offshore have begun working with MMS and the DOE to look at how royalty policies can enhance domestic offshore production. Hopefully, these efforts will lead to administrative actions to create a royalty structure throughout the offshore that will enhance domestic production. However, if this result does not occur, Congress will need to address offshore royalty policies.

At the same time it is equally important to recognize that a larger aspect of access to natural resources involves opening access to that which is not now available and halting the trend of further embargoes of western lands. Unfortunately, the Admin-

istration avoids dealing with the clear need to open government lands to exploration and production. It hides behind an environmental sensitivity argument that is proven wrong by its own DOE report. It focuses on arguments against opening ANWR and avoids dealing with access issues offshore and in the Rockies where its own National Petroleum Council *Natural Gas* study concludes that over 200 trillion cubic feet of natural gas is either off limits or difficult to permit. It is important to understand that access issues differ between these areas. ANWR and offshore activity off of California, the Eastern Gulf of Mexico, and the Atlantic are constrained by policy decisions, both executive and legislative, through prohibitions and moratoriums. These are based on outdated reactions to spills occurring in the past. The Administration's own study, *Our Ocean Future*, concluded unequivocally that offshore natural gas and petroleum production is a success story. We need to move into the 21st century and make enlightened decisions to use these critical national resources.

Access in the Rockies won't be resolved by a single act. Here, we are dealing with a mosaic of limitations. Some involve land that is completely excluded from natural gas and petroleum exploration and production.

- The Antiquities Act of 1906 has been used to declare areas as national monuments placing land completely off limits.
- In other areas, the Department of Agriculture is proposing to expand roadless areas in national forests that will preclude natural gas and petroleum development.
- Some national forests, like the Lewis and Clark National Forest, projected to be a world class natural gas source, have been administratively closed to natural gas and petroleum development.
- Wilderness areas have been created without an understanding of the resources that might be lost.

We must also deal with permitting limitations and other indirect actions of federal agencies.

- Because these are government lands, it is necessary that federal agencies issue permits for the exploration and production activities. These agencies are charged with the task of developing environmental management plans for areas under the National Environmental Policy Act (NEPA). NEPA can be used to create effective, environmentally sound management plans, or it can be used to delay and deny access. Frequently, the results reflect the attitude of the agency and its leaders. For example, in the Powder River basin the development of coal bed methane has first been delayed by the inability of the BLM to process permits. But, as the magnitude of effort was more clearcut, BLM fell back to the excuse that the EIS for the area was outdated and required a new plan under NEPA. This has led to further delay. BLM then argues it needs additional funds, requiring Congress to act and resulting in further delay. In the San Juan basin, BLM has tried to argue that its management plan needs updating and permitting needs to be delayed until another plan can be developed despite repeated assessments of the plan that demonstrate its adequacy.
- NEPA is only one of many laws that are involved in the planning or permitting processes and BLM is only one of the agencies that must be dealt with. Others include the Endangered Species Act and the Fish and Wildlife Service, the Clean Water Act that can involve both the Environmental Protection Agency and the Corps of Engineers when wetlands are concerned, and even the Clean Air Act.
- For example, many areas in the Rockies are limited during certain times of the year because of management plans designed to protect various species. While each plan individually provides opportunities for resource development, collectively, they interact to effectively prohibit natural gas and petroleum extraction.

If we are to provide the country with the domestic energy it deserves, we need to create national policies that allow environmentally sound development of these resources. No one can expect that this mosaic of limitations can be instantly revised, but we need to start the process.

First, we can determine where the most likely resources lie. Congress should compel the development of such an inventory. When actions like this have occurred in the past, they allow the disputes to be better focused. They allow the issues to be discussed in a real rather than hypothetical context. And, this can lead to real solutions for specific areas.

Second, we need a clear understanding of the impediments that we are encountering. We need to know how many laws, regulations, conflicting management plans, and whatever else are in play. This perspective is essential to provide a real sense of how these actions can result in effectively foreclosing any development. A recent assessment of one area of the Rockies showed how a mixture of management

plans for various species effectively foreclosed any petroleum or natural gas development, but no single plan would result in such denial (a graphical presentation is attached to this testimony).

Third, we cannot expect to meet our nation's needs for clean burning natural gas without reasonable access to the resource. The NPC *Natural Gas* study and all other analyses conclude that the Rockies contain significant extractable reserves of natural gas. Yet, in the Rockies access is being limited. It is either the unanticipated outcome of laws, regulations, and plans that unintentionally deny access or the manipulation of these laws to produce that outcome. In either case, access limitations are not the result of a clear policy decision. Consequently, we need a commitment from Congress and the Administration that these types of constraints will be eliminated or restrained and proper funding will be provided on a continued basis to allow environmental documents, leases, and drilling permits to be issued in a timely fashion.

Clearly, there are environmental extremists who will not support this essential development. But, as the DOE has demonstrated in its report, it can be done and in an environmentally sound manner. It will take effort, and it will also take courage.

Other Issues

While these issues dominate the factors that influence future natural gas and petroleum exploration and production, there are many others that must be addressed—some that are dominated by factors largely outside the scope of the federal government, others where the federal government is a key factor.

For example, the other factors identified in the NPC *Natural Gas* study relate to access to technology and to human resources must not be overlooked. Domestic natural gas and petroleum development have changed dramatically during the past two decades through the application of new technologies such as 3D and 4D seismic analysis, horizontal drilling, and the use of advance offshore technologies. The widespread availability of these and other technologies will be critical to meeting future challenges as well. Similarly, the industry has suffered further declines in employment. During the 1998-99 low petroleum price crisis, the natural gas and petroleum extraction industry lost 65,000 jobs of which only about 7,000 have returned. Employment has dropped below 300,000 from levels that exceeded 600,000 in 1984. These are highly skilled jobs at both the rig operator and engineering level. Many of the domestic industry workers are Hispanics. But, once people leave the industry it is hard to attract them back. Attracting new workers is equally difficult. For example, enrollment in petroleum engineering has consistently fallen over the past several years. While these are not issues that are dominated by federal policy decisions, they are nonetheless essential to meeting future natural gas and petroleum demand.

At the federal level, we must continue to work with foreign producer nations to move toward petroleum policies that produce the stability needed to maintain and enhance our domestic production. And, as we do, we cannot assume that other countries are willing to sacrifice their national incomes to meet our expectations that product prices should be low in the U.S.

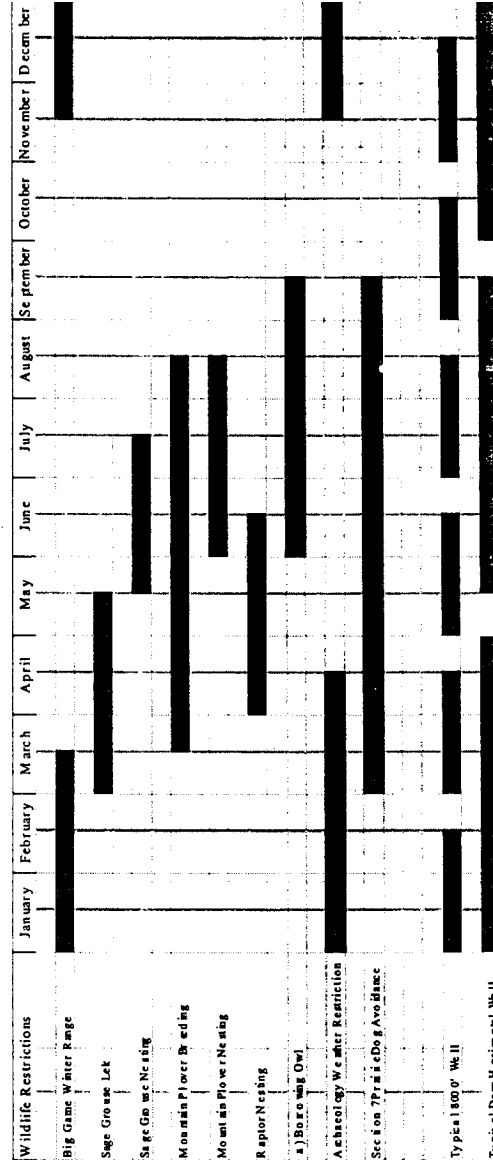
The federal government must strive toward sound environmental regulatory programs that do not burden the industry with regulations and paperwork that provide little if any environmental benefits. For example, the Environmental Protection Agency (EPA) is now being sued again to compel regulation of hydraulic fracturing under the Underground Injection Program (UIC) of the Safe Drinking Water Act (SDWA). Study after study has shown that hydraulic fracturing is an environmentally sound process involving the brief injection and subsequent removal of fluids to place proppants necessary to open natural gas and petroleum formations for development. Some analysts believe that over 60 percent of the natural gas wells that will be needed to meet the projected 2010 demand will require hydraulic fracturing. It is exactly this type of poorly targeted regulation that must be avoided. Similarly, EPA is proposing new reporting requirements under the federal Superfund and Right-to-Know laws that will add nothing to the scope of information on emergency releases but burden natural gas and petroleum producers and other industries with needless paperwork. In an era when future natural gas and petroleum production will depend on the amount of capital that must be invested, stripping this capital away through unneeded regulations is counterproductive and unwarranted.

CONCLUSION

On balance, future supply of domestic natural gas and petroleum will depend on a clear recognition—first by the federal government and more broadly by the nation

as a whole—that these commodities provide a value as a domestic resource. It will require a clear recognition that the domestic industry has changed dramatically since the 1980s and will continue to change toward greater reliance on independent producers. And, it will require a clear commitment from the federal government that it is prepared to implement policies to allow domestic exploration and production to access the capital, the resource base, the technology, and the human resources that are needed to meet the challenges confronting the country.

Surface Use/Seasonal Restrictions



Source: IPAMS

Mr. BARTON. Thank you, Mr. Russell. It is amazing. You are the last testifier, and you are under 5 minutes. That is amazing after 13 other people have gone before you, and you are timely. We commend you for that.

We will recognize the gentleman from New York, Mr. Vito Fossella—who is not running for the Senate, at least as of this morning. The day is early yet——

Mr. FOSSELLA. We have time, the way things move in New York.

Mr. BARTON. [continuing] for 10 minutes for questions.

Mr. FOSSELLA. Thank you, Mr. Chairman. And thank you—I am sorry I am late, but I thank you for holding this hearing.

I have a question for the American Petroleum Institute. With the impending June 1 implementation of the reformulated gasoline program in certain areas of the United States, including my congressional district, there have been some concerns about the problem in the Midwest as well as refinery capacity. In your opinion, will existing refineries have the capacity to meet these new, more stringent requirements and, if not, what needs to be done to improve this?

Mr. CAVANEY. We are facing a significant challenge, which is implementing this new grade, RFG Phase 2, as of June 1. There are some things that have developed.

No. 1 among those is a lower court decision upholding an earlier decision by the court on the Unocal patent. And the effect of this Unocal patent, Unocal was one of six companies that worked collaboratively in the State of California to develop very low-polluting gasoline. They patented essentially the process or the pathway, the formulation, in order to produce this gasoline; and, therefore, they are entitled under the latest court decision to receive a royalty of about 5.7 cents per gallon.

That is an amount far in excess of the profit that you make on a gallon, so it is really something that refiners are not in a position to be able to accept at this time.

So the alternative is one of two things, either to try and build gasoline around that particular patent, which is very difficult to do, or to import gasoline from abroad. One of the things that has been done is that many of the people who import gasoline are not sure whether or not they may ultimately become a liable party, so there are large questions about whether we are going to be able to import the traditional volumes, and the companies are working as rapidly as they can.

But, in general, we are running flat out. We are at record production levels in our refineries. Our utilization rate is 95 percent. We have most of it in place; and we think, with very few exceptions, that we are going to be able to be in a position to continue to handle this phase-in of RFG Phase 2 as we move through the drive season past June 1.

There is a difference, I might add, between this phase 2 gasoline in your district and in Mr. Shimkus' district, who was here earlier with us. In the Midwest, a lot of ethanol is used. And when you make RFG Phase 2 gasoline with ethanol, you need a different base blend stock than what you will need in your area. That blend stock that he needs for his area is a very much more expensive one than yours.

See, the difference in price for making RFG Phase 2 in your area is going to be about as anticipated, which was somewhere in the 3 to 5 cents a gallon cost increase. But the difference in making RFG if you are going to use ethanol is significantly greater, not unlike the amounts he was talking about.

These were figures that had been known as we have gone forward. I don't know why those figures were not brought out as EPA started to set these timetables there, but we have been working with them as we will continue to work with all of our customers because we are in the business of making sure that gasoline is delivered to consumers when and where they want it and that we are in compliance with the laws.

Mr. FOSSELLA. So you do not anticipate any supply problems in the Northeast?

Mr. CAVANEY. We think that we will be able to serve it fairly well. We cannot say that every locality will have it at that time, but we are confident that people will not go without gasoline if need be.

Mr. FOSSELLA. You mentioned you are working with EPA. Are you also working with the Department of Energy on this? Or are the two working together, to your knowledge?

Mr. CAVANEY. We are working with both, but this is essentially a regulatory requirement that was being handled through EPA.

Mr. FOSSELLA. Thank you. Thanks.

Just a question with the representative from the Interstate Natural Gas Association, I guess, Ms. Abbott. You discussed the energy delivery systems in the Northeast and the impact that has on price spikes both in the winter and the summer. What improvements are needed, other than what you offer in your testimony, in the natural gas pipeline as well as our power industry to prevent these spikes and possible reliability problems?

Ms. ABBOTT. Thank you, I think that is a broad spectrum of things. I think, largely, the broad policy of letting the market work is the important thing. What people building new power plants and trying to build new pipelines to alleviate those supply constraints are trying to address is complying with all the regulatory requirements and permitting and the different agencies that you have to deal with.

So, really, the key barrier here is in making more efficient and getting more timely approvals for the construction of those projects. And if you can get that, the private sector will respond to that demand for additional pipelines and additional power plants. And that is really what we would like to do is to serve our customers. So it is really around that regulatory reform within the permitting process and getting to decision more quickly.

Mr. FOSSELLA. Have you put forward any proposals or suggestions on how you would reform this process?

Ms. ABBOTT. Yes, we have an entire study here from INGAA on the exact steps we think would be needed. And really the key is getting the lead agencies, which in our case is the Federal Energy Regulatory Commission—usually, for power plants, it is a State agency that is the lead agency—to really take the lead and bring the tradeoffs to resolution in a more timely fashion.

Mr. FOSSELLA. I guess the consequence, as you state in your testimony, is ultimately higher prices. But is there—in that study, do you quantify more broadly or more specifically, depending on your point of view, on what the opportunity loss is here as a result of the certification process?

Ms. ABBOTT. Well, a good example would be what prices in New York for the next year are facing where it is 35 cents, roughly 50 percent above the actual cost of transportation, which is about 60 cents right now. So you can see in very concrete instances if you do not have the mechanisms to allow the supply response to occur, whether it is in electric generation or in pipeline infrastructure, that increases prices to consumers.

Mr. FOSSELLA. I guess, if I heard you correctly, the capital is there, the folks are waiting to jump in, but, right now, there is just no incentive or the cost of waiting and the time waiting just does not make sense?

Ms. ABBOTT. Well, we all have projects that we have proposed, and it is to get the regulatory approvals to be able to go ahead and build those projects.

Mr. FOSSELLA. I have no further questions, Mr. Chairman. Thank you.

Mr. BARTON. I thank the gentleman from New York.

The Chair would recognize himself for such time as he may consume, seeing no other members present. If other members show, we will give them a chance to ask some questions.

Mr. FOSSELLA. I am running for Senate. I just gave it some thought.

Mr. BARTON. All right. I am going to start with Mrs. Abbott. Now, correct me if I am wrong, under Federal policy the Federal Government, or the FERC as its representative, has the right of eminent domain in terms of right-of-way for natural gas pipelines. Isn't that true?

Ms. ABBOTT. Yes, sir.

Mr. BARTON. Has it ever exercised that right?

Ms. ABBOTT. Typically what happens is, when you get a certificate to build an interstate pipeline and the Federal Government has to find that there is a public convenience and necessity for granting you that right of eminent domain, that allows then the private company who typically has gone out and tried to negotiate with the landowners on a voluntary basis, if there are any remaining landowners that have not voluntarily negotiated you then have the right of eminent domain with respect to those parties and they have an ability to get a fair price.

Mr. BARTON. Now, how does the right of eminent domain for pipeline construction interact with all of the problems and the permitting or the environmental issues at the State, Federal, and local level interact that you alluded to in your testimony?

Ms. ABBOTT. That is a great question. A key part of the certificate process is coordination among the various State and Federal agencies over the environmental consequences of that Federal act of granting a certificate. So it is basically doing the tradeoffs and looking at the analysis as to what is the impact on the environment of a particular pipeline route, are there alternative routings that are necessary, and doing the studies necessary to do that. And

what we are finding is that there are just inconsistencies among the various agencies that have a stake in that process and what is needed is a more timely resolution of those tradeoffs.

Mr. BARTON. Now, I want to make sure that the committee gets this on the record. Eminent domain gives the Federal Government the right to ultimately, once a route has been decided, require that that route be made available for construction. But it does not give the Federal or any other government the right to override all the environmental and local zoning restrictions. Isn't that correct?

Ms. ABBOTT. Yes, yes, and so you basically have all the State, local, and Federal permitting processes that you must go through. And just as Mr. Johnson indicated I think on the production side, it is the web of those regulations and the lack of coordination to get to resolution that is the key issue. I will give you a couple of examples from our Millennium project that are quite notable.

When we filed this project, we filed 51 inches of data weighing 80 pounds, a moderate-size child in terms of the volume of data at the front end that we filed.

One of the things we do in this is we cross the Hudson River. It was a full year of wrangling among the various State and Federal agencies as to what the best time was to cross the river with our construction. We did not care when that time window was. But they couldn't agree for a full year. That is not timely decision-making. It does not do anything to save the environment when you are trying to decide. You had conflicting opinions, and there wasn't a mechanism to get to resolution as to what the best environmental answer was.

Mr. BARTON. Now I am going to ask the whole panel this question, but I want to start with you. In your opinion, is it possible for the Congress to develop a consensus pipeline review national legislation that would satisfy the legitimate requirements of the people that want to construct the pipeline and also the legitimate requirements of the community that wants to protect the environment? Can we work together with the stakeholders to come up with a comprehensive piece of legislation that would expedite the pipeline construction process in this country?

Ms. ABBOTT. I believe it is possible, and the key is in holding one agency accountable for timely resolutions of tradeoffs. You saw, in that example, it should not take a year to resolve when the best time is scientifically to cross a river.

Mr. BARTON. From an industry perspective you are not advocating to the subcommittee that we lessen or in any way ease any of the environmental protections. You are simply saying let's get the Federal agencies and State and local agencies to have to sit down and resolve those issues in an expedited fashion?

Ms. ABBOTT. Exactly correct.

Mr. BARTON. Now, any other panelists wish to weigh in on that pipeline construction question? Anybody? Mr. Cavaney?

Mr. CAVANEY. Yes, Mr. Chairman. There is currently the Pipeline Safety Act is under review for renewal, and that affects liquid pipelines, not natural gas pipelines, and I think it would be good to take a look there. Because there are several issues where parts of the Federal Government are arguing about having joint jurisdiction, and it is going to raise exactly the issue that you have just

heard here and industry across the board is trying to argue: You need one definitive point of reference that can make decisions or you will end up repeating in the liquid pipelines the same problems that you have now with the gas pipelines so it can be done. That is a good model to look at. There are some good parts of that that have worked well, but there are also some lessons learned that we and many of the others would be glad to talk to you and your staff about.

Ms. ABBOTT. And I think the key theme here is that, as industries, we are very supportive of matters to protect the environment and matters to protect public safety, but let's get to resolution and not engage in infinite dialog about the best way to get there. And I think it is that getting to resolution when you have a myriad of regulatory agencies involved, and legitimately involved, given their accountabilities. But getting to resolution I think is the key thing.

Mr. BARTON. Now, let's assume that we can untie this Gordian knot of pipeline construction permitting so that we actually get the pipelines built. That is a big if, but assume that. What do we need to do at the Federal level in terms of incentive pricing at the FERC for the transmission and operation of these pipelines? Because you alluded again to that in your testimony.

Ms. ABBOTT. Right. The dramatic changes that we are effecting in the gas industry is that we have a different set of customers now. Our traditional customer is the local distribution companies, are now going through a choice process at the local level to allow the ultimate consumer to choose their gas suppliers; and we as an industry and AGA and INGAA both support that because we think choice is a good thing. It goes along with that market support. What it means is that different players now hold the pipeline capacity, and they need different products and services.

So the kind of model we are suggesting is very much the model people have taken on the telecommunications side where your basic service is regulated and is fairly structured but enhanced services like call waiting and other kinds of things can be fairly quickly introduced and priced as a market moves.

If you think about the benefits we have seen in the telephone industry where the option used to be the black phone and then we unbundled the telephone industry and you see the myriad of products and service—I don't think cell phones ever would have developed in the telecommunications business if we had not unbundled long line. We did not anticipate that coming. Pagers, all of the things that we cannot function without. And that is the kind of product innovation and benefits to the economy you get when you go that kind of a route, and it is the kind of model that we are suggesting.

Mr. BARTON. I am going to show some of my ignorance because I have not focused on this in a while. Does the FERC regulate the transmission rate for interstate gas pipelines today?

Ms. ABBOTT. Yes, sir.

Mr. BARTON. So you want FERC to put an incentive mechanism in place or do you want to deregulate that?

Ms. ABBOTT. We recognize that we are still considered to be a natural monopoly by many, so it is the form of regulation that we are talking about. Right today we basically provide one vanilla-fla-

vor kind of service at sort of an average rate; and what we would like is the flexibility to, on top of that, kind of like call waiting, your basic telephone service is regulated, your dial tone is regulated on phone, but the products and services that you add on top of that are subject to more market forces and more flexible kind of regulations.

Mr. BARTON. What is the current FERC's view of your idea?

Ms. ABBOTT. They have taken some good steps forward in it, and I think the signal is to continue to move with the market. Because we think as the market moves forward we are going to need more flexible pricing options and service options. I think they are open to it. It is the speed of decisionmaking and the resources devoted to recognizing there is a need.

Mr. BARTON. What stakeholder groups tend to oppose that?

Ms. ABBOTT. We have had good support from our colleagues on the distribution side. I think the production segment of the community is somewhat for skeptical on some forms of that. Would that be fair?

Mr. JOHNSON. Yes, that is fair. On the producer side, the supply side, we recognize in certain instances that it is a free market; and there is no problem with competition locally. There are other segments, interstate pipeline market, that are specifically monopolies. There is only one pipe out of one place to one other place where you want to sell your gas. And what we really want to make sure of is that that particular natural monopoly—and it is an efficient monopoly, it really is, but it does need to be regulated to a certain extent so that there is not discrimination which will add to the cost of things.

Mr. BARTON. I would say you would be opposed to what we would call price gouging, charging an unreasonable amount to transmit a specific amount of gas. But if you put in some sort of incentive mechanism that allows additional services, you would not oppose that.

Mr. JOHNSON. No, incentive mechanisms would work for us. And, again, there are certain services that the interstate pipeline industry offers and wants to offer that, again, we are not concerned about. Because I think the bright light at the end of the tunnel on a lot of this is that the Internet is going to open much of this up.

Mr. BARTON. I don't think we can transmit natural gas by the Internet, though.

Mr. JOHNSON. No, but what we are concerned about is transparency of transactions. Now transactions are extremely cloaked in secrecy; and we do not see everything that goes on in the market, which leads to suspicion, obviously. And I think what you need to do with—what the Internet will affect so that everyone will see the transactions that are going on. And it will also greatly lower transaction costs, which is a big part of my business and her business and everybody else's business.

Mr. BARTON. I want to switch to Mr. Russell. I did glance at your testimony last evening, and I have one technical question and one of personal curiosity.

You have got a huge list of people that are sponsoring your testimony. But I am puzzled by the fact that the Texas Independent Producers and Royalty Owners, TIPRO, is not on there. Is there a

reason for that? You have got North Texas and West Texas, but you do not have TIPRO. And they are normally telling IPAA what to do, I guess.

Mr. RUSSELL. That was a housekeeping error. They have asked not to be included unless they have the specific time to go through it in more detail.

Mr. BARTON. As far as you know, they do not oppose anything you are saying in here?

Mr. RUSSELL. That is right.

Mr. BARTON. I want to double-check, because I have a lot of good friends down in TIPRO.

On the back of your testimony you have a chart, you do not really allude to it in your testimony, but along one axis, it says Wildlife Restrictions is the heading and then big game winter range, sage grouse lek, L-E-K, sage grouse nesting, mountain plover breeding, mountain plover nesting, raptor nesting, burrowing owl, prairie dog avoidance. Are these all local or Federal restrictions in the Rocky Mountains that you cannot drill during those times?

Mr. RUSSELL. A lot of them are. But it goes to the point that you were talking about before with the pipelines, which is, if you take an area of land and look at all the various environmental restrictions, this is just an example of some of the endangered species' kinds of restrictions there that block access during certain periods of time.

Mr. BARTON. The prairie dog is not an endangered species, is it?

Mr. RUSSELL. Yes, in some areas it is.

Mr. BARTON. It is?

Mr. SHIMKUS. Stop running over them.

Mr. BARTON. Not in Texas.

Mr. RUSSELL. You would be surprised at the list that we would show you.

But what I was going to say is it is not only this list but if you go through and look at not only endangered species but some aspects of the Clean Air Act—the permitting, the monitoring, some of the things that you talked about before which really go to this procedural aspect and the lack of coordination between State and Federal agencies, that what happens is that whole areas are essentially taken off the table for development. That is what we were trying to show there, and I can give you more supporting detail on that.

Mr. BARTON. So this is more—

Mr. RUSSELL. That is really more in some of the Rockies rather than across the country. That was put together by one of our Rocky Mountain associations, but we can give you a lot more detail on that.

But, again, it goes to the point of what you were raising before, that there is an awful lot of what can be done in terms of coordination and in terms of not looking at the substantive requirements but the overall effect of overlaying one environmental statute over another when there is no sense of what the implication is going to be for further gas development, something that you raised this morning.

Mr. BARTON. I have two more questions, and then I will recognize Mr. Shimkus.

Mr. Cavaney, Admiral Watkins earlier was fairly emphatic and passionate about the ability to drill in ANWR without harming the environment. What has been the experience in Prudhoe Bay in terms of environmental damage to the land and also to the wildlife? Has there been documented any permanent harm to the wildlife or to the environment in terms of Prudhoe Bay?

Mr. CAVANEY. Well, I think, Mr. Chairman, to the contrary; and we will be glad to work with the Alaska Oil and Gas Association to provide you a bunch of the studies and the data that has been collected.

Just to give some examples, they have monitored the herds; and the herd development over the time. One of the herds that was up there was about 3,000 at the time they finished off the pipeline. It is up to 20,000 now. I could go on and on and on.

Mr. BARTON. So they need population control?

Mr. CAVANEY. They need population control. But, clearly, wildlife has done quite well up there. It is well documented. And a lot of that goes to the site preparation. In the testimony that Alaska Oil and Gas Association committed, they point out the most recent field, which is Alpine, they are going into, that they spent years of prep work in getting the site ready by looking at all the local indigenous situations so they could track and keep records of that. What we have found, that is a special place up there. It has a unique habitat. The conditions are very harsh at times, and the industry has brought to bear technology up in that area unlike any place else in the world, and we have learned a lot from it.

Over the 20 years that the industry has been up there, they now take a pad size, which is the area where the wellheads go, and it has been reduced by over 90 percent.

And another thing that has happened is that, over that period of time, we have learned instead of having to make one bore hole for each individual well you can now utilize—with directional drilling one bore hole can go ahead and handle multiple wells. You can actually go out as deep as 9,000 feet and as far out as 4 miles with directional drilling to find what you need and bring it through. So the footprint on the surface is down to close to de minimis levels.

In terms of the operations up there on the tundra area where they operate, what we have learned to do is, any of the muds and the like that are brought out in the drilling process from down below they are reinjected into the ground, as is the gas and the others, so that by the time you leave a site basically, you wouldn't know that people had been there.

So it is possible that people are concerned about looking at drilling operations 20 or 25 years ago and saying we just do not want that up there, but it does not look at the reality of what is going on up there today because technology continues to advance. We are quite confident that we could be held to the world's strictest standards, which we are up in Alaska, and we could go up in ANWR and those other areas and both respect the environment as well as help develop an energy policy that would provide more domestic production.

Mr. BARTON. Now put this in perspective. Assuming that the latest EIA estimate on the amount of recoverable oil and gas are true

in ANWR, it is a huge number. It is almost as much as we have in the lower 48 in terms of proven reserves. It is a big number.

Mr. CAVANEY. Yes.

Mr. BARTON. How big would the drilling platform or the drilling footprint be to actually drill ANWR if everything is there that EIA says is there? Put it in some sort of way that we can understand. Bigger than the Capitol? Bigger than the State of Texas? How big would it be to do all the drilling?

Mr. CAVANEY. Let me give you an example of this Alpine field, which is not in ANWR, it is over in the plain. There you have an area of 40,000 acres. Now, they have done all the seismic and the testing, which has not been done in ANWR yet so you have to do a lot of work before you can get the details down. But they can take an amount which is less than 1 percent of the land mass, would be all they would ever have to touch to be able to access and resource that entire area. So you would have to go in and, first of all—

Mr. BARTON. That would be 400 acres based on 40,000 acres?

Mr. CAVANEY. Yes.

Mr. BARTON. Four hundred acres?

Mr. CAVANEY. And that is a relatively small amount and could be smaller based on technology.

Mr. BARTON. What is a city block? How many acres is in a city block?

Mr. CAVANEY. Gosh, I think a city block is considered to be 10 or 12.

Mr. BARTON. We are going to show all of our technical expertise here. So if a city block is 10 acres, you can drill this entire area in 40 acres. Four city blocks could drill this entire field?

Mr. CAVANEY. I think it is not fair to extrapolate this, because we have not had a chance to go in with seismic and determine whether these reserves would all be in several large deposits or caverns or whether they are—

Mr. BARTON. I am trying to help. This is not an unfriendly question. But I am told that we could have a drilling platform on the parking lot of the Capitol; and if there were referable oil and gas reserves in the District of Columbia, one drilling platform centrally located could drill all the wells that would be needed to drain the District of Columbia.

Mr. CAVANEY. That is correct. That is correct.

Mr. BARTON. So this image of these forests of rigs like you remember from the 1930's in Kilgore, Texas, in reality in Alaska, if we are allowed to drill in ANWR, you are going to have very few platforms; and to the caribou or an animal walking through, they are probably not even going to notice the drilling, unless at night they stumble into it.

Mr. CAVANEY. They won't. I have stood at a site up in Alaska and actually had caribou walk within 50 feet of me undisturbed. It is not the old sepia-toned tintype of all these rigs and everything those are from the 1920's and 1930's.

What you use today is modern technology. You bring the rig in, drill the hole, remove the rig, pull it out. You have a small well-head that is there, and that is all that is seen, and then some lines to be able to collect the oil and move it on to tankers, basically. All

about invisible to the eye once the actual bore hole has been drilled.

Mr. BARTON. I have some more questions, but I will recognize Mr. Shimkus for such time as he may consume, and then I will finish the hearing.

Mr. SHIMKUS. Thank you, Mr. Chairman.

I think 400 acres would be classified as a small farm in Illinois. In fact, it is probably a small family farm that cannot make it today at today's commodity prices.

Mr. BARTON. That would be a backyard in Texas.

Mr. SHIMKUS. I appreciate the panel's longevity and staying through. It is a long day, and I know most of you were here for the previous panel.

I have always been very vigilant on this national energy policy, and if you went back to the records of other hearings I have bemoaned the fact that we really do not have a strategy that takes in these other fields that we could do, the marginal wells that I have in my district and, obviously, the renewable portion.

Now we are going to have a hearing on the renewal portion, but I only wish, Mr. Chairman, that some of that renewable portion, especially in the fuel blending area, could have been today because it does fit well in the fuel debate. To separate it with the wind and hydroelectric and solar I think does a great disservice to the debate, and next time I will be a little bit more prompt and involved in seeing that there is good representation.

So, not to be adversarial but to continue to push the issue, on a small portion of the national energy strategy which has to be that renewable portion of our portfolio, I visited Williams Companies' Pekin energy plant that produces ethanol and many other products. 100 percent, there is no residue in the production, and ethanol is just one of the products—feed, protein, starch, all this other stuff. I was just amazed at the lack of residue in this refinery, and I would encourage people to visit it. And DOE mentioned the fact and the first panel mentioned about science research and development will not only help us move us further down the line.

I also want to take the chance to ask if anyone on the panel here disagrees with the EPA's evaluation of the phase 1 RFG areas, which obviously is part of the oxygenate debate. There EPA says that volatile organic compounds, VOC, reductions average 27 percent, and the goal was 15 percent. So exceeded the goal by using the oxygenate standard. Air toxin reductions averaged 22 percent; the goal was 15 percent. Average NO_x reductions for phase 1 is 3 percent. There was no requirement under the phase 1 program. And ambient benzene levels decreased by 43 percent of the oxygenate standards.

Now benzene is a carcinogen. Does anyone dispute the fact that the oxygen standard has been very helpful in the clean air battle that we have been fighting the last couple years?

Mr. CAVANEY. I would like to make a point, because we have been through much of that. I think in the initial stages the oxygen mandate may have had some benefit, but I think most of the people who manufacture gasoline and the regulators who look at them can now say—how shall we say—the low-hanging fruit has already been realized. And you can be held to meet the exact same stand-

ards without using oxygen and still get those results out. What happens to—

Mr. SHIMKUS. If I might jump in, we have had a hearing on the oxygen standard, and we did have the doctor from the Colorado School of Mines that in testimony before the committee would say that is true, but you then have a rise in aromatics. So—and the possibility of—so the question is this: Do you dispute the EPA standards on the reductions of the organic compounds, the air toxic reductions, the NO_x reductions and the benzene reductions?

Mr. CAVANEY. All I was trying to say is—

Mr. SHIMKUS. But, sir, the question is—but the question is, do you dispute that the oxygen standard has been beneficial in the Clean Air Act?

Mr. BARTON. I think you ought to give him a chance to answer the question.

Mr. SHIMKUS. Well, he is not—the debate—the response is—the question is, has the oxygen standard been helpful and has met the standards that the EPA has directed? That is the question.

Mr. CAVANEY. In the beginning it did, yes.

Mr. SHIMKUS. How about currently?

Mr. CAVANEY. Currently, you can achieve the same effects without the oxygenate mandate in there.

Mr. SHIMKUS. Well, and that is debatable, based upon other testimony that we have had.

Mr. BARTON. Would the gentleman yield? To try to help you out a little bit, can you achieve the same effect at the same cost?

Mr. CAVANEY. Actually, in some cases we can probably do it less expensive. We are supporters. We are the largest user of ethanol. What we object to is the idea of mandating. Because it gets you, in certain conditions, into very high-expense things where we have to pass that cost along to the consumer. We don't disagree that oxygenates have a very valid role. We think ethanol has a very bright future in our industry. We will be using significantly more of it, with or without a mandate. What I am just trying to say is you are asking for a blanket statement in a condition, that the blanket answer—

Mr. BARTON. The gentleman's statement is correct. The oxygen requirement under the current Clean Air Act has exceeded the estimates of the cleanliness of the air that would develop by using those standards. I think that is a true statement. I think—

Mr. CAVANEY. And the industry can blend without an oxygenate today and maintain those extra gains won't be lost in the process. The case that has been mentioned by the earlier panel, technology does change, so what was true 10 years ago can be done different ways now. We have to acknowledge those kinds of things. We are not trying to back away.

Mr. BARTON. The gentleman from Illinois is an ethanol man, and the gentleman from Texas is an MTBE man.

Mr. SHIMKUS. Just reclaiming my time. We know what we have, and we know what we have works. There is dispute on other refinery capabilities, and this is how it ties in though—with the whole energy security issue.

Also, the DOE and our testimony that we had in March, Mr. Chairman, the question was asked of DOE: If we would eliminate

the oxygen standard, what would that do to the cost of fuel? And we had a hearing on the high cost of fuel. Their response was an increase of 3 to 5 cents a gallon.

And if basic supply and demand—you are actually losing volume and replacing it by refined petroleum product, i.e. A gasoline, that, obviously, supply and demand is working in favor of the producers now with high prices. So if we want a national energy policy, we are in a schizophrenic time—a clean air benefit and a renewable source of fuel. That is why the separation of these issues in various panels sometimes is not very helpful. And I will continue, obviously, to fight for the interests of Illinois.

Mr. BARTON. That is a real news flash.

Mr. SHIMKUS. Last thing is because—and I mentioned this to the first panel—because of the biodiesel provision in the Energy and Policy Conservation Act, soy diesel—demand for soy diesel has increased 700 percent, and there is a great reduction in the ability of the exhaust. We look forward to working with the Petroleum Institute and—working with us so that we can get cleaner air, but we also address our national energy security by—hopefully, it never happens, the oil lanes are closed and we start pumping out of the SPR to meet the demands of our military forces. In essence, that is a limited supply. We better have our marginal wells, we better have some continental United States oil production, and we better have a renewable portion of that portfolio.

More statements than questions, Mr. Chairman, but that is a member's prerogative. With that, I will yield back my time.

Mr. BARTON. I just have a few more questions. Then we will close the panel.

This is really to Mr. Cavaney. We have reauthorized the Energy Policy Conservation Act in both the House and the Senate. The bills are somewhat different; and there is some controversy over a provision of the House that if oil prices in the world market were to go below \$15 a barrel we would authorize the first time for the Secretary of Energy to purchase oil at \$15 a barrel for the Strategic Petroleum Reserve from the stripper wells.

In the Senate, I don't know if it is in the EPCA Reauthorization Act, but Senator Hutchinson has a provision that if oil prices were to go below \$15 a barrel a tax credit of up to \$3 per barrel would be made in order for these same stripper wells.

Obviously, the intent on both the Senate and the House is to keep the stripper well production producing when world prices collapse again, if they do. What is API's position? Do you support both provisions? Do you have a preference for one?

Because at some point in time we are going to go to conference with the Senate and, obviously showing some personal bias since I am the author of the discretionary authority by the Department of Energy, I would hope that we would keep that in. But if Senator Hutchinson were here I know she would speak on behalf of the \$3 per barrel tax credit.

Mr. CAVANEY. We strongly support a strong domestic energy production capacity, and we would work very closely and do with IPAA. They are the principal constituents with many of those people.

Mr. BARTON. We have to give Mr. Russell a chance.

Mr. CAVANEY. Whatever would work out and be good with them, I think you would find the API would be very supportive of that.

Mr. RUSSELL. We support both. But we support those things, especially the marginal well tax credit that you mentioned. That is the thing to preserve, the marginal wells in this country. We were talking before about the strategic petroleum reserve and we have this, the marginal wells, in this country that produce about as much oil as what we import from Saudi Arabia. So it is geared to protect that production when we have downturns.

Mr. BARTON. The House provision in conjunction with the Markey amendment on the reserve fuel oil refined product reserve in the Northeast passed the House like 400 to 6. So we have actually had a vote in the House, and it was overwhelming.

I support Senator Hutchinson's provisions, too. Unless it has been voted on at committee, I don't believe it has had a vote in the Senate.

Well, I am going to let this panel go. As I said to the first panel, I want to give you my personal appreciation for attending today. This is a very helpful dialog.

I especially think the testimony of INGAA about the need to reform our pipeline licensing process and try to bring the permitting process into some sort of conformity and expedite the procedure is very helpful. I will be working with the minority. If we can come up with some consensus language to at least introduce for discussion purposes in this Congress, you know, I would like to do that.

On the larger issues of oil and gas policy, I can assure you this is not a hearing just to hear ourselves talk. We are going to have two more hearings this summer. Next hearing is going to be on coal and nuclear, and then we are going to hold a hearing on all the renewable and alternatives, environmental issues. And we are going to try somewhere to put in some focus on electricity, which kind of uses all the base sources but is an end use. People look at electricity as something they use like natural gas or like gasoline.

So by the end of the summer we hope to have had a comprehensive set of hearings and have developed a record to begin to try to develop, again on a bipartisan basis, a comprehensive national energy strategy for the next administration, whichever political party is in power.

So, again, I want to thank you. This hearing is adjourned.

[Whereupon, at 2:10 p.m., the subcommittee was adjourned.]