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RISING OIL PRICES, EXECUTIVE BRANCH POLICY, AND U.S. SECURITY IMPLICATIONS

HEARING

BEFORE THE

COMMITTEE ON GOVERNMENTAL AFFAIRS UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

SECOND SESSION

MARCH 24, 2000

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RISING OIL PRICES, EXECUTIVE BRANCH POLICY, AND U.S. SECURITY IMPLICATIONS

FRIDAY, MARCH 24, 2000

U.S. SENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The Committee met, pursuant to notice, at 10:00 a.m., in room SD–342, Dirksen Senate Office Building, Hon. Fred Thompson, Chairman of the Committee, presiding.

Present: Senators Thompson, Voinovich, Domenici, Lieberman, Akaka, and Cleland.

OPENING STATEMENT OF CHAIRMAN THOMPSON

Chairman THOMPSON. Let's come to order, please. Thank you all for being with us here this morning. Today the Committee is holding an oversight hearing on rising oil prices, Executive Branch policy and U.S. security implications. As we all know, oil is an essential component of our economic vitality and lifestyle. Petroleum products fuel 97 percent of our transportation needs, for example.

Oil is the primary energy source for many industries and a key feed stock for others. High oil prices affect everything from travel, shipping, autos, chemicals, consumer products, technology, and home heating. It wasn't long ago that we enjoyed historically low oil prices. A little more than a year ago, oil was about $10 per barrel. Gasoline was less than $1 per gallon.

In March 1999, OPEC decided to decrease oil production and drive up oil prices, even as world oil consumption was rising. Since then, oil prices have tripled to about $30 per barrel. During this winter, home heating oil prices doubled in the Northeast. As Secretary Richardson put it, the administration was caught napping at that price jump.

Economists are predicting gasoline prices will continue to rise in the near term and some think that gasoline could cost about $2 per gallon this summer. Oil also has important application for our national security. Because oil is the life blood of our economy, it must be reliable, affordable, and predictable. Relying completely on others to supply it can present dangerous consequences to our prosperity and way of life, both vital interests that the country must be prepared to defend.

The United States is becoming increasingly reliant on foreign oil. This is cause for alarm, given that some of the world's leading oil producers are politically unstable, face difficult internal issues, or live in tough neighborhoods. We now depend on foreign sources for over half of our oil needs and we are heading to 60 percent within

5 years. It seems that few people view our reliance on foreign oil as a problem until prices are raised.

Here in Washington, it is tempting to enjoy the political windfall of low oil prices; so long as prices are low, policymakers are prone to ignore the link between oil imports and national security. But it seems to me that there is a danger not having a proactive energy policy. The recent oil price shocks may be a sign that these chickens will come home to roost and perhaps might be a blessing in disguise if it gets our attention.

It seems to me that after a decade, when we were using more oil, consumption was increasing and production was declining, during which we enjoyed historic low prices because of a given set of circumstances that was prevalent at the time—the Asian economic crisis, weather, various other things, miscalculations by OPEC, oversupply from their standpoint—those forces are simply reversing themselves now, as could be expected. But after all of this happening, we find ourselves now that OPEC has changed its mind about its policies.

We are all in a state of shock that such a thing could happen. It does not seem to me like we really ought to be, and so now we are looking at some short-term solutions that I hope will not present more problems than they cure, and also, hopefully again, some long-term solutions that we usually seem to want to take a look at only when prices go up. But I think the issues of supply and stability, frankly, are much more important than temporary price increases, considering the historical price of oil anyway. But anyway, with that, I will turn it over to Senator Lieberman.

OPENING STATEMENT OF SENATOR LIEBERMAN

Senator LIEBERMAN. Thank you, Mr. Chairman. Thank you particularly for moving quickly to convene this timely hearing on this problem that has been of great concern and frustration to the Northeast this winter and now is to consumers of gasoline throughout the country. The worst of the home heating oil panic that hit the Northeast this winter has now subsided, mostly because temperatures have warmed, although the supply eventually came up to begin to meet the demand. But consumers are still bearing a very heavy financial burden with oil prices at the $27 to $28 per barrel range, and gasoline prices, as everyone knows, are still rising unabated.

Because our gasoline stocks are now at about the level they usually are on Labor Day, reputable analysts are predicting drivers could be paying between $2 and $2.50 per gallon at the pump as the spring and summer vacation season approaches. Incidentally, one of the questions that I will want to ask the witnesses today is about the inventories. There was a recent article in *Business Week* that indicated that normally the oil industry builds its stocks of oil, to a peak around April 1 and then runs them down through the summer driving season.

This year, however, gas stocks are at the ultra-low levels now, usually seen around Labor Day. I want to ask questions about that. More generally, Mr. Chairman, I know Secretary Richardson has had some success in pressuring OPEC to step up its oil production, and, of course, I am grateful that he has taken an aggressive role

in trying to ease the current squeeze, but still we will not know by how much or how soon output will be raised until the OPEC conference in Vienna on Monday.

That reminds us of what Senator Thompson has said, which is that we have put ourselves in a position where we are dependent on foreign sources of oil and therefore vulnerable. I was also encouraged that the President, in his radio address last Saturday, called for the creation of a regional home heating oil reserve for the Northeast, with an appropriate trigger that would supply additional heating oil to the market during a future shortage.

Senator Dodd and I introduced a proposal along these lines last month, so I look forward to working with the administration on a bill that we can hopefully pass this year so that we can give some sense of security to businesses and family consumers in the Northeast, before next winter's home heating oil season begins.

But I must say none of this eases the frustration of being caught in an all too familiar and aggravating OPEC oil vise yet again. So I hope we can discuss today how this great country of ours got to this point of economic vulnerability to a cartel whose supply-controlling, price-fixing practices would be illegal in this country. I hope that we will, if you will allow me to put it this way, not just get mad at OPEC today, but figure out how to get even, and in that sense, I mean by beginning to take the steps that are necessary for our country to be more energy independent.

In the meantime, a lot of us have talked about the desirability of responding to the oil crunch by drawing down from the enormous crude oil inventory we have in the Strategic Petroleum Reserve to add to supply that will reduce prices.

I do not view this as a panacea, but it certainly could and probably would have a short to mid-term effect on gasoline prices, and it gives some strength to our position and makes us, I think, more than simply a supplicant without resources, begging and pleading at the OPEC's table. I remain concerned that we have not gone into the Strategic Petroleum Reserve, but I'm encouraged that some of our witnesses advocate the approach, particularly and preferably the so-called swap approach that would involve the release of oil now to refiners in exchange for a promise to return additional amounts of oil to the reserve in the future.

But let's step back and look at the big picture, and it looks a lot like the Chairman indicated. It is clear that the price volatility and the threat that it presents are symptoms of the more fundamental long-term problem, which is our dependence on foreign oil. By failing to provide our own citizens with energy alternatives that are within our control, we limit our options in times of national emergencies and entrust our economic and therefore, our strategic security too much to the whims of others. I think it is imperative that we take some steps now to wean ourselves from foreign oil and to develop a domestic infrastructure to deliver reliable alternatives.

First, we have to invest the time, money, and energy, to wisely increase our domestic gas and oil production, diversify our energy mix to include more solar energy, fuel cells, wind and even nuclear power, and develop long-range strategies for harnessing these additional energy resources. I know in this regard that there are different and difficult balances to be made, particularly about the

drilling of oil domestically. Again, some have suggested that we target, for instance, the Arctic National Wildlife Refuge.

The U.S. Geological Survey estimated that there is less than a 6-month supply of commercially recoverable oil in ANWR, which is not inconsequential, but nonetheless convinces me as I make my personal comments, that it is not worth it to destroy this refuge for that amount of oil, which some have estimated would never meet more than two percent of our Nation's need at a given time. But those are the balances that we are going to have to make, each of us and the Nation as a whole, as we try to become less dependent on foreign sources of oil.

Second, in the context of the utility deregulation debate, Senator Jefferson and I are cosponsoring legislation that would require utilities to use renewables for ultimately 20 percent of their power projection by the year 2020.

Third, we have got to take stock of the domestic energy market and evaluate national and individual consumer decisions affecting our energy supply and efficiency. In some areas here, the results are actually encouraging. Conservation and efficiency measures that have been taken by American businesses have significantly improved the energy efficiency of the overall economy. During the crisis of the 1970's, nearly nine percent of our GDP was spent on oil. That is down to three percent today and I think we can build on that progress.

But the record is not so bright across other sectors of the economy, particularly when it comes to our driving habits where vehicle miles have increased by 130 percent over the last 30 years and, despite early improvements in fuel efficiency, current standards have stagnated and Congress has imposed a freeze on raising or even studying the benefits of raising the corporate average fuel efficiency. I think we have got to do much better at that.

So, bottom line, Mr. Chairman, I hope that we will use this moment of dwindling oil supply and rising prices to heed the warning signs, to think about our future health and security as a Nation, and to act together to adopt a new progressive energy policy for this new century. I thank you. We have an excellent group of witnesses and I look forward to hearing from them this morning.

Chairman THOMPSON. Thank you very much.

Senator Voinovich, do you have any questions.

OPENING STATEMENT OF SENATOR VOINOVICH

Senator VOINOVICH. Mr. Chairman, first of all, I want to thank you and Senator Lieberman for holding this hearing today. I have been concerned about this Nation's lack of an oil policy or energy policy back from the 1970's, when we had that terrible situation where our gas prices went through the roof. In spite of the fact that we have been through these peaks, this Nation has not taken the time to sit down and develop an energy policy and to get all of the competing interests together in a room and figure out where we are going.

Yesterday, Senator Warner, Senator Baucus, and I held a news conference in opposition to reducing the tax on gasoline by 4.3 percent, which people are suggesting is going to solve the problem that we have, on the grounds that about all that would do is save the

average driver a year about 43 bucks and break the covenant that was made by this Congress to the governors of this country that we would have reliable and stable source of revenue so that we could deal with the highway and transportation problems that we have in this country. I also mentioned the fact that the proposal was just another thing to take our eye off the real issue, and the real issue is that we do not have an energy policy.

Senator Lieberman, I think you eloquently spoke to some of the various options that are available to us. But we have not been willing to do that, to bring them to the table. And the environmental interest—we cannot do this and we cannot do that. The fact is, we have to get our national security interest on the table. We have got to get our economic interest on the table. We have to get our environmental interest on the table and reconcile them. But one thing I think most people would conclude after we do that is that we are too dependent on oil from around the world, from a lot of places that are very unstable. We have to do, as a Nation, a better job of providing our own source of oil.

The issue is how do you go about doing that and at the same time, give consideration to the environmental concerns and other concerns that people have? This is an ideal time to do it because of the fact that we are seeing just what impact this has had on our economy in the short run and God knows how long it will be, but I suspect Secretary Richardson and the President—we have got a November election coming up, some miracle is going to happen before November that gas prices are going to go down. I am confident of that, folks. It will happen.

But then the issue is, after the dog has stopped barking, are we just going to go back to the way we did things before and not really confront this issue? So it is time to get together on a bipartisan basis and try and face this thing forthright and stop dealing with it by putting it in a drawer, and of course, to try to explain to the American public, that there are a lot of things that we could be doing. But, it has got to be a multifaceted program that we have, and not just one silver bullet that we are going to say is going to solve this problem.

I am anxious to hear what you have to say about this issue from a national defense point of view. We do not think about that, do we? We have our Strategic Petroleum Reserve, but what if we do really get into a jam? How vulnerable are we from a national security point of view as a result of the policies that this Nation has been following?

So, again, I want to congratulate the two of you for holding this hearing and let's hope that after this crisis is over, that everybody just does not go back to where they were before. We ought to take this thing on and make a covenant among ourselves that we are going to stay on this administration and the next administration to make sure that this Nation has an overall energy policy, and one that will protect our security interest and also deal with our own economy. Thank you.

Chairman THOMPSON. Thank you.

Senator Akaka, did you have any opening comments.

OPENING STATEMENT OF SENATOR AKAKA

Senator AKAKA. Thank you very much, Mr. Chairman. I want to thank the Chairman and the Ranking Member for having this very important hearing this morning. America has energy problems and we all understand that there is no overnight solution, but we have got to work on it.

More than 55 percent of the oil we consume is imported. And in places like Hawaii and New England, import dependence is 75 percent or greater. Our import dependence has been rising for the past two decades and we cannot turn this trend around overnight, and this is our problem. As I see it, two things will reverse our energy problem: A multifaceted energy strategy and the commitment to sustain that strategy.

In my judgment, we need both of these in equal proportions. If we want to improve our energy outlook, we should adopt energy conservation and demand reduction measures. We should develop energy resources that diversify our energy mix and strengthen our energy security. We should adjust tax policies to assist marginal oil producers, encourage energy efficiency, and promote renewable energy.

We should build more efficient buildings and weatherize existing structures, so that they waste less energy. We should give up our gas guzzling SUVs and drive a new generation of cars that consume one-third as much energy. These are long-term measures to improve energy security, but I want to point out an immediate, short-term energy security initiative, championed by the Clinton administration, that has not been given the praise it deserves, and I am referring to the Clinton initiative to fill the Strategic Petroleum Reserve.

For the first time in many years, the Clinton administration has added significant volumes of oil to the Strategic Petroleum Reserve. This achievement was possible thanks to a collaboration between the Department of Energy and the Department of Interior. This creative arrangement, known as the Outer Continental Shelf Royalty In-kind Program, will add 28 million barrels of oil to the Strategic Petroleum Reserve this year.

Instead of receiving lease payments for oil produced on Federal lands, the government receives crude oil that we deposit in the Strategic Petroleum Reserve. Filling this reserve means greater energy security in times of crisis.

For too many years, we treated our Strategic Petroleum Reserve as a petty cash account. In 1996 and 1997, we sold $450 million of Strategic Petroleum Reserve oil for deficit reduction. Whenever we needed a quick budget fix, Congress and the administration agreed to dip into the Strategic Petroleum Reserve and sell the emergency reserves.

Through the royalty in-kind program, we reversed many years of bad energy policy. Unfortunately, this is a temporary program that expires later this year. But if we extend the royalty in-kind program, we could fill the Strategic Petroleum Reserve to capacity by the year 2007. That would be a great accomplishment, if we could do it, but it will not happen without an extension of the royalty in-kind program.

Six members of this Committee come from New England and Mid-Atlantic States that are suffering high energy prices. I'm sure that all of you support the Clinton administration proposal to establish a regional home heating oil reserve. If you support the regional home heating oil reserve, you should also support an extension of the royalty in-kind program.

The royalty in-kind oil has been the only source of new oil for the Strategic Petroleum Reserve in the past decade and it is likely to be the only source of petroleum product to fill New England's regional reserve. Thank you very much, Mr. Chairman.

Chairman THOMPSON. Thank you.

Senator Cleland, did you have any comment.

OPENING STATEMENT OF SENATOR CLELAND

Senator CLELAND. Yes, sir, Mr. Chairman. Thank you for having this hearing. It is very timely and I want to thank you and Senator Lieberman for bringing us together. Mr. Chairman, I might say that the question of high gas prices, to me, is deja vu all over again. I was head of the Veterans Administration in this town in the late 1970's, and the devastating thing that I remember about those years are rising gas prices, which basically, on their own, programmed in about three percent of the terrible record inflation that we had in those days.

So I think that rising oil and gas prices are a tremendous threat to the economic growth that we have sustained over the last 7 or 8 years. I think we have to act on this threat to our economic well-being and we have to act quickly. I think we need to go back and turn the pages of history back about 20 years, to what President Carter was thinking about in those days. That was synthetic fuels and more research in that regard, ethanol, and using some of our technology to devise means where we could become more energy self-sufficient.

How did we get to where we are? Well, the 1997 Asian economic recession, among other factors, led to a decrease in global demand for oil. As the market became saturated, the price per barrel of crude oil plummeted. At the beginning of 1999, consumers enjoyed the lowest real dollar price for gasoline in history. Mr. Chairman, actually, in my State, the average price last year in Georgia for gasoline was 89 cents per gallon. I cannot even hardly run my wheelchair that economically efficient.

That is pretty cheap. Now, Senator Lieberman tells us that gas prices, by Labor Day, may go to $2 per gallon or $2.50 per gallon. This is of great concern to us and great concern to citizens in this country and people in my State. Well, the 1999 gas prices did not stick. The events caused domestic oil production to be curtailed to extremely low levels. In fact, by July, 1999, domestic oil output had fallen to levels last seen in 1946, right after World War II. Think of that.

By July, 1999, domestic oil output had fallen to levels last seen in 1946. All of these events compounded to amplify the devastating effect when, in March 1999, OPEC adopted production quotas to reduce the global supply of petroleum. By cutting output as much as 4 million barrels per day, OPEC was successful in driving the cost of gasoline up as much as 33 cents per gallon in just a single year.

This sharp increase in oil prices has caused tremendous hardship for many of our industries in this country and certainly in Georgia and elsewhere, not to mention those individuals who must rely on home heating oil for warmth in the winter months. Over the last several weeks, I have been contacted by many of my constituents who expressed their serious concerns about the impact of the recent dramatic increase in petroleum prices.

Among other concerns, propane dealers are facing difficulty in trying to purchase and market their product. In several areas of my State, propane provides vital fuel for home heating. Also, propane is heavily integrated into the management of George's poultry operations. We are the leading poultry processor in the country and poultry operations processors are a leading industry in the State. The high cost and lack of product have caused economic hardships to these industries, which rely on propane for daily operations.

Because of my concern about the continued rise in oil prices, I've contacted President Clinton to request the administration's assistance in addressing the problem. I also called on the President to examine the release of petroleum from the Strategic Petroleum Reserve. While a release of petroleum from the Strategic Petroleum Reserve is one possibility, I believe we actually have got to consider any and all policy options which may serve to alleviate the increasing cost of oil, including strong diplomatic pressure on those oil producing nations which actually rely on the United States for two things, one, a market for their products, and, two, the guarantor of their security.

We should also take a close look at several legislative proposals to reduce or temporarily suspend the tax on gasoline and diesel fuel. Senator Campbell has introduced S. 2090, America's Transportation Recovery Act, to place a 1-year moratorium on the 24.3 cent per gallon tax on diesel fuel, effective only if the price per barrel remains above the December 31, 1999 market value, followed by a permanent reduction in the tax to 4.3 cents, to begin on October 1, 2005.

Well, I want us to do what is right, prudent, and wise, but there is a very palpable air of near-crisis when I go home to my State and see the very real effects the rising oil prices are having on average working Americans when they have to fill up the gas tank to drive or to car pool or when they buy airline tickets to visit friends or family or when they are paying their monthly utility bills. My constituents are getting socked where it hurts, in their wallet, every single day.

When I go home to Georgia each weekend, people want to know what we are doing in Washington to address incredibly high gasoline prices. Mr. Chairman, I am grateful for this hearing today so we can review what is actually being done and possibly come to a consensus on what else is appropriate. I know this is a very delicate situation, and it is having very painful consequences on Georgians and on all Americans.

We must all recognize the severity of the situation and the need to act, and act swiftly. The American public is looking to us to produce an effective and bipartisan response to this challenge. Thank you very much, Mr. Chairman.

Chairman THOMPSON. Thank you very much. Senator Domenici, I think, suggested we go directly to the witnesses. Senator, do you have any——

Senator DOMENICI. I have been stimulated.

Chairman THOMPSON. Senator Domenici.

OPENING STATEMENT OF SENATOR DOMENICI

Senator DOMENICI. And I finally woke up. Is that all right with you, Mr. Chairman? Thank you very much for having this hearing, and thanks to our witnesses. Actually, what caused me to say a few words is that my friend, Senator Lieberman, met me back behind the Chairman's desk, and told me that today, he did not leave out nuclear energy.

Senator LIEBERMAN. We have a running dialogue on that.

Senator DOMENICI. Heretofore, he has spoken about America's energy mix, and I have not heard him say that we need to look at nuclear power. But he has told me privately, that it is absolutely urgent, and so I wanted to thank him for being all-inclusive this morning.

Senator LIEBERMAN. Thanks for making that public again, Senator. [Laughter.]

Senator DOMENICI. Essentially, I have a lot of questions. I would suggest, however, right up front that the response of the administration compared to the size and the dimension of this crisis, and its potential harm to Americans, is totally inadequate. This is a big-time American problem. We can keep putting it off, and we might have a new President who will do little or nothing, but the truth of the matter is that this problem will not go away, because we are at the mercy of a number of countries who have their interests at stake, not ours.

As a matter-of-fact, when we talk about OPEC, we have got to remember that we did not say anything when oil was selling at $10 per barrel, and Mexico could not make it economically at $10 per barrel, but we were thriving on cheap oil like kids with a new toy. The same thing happened for month after month during this recovery period. Venezuela, the same way. They are totally an oil dependent economy. When it was $9.50, $10, or $11, we didn't say, "Wait. Wait. Maybe we ought to figure out some way so they can have a reasonable economy."

So now, when the price goes back up, we think we can negotiate our way out of this. I want to tell you another thing. There is this notion that we can send our ambassador, as good as he is, Secretary Richardson, around the world to negotiate. Negotiation with the cartel is no substitute for an energy policy. It is not an energy policy. It is, in fact, the opposite of an energy policy. Since we do not have an energy policy it means we have to go try to convince countries one at a time to change their policies to help the United States.

Now, my suggestion is that if the administration does not want to adopt an energy policy, then somebody in Congress that has jurisdiction ought to look at every single aspect of energy supply for the United States and then proceed to maximize the use of the variety of energy sources. Now, obviously, environmental concerns will be raised, but the production of energy should not be a nec-

essary evil, as I have heard some in this administration say as it relates to public domain and the use of public domain for oil and gas drilling. Not so. It is an absolutely necessity, not evil, and we should open all our lands that we possibly can to oil and gas exploration.

During this administration, we have minimized our options. How in the world do we send any signal that we are serious when we minimize exploration on public lands? We talk about natural gas as being the great solution to all of our problems. Yet, we lock up huge supplies of natural gas in the offshore fields that are loaded with natural gas, all in the name of the environment. Then, we turn around and have 1,000 new ships loaded with oil coming into our ports because of our growing dependence, and where is the discussion of environmental risk in that?

There is a great environmental risk when you add hundreds of thousands of ships that have to come into our harbors, loaded with oil and other related products. Yet we leave our lands and our offshore drilling unexplored because somebody has decided that that is a big environmental issue. Let's look at it. How big is it versus the crisis? I close by saying we ought to look at the reality. Oil Patch suffers from lack of reasonably priced capital. There's no doubt about it. The administration is right about one thing, this is a stability problem. This is a volatility problem. Part of the volatility has to be solved by new mechanisms for financing oil field operations.

I am going to introduce a bill to create an entity much like Fannie Mae and Freddie Mac for Oil Patch. We are going to call it Paddie Mac, and it will be introduced pretty soon. It will be a very good talking point for us to consider. It will not cost anybody any money; you'll use the great skills of hedging on the marketplace to assist those who are investing in Oil Patch.

Last, I want to conclude that today, as we sit here, there are 103 nuclear power plants roaming the seas and oceans of the world, more than America has onshore producing energy. They are run by the U.S. Navy and they are on naval ships from battleships to submarines—103 is my number, I believe.

Now, since their inception in 1954, I say to my friend, Senator Lieberman, there has not been one accident. There has not been one leak. There has been absolutely nothing happening except precisely what the Navy has predicted, total safety, and only one seaport will not accept them, Senator Lieberman. They pilot right into any seaport in the world with the nuclear power plants in their hulls operating. New Zealand decided many years ago they will not accept them. All the rest of the seaports in the world accept them.

They are not afraid of them. They do not tell them to wait 200 miles offshore. Here we are, fussing over what we are going to do with waste in the United States, to put it in a temporary, but disposable, situation so we can move on with a second generation and third generation of nuclear power. Borderline insanity from the standpoint of an enlightened country, what we are doing with nuclear power.

I was not going to talk, but I did. Thank you.

Chairman THOMPSON. Well, as you see, we are desperately seeking solutions, since we have no opinions ourselves as to what to do

about this matter, so we are pleased to have with us today David Goldwyn, Assistant Secretary for International Affairs at the Department of Energy, and Dr. Jay Hakes, Administrator of the Energy Information Administration. Thank you both for being with us, and the full text of your remarks will be entered into the record. Summarize them for us, if you would.

Mr. Goldwyn, would you like to proceed with your testimony?

TESTIMONY OF DAVID L. GOLDWYN,[1] ASSISTANT SECRETARY FOR INTERNATIONAL AFFAIRS, U.S. DEPARTMENT OF ENERGY

Mr. GOLDWYN. Yes. Thank you, Mr. Chairman.

Mr. Chairman and Members of the Committee, I am pleased to appear before you today and I appreciate the opportunity to address the current situation in the world oil market and the short- and long-term solutions that have been advanced by the Department of Energy and the administration to respond to the situation we now face.

The measures that we have taken are substantial and they seek to protect our economic, security, and national interests. The administration is concerned, as all of you are, about oil price volatility. Oil inventories have fallen to levels that could put global economic growth at risk unless OPEC and non-OPEC producers increase production soon. OPEC will obviously have its chance to act when it next meets on March 27.

Many of you and your constituents are asking how did this happen? Why are prices so high? What is our government doing about it? My testimony will seek to respond to each of these questions and I hope to reassure you and the American people that the Department of Energy, led by Secretary Richardson, is concerned, is taking measures to deal with the problem, and that we do have an energy policy and an energy strategy in place to deal with the situation and to respond to in the future.

While, on the whole, competitive markets have provided consumers low average prices, the price volatility that we have been seeing in the market, $10 a barrel a little over a year ago and $30 a barrel earlier this month, hurts both consuming and producing nations. Here at home, as you know, $10 oil led to shut-in wells and put many independent producers out of business. $30 oil hurts our consumers, especially those on low incomes, those who drive long distances, as well as businesses and truckers.

Overseas, it was no different. $10 oil, as Senator Domenici pointed out, was harmful to Venezuela, Mexico, and other countries, and $30 oil is causing severe damage to oil-importing nations in the developing world, as well, and threatens the economic recovery in Asia. So what we all want, producers and consumers, is a more stable market and our energy policies are focused on ensuring stability in the long run and addressing the recent volatility that we have been seeing.

My colleague, Dr. Hakes, is going to talk about the market conditions that led us to the situation and also the current markets, so I am not going to address those points, but let me turn to what we have been doing to restore stability, increase production, and ad-

[1] The prepared statement of Mr. Goldwyn appears in the Appendix on page 59.

dress our short- and long-term energy strategy. Secretary Richardson and the Department were out in front in recognizing the problem of low inventories.

When we received signals from our Energy Information Administration last fall, Secretary Richardson began quietly starting diplomatic action with the major producers. Because of our efforts, we are no longer the lone voice calling for action. Major consuming nations, the European Union, the International Energy Agency, the OECD countries, have all joined our efforts.

There has also been a shift in the attitude of producers in the last month. A month ago, when we started this, they were saying they thought there was no problem in the oil markets. They thought that prices were all right, that stock levels were satisfactory, and there was not any jeopardy to the world's economy. After Secretary Richardson went to Mexico, Norway, Saudi Arabia, Kuwait, and had meetings and phone calls with other ministers, including Venezuela, there is now a consensus to increase production.

There is a consensus that volatility is bad. There is agreement they will reevaluate the data, and Dr. Hakes and I were both on the trip with Secretary Richardson to give them this data, so that they could look at the current oil market situation and try to reach a new level of production which would do what all of us want, which is to sustain world economic growth.

This week, the Secretary's energy diplomacy is continuing in earnest. He has been to Nigeria, Algeria, and Norway, and met with the OECD ambassadors in Paris. Our momentum is continuing. Kuwait, Venezuela, Saudi Arabia, Algeria, Iran, Mexico, and Norway, have all made public statements saying they support production increases. So now we are in an environment where the question has gone from if or when we are going to have an increase in production to how much, and the Secretary and others have pushed for an early and substantial increase in production.

But our concerns about long-term energy security did not begin with $10 oil or $30 oil. Since Secretary Richardson has been at the Department of Energy, we have taken a number of measures to increase our Nation's energy security. In February, 1999, we took steps to strengthen domestic production and improve security for the long term.

Senator Akaka mentioned the program to add 28 million barrels of royalty oil to the Strategic Petroleum Reserve from royalty online oil. To support domestic production, we streamlined procedures for producers, provided administrative and accounting relief for small producers and invested in technology for recovery in endangered or hard to produce oil reservoirs, as well as many other steps.

We've also been working to diversify our sources of supply. You know, I can talk later about our work in Africa, Latin America, and also the Caspian Sea. There is concrete evidence that, in terms of diversity of supply, this approach is working. Our top supplier of oil varies from week to week, among Canada, Venezuela, Saudi Arabia and Mexico. We are actually less dependent on OPEC oil and last year imported crude oil from 40 different countries.

I have talked a lot about what we are doing internationally, but there have been a number of domestic responses, as well. This past

weekend, as you know, the President announced a series of steps to address the current situation, strengthen our energy security, and reduce our reliance on foreign oil. The President's plan includes establishing an environmentally sound home heating oil reserve in the Northeast, calling for reauthorization of the Strategic Petroleum Reserve, which is due to expire next week, through extension of the Energy Policy and Conservation Act, and enacting a comprehensive package of tax incentives to improve our energy efficiency, promote the use of alternative fuels, and preserve the productive capacity of the domestic oil industry.

He talked a lot about investing in energy efficiency and alternative energy technologies by calling on Congress to fully fund the more than one billion dollar request the administration has made to accelerate research and development of more energy-efficient technologies. And over the past month, the administration has also made a number of aggressive short-term moves to ease the current situation.

The President released almost $300 million in funds to low-income individuals to pay their higher heating bills, and fortunately, this year that aid reached people in time, rather than the slow pace in earlier instances. He has asked for $600 million more to replenish that fund and is also seeking $19 million from Congress for low-income home weatherization.

We have also taken measures to increase oil supply, increasing Coast Guard support for tankers, small-business loans for heating oil distributors and other small businesses, and also encouraging refiners to produce as much heating oil as possible. The President has also directed the Department to study ways to reduce regional reliance on heating oil, mainly through the increased use of natural gas, and to study the impacts in interruptible natural gas contracts on heating oil supply, and we expect these studies to be completed soon. These are all concrete measures whose impact in the future can be significant.

In terms of future responses, we have looked at ways in which we can prevent this from happening again and look at how the Department can help. One is by reestablishing an energy emergency office, another is working with industry to get better information on world oil inventories, and a third is the possible development of global data regimes to give producing and consuming nations an early warning system when supplies and production levels get out of balance with demand and consumption needs.

Mr. Chairman, in a few short days, we are going to have some important news. OPEC ministers are going to begin their meeting on March 27 in Vienna, and we expect that OPEC and its allies will agree to increase oil production, effective April 1. The oil market seems to be sharing this view, as oil prices have come down over the past 2 weeks, falling below $30 per barrel. But we still do not know what the magnitude of the production increase will be and what the timetable will be. With enough additional supply, we should expect some further easing of crude oil prices in the next few weeks, although it does take awhile for those to reach the pump.

OPEC's decision is not going to be the whole story. We are also going to need to look at what non-OPEC producers are doing and

how the market reacts. Our fundamental policy is not to interfere with market forces. But Secretary Richardson and the rest of the administration look at these measures next week, see what OPEC and non-OPEC producers do, and assess what additional steps, if any, need to be taken at that time. I heard many other questions, and I think I will leave those for the question and answer period. That concludes my prepared testimony.

Chairman THOMPSON. Thank you very much. Dr. Hakes.

TESTIMONY OF JAY E. HAKES,[1] Ph.D, ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION

Mr. HAKES. I would point out that the Energy Information Administration is an analytic arm of the Department of Energy. I frequently testified before congressional committees on energy issues and I think that members on both sides of the aisle will tell you that we try to base this on good analysis and let the chips fall where they may. I would also say that we are a major provider of data and information on this subject. In recent days, we have had as many as 35,000 people come onto our Website in 1 day, looking for information on energy, particularly oil issues.

I think the history of this is relatively clear. OPEC took a third step last March to cut production and, over time, because of rising demand in the world, we have got a situation where the world was producing less oil than it was consuming. World stocks got drawn down creating a sellers market and very high prices. I think the data on this is shown pretty well in the graph that I brought.[2] It is actually in the handout, it is the third item there, even though it looks like the first item. You can see that when the cuts started, the inventories in the United States for all petroleum were above normal levels. Late last year there was a dramatic drop bringing levels to well below the normal range that we would expect and creating what my somewhat conservative government agency has called "alarming" stock levels. One way we started to describe this some months ago was that we were skating on thin ice. In other words, when stocks are very low, if you get all the breaks going your way, you may not get big run-ups in prices, but if any little thing goes wrong, like a frozen Hudson River or a refinery going down, it gets very magnified because of these low stock levels.

I think if I can show the next graph,[2] it shows what happens when the ice breaks. This is basically the situation in the Northeast, where you had a run-up in prices that took place in just a very brief period of 2 or 3 weeks. Diesel fuel ran up to $2.12. This is one of the most rapid increases in prices in American history.

As you can see, the market did correct this regional imbalance, and prices are basically back down to the national levels, albeit high levels. We are in a situation now where actually gasoline costs more than diesel fuel and prices on the West Coast are higher than they are on the East Coast. I think that as long as we maintain low stock levels, that the United States will be vulnerable to these kinds of price spikes.

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[1] The prepared statement of Mr. Hakes with attachments appears in the Appendix on page 66.

[2] The graphs referred to appear in the Appendix on page 71.

It is particularly true on the coasts. In the middle of the Nation, people are more tied into the delivery system and less subject to these interruptions, but in California and New England, which are sort of at the end of the delivery chain, this vulnerability will continue to exist. Of course, we will be looking at what happens on Monday to see if production levels will be increasing and some steps will be taken to get world inventories back into more equilibrium.

I will cut my comments short because I know all of you will have many questions.

Chairman THOMPSON. Thank you very much, Dr. Hakes. We all know, and I think we're here today, primarily because of oil prices. I am hopeful that it will cause us to once again focus, as Senator Voinovich has pointed out this morning, on something that I consider a much more serious problem, and that is supply.

Nobody holds hearings or gets very excited about the issue of supply until we have an issue with regard to prices. And now everyone wants to focus on short-term solutions as to what to do about it. I guess I approach it, as I have had time to think about it and look at some of the writing on the subject, maybe from a bit of a contrarian position, maybe as far as most of us here behind the table are concerned, and that is it seems to me the quicker the so-called solution affects prices, the more skeptical we ought to be about the solution, because it interferes with market forces, which will invariably reverse themselves and moderate out.

And it allows us to ignore the longer-term problem of supply and stability in regions of the world as Senator Domenici pointed out.

There is only one oil market and that is the world market. It is important that our supplier friends maintain themselves, too. If they—through instability or other reasons—are not able to supply not only us, but the world, then we have a world problem.

You state, Mr. Goldwyn, in your testimony, that the administration's energy policy is based on market forces and not artificial pricing. You note that the oil price controls in the 1970's prolonged shortages and high prices, yet the administration is still talking about the Strategic Petroleum Reserve to address the high oil prices and is proposing a home heating oil reserve to address higher heating prices in the Northeast.

Clearly, the Northeast has a special problem and it deserves attention, but these are both market interventions. So which way is it, an energy policy based on market forces or one based on market interventions? I was under the impression that the Strategic Petroleum Reserve was there for disruptions in supply. It was not set up to have anything to do with prices. Perhaps some would like to change that now. I do not think it would be a good idea to change that policy.

And it also seems to me that the swap ideas that we have heard discussed, in terms of the Strategic Petroleum Reserve, perhaps make sense unless we predict that prices go down and we miscalculate and prices actually go up. We will be able to get our oil at the lower price, but that would be pulling oil off the world market at a time when prices are already going up. I would also think that OPEC would be watching to see what we are doing with regard to our reserve and would react accordingly.

On the home heating situation, what do you do? If people know that at a target price, the oil is going to be dumped on the market and prices are going to go down, how is that going to affect them? So, what is the administration's position with regard to these two so-called short-term solutions, and if they are really viable and on the table, do they not go against a policy based on market forces that I think most everybody has concluded that, basically, is the way to go?

Mr. GOLDWYN. Mr. Chairman, the administration's policy is to respect market forces. I think, in terms of the use of the Strategic Petroleum Reserve, that you are absolutely correct that the legislation provides that it is for national supply emergencies, and the reluctance of the Secretary to recommend its use or to recommend a swap so far, and the reluctance of the President to use it so far, is because there has been no determination that there is a national supply emergency at this time. And we have been working to get OPEC and non-OPEC producers to do what the market is encouraging them to do, which is to allow supply to meet demand. We have got to see how that works out, and that is why there has been no actions on that so far.

Now, I guess the reason that the President has said that all options remain on the table, including a sale, or a swap, or other measures, is that if OPEC refuses to let market forces do what they are intended to do, if there is an artificial response which causes a supply emergency, then the question is, is that an appropriate time to use the Strategic Petroleum Reserve for a sale or a swap? Are they creating an emergency situation here or not? That is a determination that is going to have to be made in the future when we see how the market reacts.

I would distinguish the swap from the sale only in the sense that people say government ought to act more like business. Businesses are smart in how they manage their resources and are able to sell high—buy low and sell high. The Federal Government tends to do just the opposite. The idea behind a swap is we can grow the size of the reserve by the end of the year, increase our security, and try and deal with a short-term situation. But it is not a preferred option. I think that is why you have not seen it exercised so far.

With respect to home heating oil and the creation of a reserve in the Northeast, the Northeast is a different situation, as you pointed out. This winter, a lot of the problem was that there were low stocks, so when the prices went up and there was not a reserve there and harbors froze over and barges could not get through, supply could not get to market. It would have been good if there were higher supplies and if people had thought ahead, who were responsible for stocking home heating oil to do that, but it did not happen.

So I think the idea of a reserve is meant to address the unique situation of the Northeast, but one of the things we will have to do in the coming weeks is to figure out, how do you create that in a way that does not mess with the market? How do you do that in a way that is sort of respectful of the businesses that work there, but also protective of the interests of consumers? It is not an easy question, but it is one that we are going to apply ourselves to in order to minimize the interference in the market.

Chairman THOMPSON. All right, sir. You talked about domestic production and taking steps to assist that. I think we all know that solutions to the problem have to do with either decreasing consumption or increasing production. And we all have ideas about what to do or what not to do on both sides of that ledger, but clearly, as has been pointed out, the administration must take the lead in coming together with the right kind of package here. But, it certainly would seem that domestic production—increasing domestic production, new oil fields, increasing production from existing fields, is an important part of that.

Domestic production dropped 5.6 percent in 1999, and a great many of our small producers went out of business. So the proof is in the pudding, isn't it? It does not seem like we are doing very much in that regard.

Mr. GOLDWYN. Mr. Chairman, I would say two things. One, is that obviously it is best that producers respond to the market, and part of the problem, as Senator Domenici pointed out with the volatility, is when prices swing up and down, there is less incentive when it is down for them to produce. It is hard for them to predict what their income is going to be, and so producers got hurt badly by that drop in oil. And right now what we saw is a slowdown in exploration and production when it was not profitable, but now we need that production and it is not there. But the administration, in fact, has taken a number of measures and I am just going to give the very highlights of this, because we have been and are concerned about domestic production.

One of them was lifting the ban on the export of Alaskan North Slope oil to extend life of the fields there. Another was, in Alaska, also opening the National Petroleum Reserve, also on the North Slope; providing heavy oil and stripper-well oil relief on Federal lands. The deep water and marginal leases royalty relief measures have actually brought deep water gulf production to new highs, and alternative minimum tax relief for small producers.

Research and development helps industry a lot, lowering refining costs and enabling them to make more money by making it cheaper for production in difficult circumstances or geologic environments. Funding 32 reservoir class technology demonstration program projects has been much appreciated by industry—the Royalty Fairness and Simplification Act and also revisions we have made in the Energy Policy and Conservation Act.

Last year when prices went so low, there were additional measures to deal with—the impacts on small producers, particularly suspending production requirements for stripper oil on Federal lands and royalty relief on Federal lands, also some new technologies for independent producers and trying to make more advanced technologies for improved recovery available to them. So I think there has been a good deal of concern and a good deal of money put into research and development, and balancing the environmental concerns to have some deep water explorations, but not in other areas where there is more sensitive environmental concern.

Chairman THOMPSON. I think several of those things were begun last year, weren't they?

Mr. GOLDWYN. A number of those were done last year and others were done earlier. Yes, sir.

Chairman THOMPSON. That is kind of late in the game, isn't it?

Mr. GOLDWYN. On the small producer front, I guess when they were in deep trouble, we moved to help them, but I think the——

Chairman THOMPSON. Well, a lot of people think the country is in deep trouble with a 55 percent dependency, and we have been that way for a long time. As we can get into this a little earlier, back as far as at least 1994, the Department of Commerce determined that increased oil imports impair our national security. This is not new news to us. Senator Lieberman.

Senator LIEBERMAN. Thanks, Mr. Chairman. Dr. Hakes, just by way of some factual premises here, how much of our imported oil, percentage-wise, comes from the OPEC countries?

Mr. HAKES. I will try to get you an exact number. I know that we actually import less from the OPEC countries than we did in the 1970's. The growth of production in places like Mexico and Canada has led much of our dependency to be on places that are closer to us. OPEC actually has less of the share of the world market today than it did in the 1970's and much less of our petroleum comes from OPEC. That may not be a definitive issue in the sense that it is world oil market.

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In 1999, total crude oil and product imports averaged 10.6 million barrels per day. OPEC accounted for 4.9 million barrels per day or 46 percent of that total. Since the Arab oil embargo in 1973, U.S. imports from OPEC have varied from a high of 6.2 million barrels per day in 1977 (70 percent of total imports) to a low of 1.8 million barrels per day (36 percent of total imports) in 1985.

Senator LIEBERMAN. Right, and OPEC helps determine, and plays a critical role in determining the world market.

Mr. HAKES. Yes.

Senator LIEBERMAN. Secretary Goldwyn, what do we need OPEC to do on Monday at their meeting in Vienna? In other words, what are we looking for to create the kind of supply that will meet demand here, and obviously I'm speaking short-term, leaving aside everything else we talked about, about longer-term energy policy changes?

Mr. GOLDWYN. Well, what we want them to do is, and in fact what we have been working with them to do, is to understand what market demand is, that demand for crude oil is not going to go down the second quarter as many of them said, but will go up in the United States and it will be level in other places. We are asking them to look at the gap.

Looking in the last quarter, there are 75 million barrels being demanded and 73 being produced, so we have said you have got to let supply meet demand. But, we also want them to look ahead for the second quarter and the third and the fourth quarter, for that matter, and plan production increases that are going to bring the market back into equilibrium. We do not recognize their legitimacy and so we do not tell them to pick a price and here is the exact amount that you need, but we educated them with help from Dr. Hakes on what our situation is, on the need for crude oil to get into the market in April and May, so it can be refined for gasoline over

the summer, and that this is a worldwide situation. So we are looking for a significant increase at this meeting.

Senator LIEBERMAN. So, are we looking for a 2 or 3 million barrels a day increase in supply?

Mr. GOLDWYN. I guess we have been reluctant to put a number on it, in part because we did not want to get into the business that OPEC is, of picking what is the right number of supply. What we have given them is really orders of magnitude. So far, that has been the size of the gap. But we want to look at the third and the fourth quarter also, but I think in terms of order of magnitude——

Senator LIEBERMAN. Will the announcement they make on Monday be clear? In other words, do we expect it to have a number attached to it or will it be a more fuzzy diplomatic language? In other words, will they say, we are going to increase production by so many million barrels per day?

Mr. GOLDWYN. It may not be clear and it may not be Monday.

Senator LIEBERMAN. It may not be Monday?

Mr. GOLDWYN. No, their meetings begin on Monday, but they may run for a couple of days. It is hard to predict from their past behavior how they are going to act. I think they understand, because Secretary Richardson has called every minister in OPEC with whom we have diplomatic relations, that we need a clear signal for the market. But they have a number of choices in how they could characterize their position. It could be an increase in production or it could be an increase in quota. It will take us some analysis, I think, to look at what they say and then what the market effect is going to be.

The other thing that we are going to look at is, OPEC is not the whole story. We are going to look at what non-OPEC producers do, as well—Mexico has already indicated it will go its own way and it will increase production—what Norway is going to do, what other non-OPEC members are going to do. Our analysis of OPEC's decision, non-OPEC producers and how the market reacts is going to be what is going to tell us what the real effect of that decision is. That may take us a little bit of examination.

Senator LIEBERMAN. If, by whatever means, we determine that the OPEC decision and the decision of the other non-OPEC oil producing nations is inadequate to meet demand, and here again I'm thinking short-term, second, third, fourth quarter of this year, what alternatives does the administration have to try to make the problem less painful for the American consumer and the American economy?

Mr. GOLDWYN. Two of them had been talked about this morning and the President said that all options remain on the table. One of them is the swap of Strategic Petroleum Reserve oil. The other is the sale of SPR oil. Another is to try and work with refiners to take whatever measures we have now and make better use of them. Those are the top of the list. We are already taking measures to make sure the Federal Government makes more efficient use of the oil that we consume, but a lot of those are going to be sorted medium-term rather than short-term.

Senator LIEBERMAN. Right. I hear you to say that if OPEC does not adequately increase supply next week at their meetings, and the same is true for the non-OPEC oil producing nations, that it

is more likely that the administration will consider swaps from the Strategic Petroleum Reserve as a way for us to increase supply short-term. I guess I would simply say I hope so. I hope that is true, if OPEC does not bring supply to meet demand, because otherwise we are going to have a very difficult driving season, spring and summer, in this country. Dr. Hakes, let me ask you to speak, and Secretary Goldwyn, if you want to add, a little bit about this question of oil inventories in our country. Let me state it with this edge to it. Some have suggested to me—not that there is anything illegal about it, as far as I can tell, I do not believe there is—that the oil industry, our oil industry, acted in its economic self-interest as the price of world oil went up, which is to say they bought less of it, hoping it would go down and they would buy it at more favorable prices.

The effect of that was to make the problem worse because it reduces supply. I wonder if you could describe what happened in the last 6 months or so, maybe 1 year, after OPEC spiked up the price of world oil, evaluate the behavior of our oil industry and the oil inventories, and then suggest if there is anything that we could or should be doing about that, which is to say, to intervene in the market. I would ask Mr. Goldwyn to answer the same.

Mr. HAKES. Well, I guess I would prefer to deal with this year to sort of avoid a long dissertation. If you go a few weeks before the real run-up in prices in the Northeast, the refineries were running at very low levels, which did lead to low product stocks. Now, if you look at the economics of refining at that point, they were operating on very thin margins; so it would be hard for an outside person to understand why they would be running at high levels, because there just were not margins available for them to make much money.

Now, once the price ran up, then the margins ran up, and this has been an incentive for refining to pick up a bit. It is running higher now than it was then. However, refining levels are still lower than they were last year at this time and maybe a little bit lower than one might expect from the spreads that currently exist.

Last week, refineries ran at about 89 percent of capacity. We estimate that, at points this spring, refineries will have to run at about 98 percent to provide the necessary supply. I do not know what the alternatives are to the market. I mean, the market certainly brings about corrections. You can see, even in the Northeast, as bad as that problem was, there was some market correction to it.

But I think this is an area that requires continued discussion. It is a little more severe in the heating oil situation, because you're talking about health and safety there. I mean, if a person pays more for gasoline, that is very irritating and may be economically damaging, but if you were actually to run out of heating oil, that could be a real health and safety issue for a lot of people.

So I think that the inventories question, in particular, requires more work, and, of course, we are doing some larger studies on these issues so we can answer that question in a little more detail.

Senator LIEBERMAN. I look forward to the results of those. Secretary Goldwyn, do you have any thoughts on this, which is whether government should be doing anything to either require or

incentivize, create incentives, for oil inventories to be maintained at a more even level, so that we avoid the exacerbation of the impact of world price fluctuations?

Mr. GOLDWYN. It is a hard question, Senator Lieberman, because past attempts to try and incentivize or try and control prices, incentives have often led to worse situations than existed before the intervention. I mean, I think it was a hard market lesson for all the people who sell home heating oil in the Northeast, not to have planned ahead, and that is a lesson that they may change, and the fact that the government is working to create a reserve is going to have an impact on them.

You know, we have had a bunch of warm winters, and so I think everyone is at a high price, attuned to the fact that we have got to plan for the worst and not for the same. In terms of other inventories, it is hard to imagine what we could do to be helpful, but as Dr. Hakes said, people who are expert in this, and we obviously work closely with API and others, will look at the question of what we can do to not let this happen again.

Senator LIEBERMAN. Thanks very much. My time is up.

Chairman THOMPSON. Thank you. Senator Voinovich.

Senator VOINOVICH. I am pleased with the fact that there is a lot more diversification in terms of foreign oil supply, so we are not as reliant as we have been on some of the nations that are a little bit questionable; but the fact of the matter is that we have seen an enormous increase in gasoline prices, and, with all due respect, I think the Department of Energy should have been paying more attention and monitoring the situation so that we would not end up where we are today.

I share Senator Lieberman's interest in what is going to happen at that meeting in Vienna, and hopefully we are going to get a good result, and with a little cramming, take care of a situation that could have been taken care of if we had done our homework during the past number of months. That being said, I notice that we have seen a greater and greater reliance upon foreign oil, and all of the projections that I see indicate that we are going to be even more reliant on foreign oil.

Has anyone ever sat down to figure out what the number ought to be? Are we too reliant? Should we be less reliant? If we should be less reliant, in terms of our national economic and security interests, how do we go about achieving that goal? I think of our exploration policies. I think of our tax policies. I think of our environmental policies, if the Department of Interior, the Department of Energy, and the Environmental Protection Agency ever sat down together and talked about does the left hand know what the right hand is doing?

We have not built any new refineries in this country. If you talk to the refiners, they say our environmental policies have had a negative impact on their going forward with refineries. We have a new controversy over new source pollution permits by the Environmental Protection Agency, where they are cracking down, and it is going to make it more difficult. We just have ordered the oil companies to change, to reduce substantially, the sulfur in the gasoline, which some predict will be five or six cents more per gallon.

It may very well be justified, but there are so many—Yucca Mountain. Senator Domenici is not here, but we passed the bill about moving forward with that place to store high-level radioactive material. The President is threatening to veto it. That leaves the whole issue of nuclear power. The biggest power problem with nuclear power in this country is what do you do with the waste? We have had that around a long time.

The Europeans have seemed to handle it. We just can't seem to get that under control. If you start looking at all of these various things that are going on, it does not really seem like we have got our act together. I would like to know, from your perspective, what is the number, in terms of our reliance on foreign oil? Are we too reliant today on foreign oil supply?

Mr. GOLDWYN. Senator, let me try and answer all those questions, and first, we are very dependent on foreign oil and we should be less dependent on foreign oil, and that is the direction we want it to go, and it is going up and not down. This has been a problem for a long time for the United States. Since the 1970's, we have been looking at measures to try and make ourselves more energy secure and reduce our dependence.

A number of those measures have been successful. And so, I think we have not picked a number, but what we have done is launched a series of measures to give us choices, to give Americans choices and to give us the ability to reduce our dependence on foreign oil. Let me just try and deal with them in a couple of baskets.

After the oil shocks of the 1970's, we decided first we needed to have some security in case there was an interruption, so not only do we have the Strategic Petroleum Reserve, but we have got the International Energy Agency, 25 countries in there, and they have got reserves. So we have got some insurance against a supply interruption.

We also started a campaign then, which has intensified now, to reduce the intensity, basically, increase how efficiently we use oil. As a result, the U.S. economy is far less dependent on oil and the ability of oil to impact other sectors of the economy is far less than it was in the 1970's. That has provided us some energy security and some insurance, as well.

We have had campaigns to try and give Americans choices in kinds of supply, as well as diversity of supply. We have also worked around the world to make sure there are more suppliers that are outside of OPEC, in Africa and Latin America and the Caspian Sea, so that no one particular country can have too disproportionate an influence on our security or the security of our allies.

The two big baskets are energy efficiency and renewables. Energy efficiency is an important thing. I have one statistic here on some investments that we're making in energy efficiency, which, if things like advanced vehicle technologies and alternative fuel research were successful, we could reduce our consumption by 700,000 barrels per day by 2010, and 1.5 million barrels per day by 2020. That is pretty much an order of magnitude from where we are right now.

Senator VOINOVICH. I have seen some of that information, but when you see what the experts are saying, they are saying we are

going to become more reliant on foreign oil. Now, I mean, in spite of all of what you're saying——

Mr. GOLDWYN. But we have choices, Senator, and there are choices to make right now, which is either we can continue to invest and invest more, as the administration has recommended for some time, in alternative fuels, in renewable sources of energy, in research and development that will give us more choices. If we have those, if we do that research and development, if we are able to make that investment, then we will have choices other than crude oil and gasoline, things like the new generation of vehicles.

Senator VOINOVICH. But isn't it a combination of a couple of things? Well, we are going to have to become more energy-efficient and we are going to do this and we are going to do that. So you go ahead and do it, and in spite of that, you are continuing to be more reliant on foreign oil. I mean, it is not one thing or another. Don't we really have to look at opening up more opportunities for us to have a domestic supply of oil, combined with that?

In other words, we have this, "Well, this is the way to get the job done." We had a hearing in Cleveland with a couple of congressmen about bringing nuclear waste through our city streets or our highways, and people were very disturbed about that. I said do not worry about it, because Yucca Mountain is not going to be there. You forget that I will be dead before that happens; what you ought to be worrying about is the nuclear stuff that is piling up at our two nuclear power plants in Ohio, that one of these days, they are going to run out of space and what are they going to do at that time?

But the issue that came up was what is the solution? Where are we going to get our supply of energy, if you don't consider nuclear and somebody said solar. What I am trying to say is I think there is too much of this, this is the silver bullet thing. What I am interested in is what are your ideas on how we can expand the availability of more oil, domestically produced oil? What's your thoughts on that?

Mr. GOLDWYN. Well, we do believe that we need to take measures and, in fact, have proposed measures to increase domestic oil production, in opening the National Petroleum Reserve (NPR), up in Alaska. There is more offshore drilling in the Gulf. We are making investments in nuclear energy, too. I am sorry Senator Domenici is not here right now, but we have asked for a 56 percent increase in the Nuclear Energy Research Initiative. We are looking at a fourth generation of nuclear reactor technology. So, you are right. We have got to look at nuclear. We have got to look at domestic production. We have got to find ways to make it economic for domestic producers to do this. We are looking at gas-to-liquids technology, to get the natural gas from Alaska in a cost-efficient way into the U.S. market, so we do not have to buy it from someone else. So we have to look at the supply side and we also have to look at the demand side. Consumption is increasing.

So you are right; there is not a silver bullet and we have to do all of them. But our ability to make huge gains in reducing dependency is probably going to come more from providing choices and making more efficient use of the oil that we consume, and having

more new industries use other kinds of fuel than it is from the domestic side. But you are right. We have got to do both.

Senator VOINOVICH. Usually, when I was governor, I always said if you cannot measure it, do not do it. We would say by X time, we are going to try and reach a number. Have you sat down and said, by X year, we are going to be less reliant on foreign oil and we are going to bring it down by 50 percent or 45 percent, and what is the method that we are going to use in order to get to where we want to go? You have got to have some goal. Have you done that?

Mr. GOLDWYN. Well, I think we do it—we have done it, but not in the sense of picking a number to reduce by, but we have done it in saying that we have got to do less importing and we have to look at all the measures, domestic production, research and development, efficiency, and everything else, to make that number go down and not up.

Senator VOINOVICH. I would suggest that, as a Nation, we ought to figure out what the number is and then figure out how we are going to achieve it and hold ourselves responsible; and you know something, if we do that, we might just make it.

Mr. GOLDWYN. Thank you, sir.

Chairman THOMPSON. Thank you very much. Senator Akaka.

Senator AKAKA. Thank you very much, Mr. Chairman.

Secretary Goldwyn, 1 week from today, provisions of the Energy Policy and Conservation Act, which authorize Strategic Petroleum Reserve and DOE's international programs, will expire. Because of high oil prices and a desire to change our energy policy, we are facing a difficult time passing a reauthorization. There will be many amendments related to the current energy situation. It is probably unlikely that we can resolve them in time to enact a bill before the March 31 deadline.

I am sure that the leadership of the Energy Department is concerned about what would happen if Congress failed to act and we had a gap in Strategic Petroleum Reserve or international energy authority at the time when we need it most. In today's tight energy market, the last thing we need is more uncertainty. My question to you is, will you please tell the Committee the consequences of Congress' failure to reauthorize the Energy Policy and Conservation Act?

Mr. GOLDWYN. Senator, thank you for raising that. Obviously, we are deeply concerned about the extension of the act, and all that we are asking for is really a simple extension of the existing law, which we hope will make it easy for the House to act. I think our lawyers have looked carefully at what our ability is to do things like use the Strategic Petroleum Reserve in the absence of the act, and we have looked at what the authorities are under appropriations law and other laws.

I think the prudent answer is that it is a lot harder and this is the worst possible time to let this act expire, and that we hope that it will be renewed, just a simple extension, before March 31. We are not without options, and I do not want to give the legal briefs, since I am a lawyer, but not an energy lawyer. But the right answer, as your question implies, is to renew that immediately.

Senator AKAKA. I hope there are contingency plans to take us on here. Secretary Hakes, you paint a fairly bleak picture about gasoline pricing during the summer driving season that is coming. You state that with low stocks and a market short on crude oil, the situation is ripe for gasoline price volatility. What is your prediction concerning supply? Do we expect gasoline supply shortages and, if so, do you have any expectation as to the location of shortages?

Mr. HAKES. Well, I think we are back into a situation where we are skating on thin ice. Our prediction for the average price for regular gasoline is that we think it will peak somewhere between $1.57, which is not too much higher than it is now. But I think that understates the threat of volatility, because I think your State, the West Coast area, and the Northeast, tend to be more vulnerable if, say, a single refinery goes down for unplanned maintenance.

So, you could see spikes well above this. We are seeing some of this on the West Coast right now. The average price in California is more than 20 cents higher than the national average, and in northern California, even more than that. Of course, this is very contingent on what happens next week, whether more supplies are produced, but based on what our current expectation is, we think this will be a very tight summer.

Senator AKAKA. From what you said, I take it that the shortage will not be critical, and probably Hawaii, the West Coast, and the Northeast States will probably suffer more than the rest of the country.

Mr. HAKES. I think because of the transportation delivery system and the location of refineries, those areas tend to be more vulnerable, yes.

Senator AKAKA. In his testimony on the next panel, John Holdren states that it is not certain that any oil will be found in the coastal shelf if the Arctic National Wildlife Refuge is opened to oil development. My question is what is your prediction concerning oil supplies in that region?

Mr. HAKES. Senator Murkowski has asked EIA to do a study on that particular question, on the production capability in ANWR. The U.S. Geological Survey, in my understanding, is actually coming out with some new information very, very soon, which we will use in that study. So I would prefer to delay a detailed answer to that question a month or two. I think we will be coming out with a specific study on that.

Senator AKAKA. Should our problem increase, do you see where we may be needing gasoline rationing?

Mr. HAKES. No. You know, there are a lot of advantages to the market setting the price. If you look back in the last two decades, since we moved away from price controls, on average, and even including this recent spike price, energy prices in this country have risen more slowly than the general rate of inflation. I think also because of the market, we do not get in quite as tight a box where we would run out of supply.

So I may be proven wrong by events, but I have said with considerable confidence that I think the market—even with the shortages—the market will be flexible enough to supply the product to people who want to buy it. It may come at a higher price, but I

do not think we will see a repeat of the gasoline lines that we had in the 1970's, for instance.

Senator AKAKA. Thank you very much. Thank you, Mr. Chairman.

Chairman THOMPSON. Thank you. Senator Domenici.

Senator DOMENICI. Thank you, Mr. Chairman. Dr. Hakes, let me ask you, who made the miscalculation with reference to supply? Did somebody and was it intentional?

Mr. HAKES. Are you talking about the estimations that were made last year of what the supply for the year would be?

Senator DOMENICI. I am talking about the fact that there is not enough supply and that that is why the prices are going up, and that happened because certain countries produced less. I'm asking: Why did they do that and where did they get their information? I mean, it is not like this just happened overnight because—it was done initially by not just OPEC, but those who work with OPEC. We talk of OPEC and we do not think Mexico is a part, but thus far, they have been running on parallel tracks. They're running together; right?

Mr. HAKES. Well, I think there were several factors. One is it was never clear to the producers, and, frankly, not clear to us at all points, exactly what the OPEC strategy was going to be in two respects. One is OPEC was a little bit more successful this time because they have had the best compliance record with their quotas that they have ever had. As you know, they frequently have had high levels of cheating.

They did not have that this time. The other thing that was unknown to producers and I would say also to us in the government, is how long the OPEC quota cuts were going to last. Were they going to relax them in December? Were they going to relax them in March? Whenever. So, I think the investment community in the United States was a little bit hesitant to rush back into production because of these uncertainties. As you have seen, the production response to higher prices has not been there: It has been somewhat muted.

I would say EIA, which is an independent organization, tracks this as well as anybody and I will match our record against anybody, but we certainly, if you look back to, say, June of last year, thought that OPEC would actually be producing more, because we thought that its production would be more at the levels of previous cheating and not this time. Venezuela, in particular, has really turned around from being one that almost ignored the quotas to now almost being the strictest follower of the quotas.

Senator DOMENICI. So from my understanding of this, OPEC was successful in keeping everybody on board and reducing the quotas of the members, correct?

Mr. HAKES. They are more successful than they have ever been. The current quota is 23 million barrels a day and they are actually producing 24 million barrels a day. So over time there has been some erosion in the quota, but if you compare this to other actions by them in the past, they have had the highest level of compliance they have ever had.

Senator DOMENICI. So do you have any idea why they arrived at that quota? Where did they get it? Did they think there would be

a supply shortage in the world? Did they think the prices were going to go up dramatically?

Mr. HAKES. I think originally they were shocked by $10 a barrel. They had made an increase in 1997, at the time that they thought it would meet rising world demand, and shortly after that increase, the world price started to drop dramatically. Just as this hurt private producers all around the world, the treasuries of these nations were decimated.

At the time, they said that what they wanted to do was bring stocks back into the normal level; but as stocks got back into the normal level, the quotas stayed where they were. So the delay in raising production has been a serious problem. But their initial goal, as they stated it, was to deal with this big overhanging in supply, which created a difficult situation.

I think some consumers at the time were happy with the 89-cent gasoline, but the fact of the matter was those prices were not sustainable, because the world cannot produce oil at those prices. And I do not think OPEC is going to maintain the price of $25 per barrel because other places in the world can produce a lot of oil at $21 per barrel. So any swing in the market, I think, over the long-term is unsustainable.

But I think their initial action was based on a fear of that $10 per barrel oil.

Senator DOMENICI. So if we thought we were getting a good deal at 89 cents per gallon gasoline, clearly that was going to be short-lived, and somebody as knowledgeable as you knew that, right?

Mr. HAKES. Yes. We, I think, have pointed out at every valley and peak in the market that this was likely to be a short-term situation. Now, this situation turned around faster than we were saying at the time, because we had no knowledge of how OPEC was going to deal with it, and the three OPEC cuts combined are almost 4.5 million barrels per day. That is a lot of oil.

We had said this will take awhile to work off these low prices. They got worked off a lot quicker because OPEC made a decision that they could cut oil production by 4.5 million barrels per day.

Senator DOMENICI. I would ask Mr. Goldwyn, did I hear you correctly that, with reference to incentives to Oil Patch America, that you were aware that incentives had to be built-in that would be tied to price. So, if the oil came in below a certain price, incentives would trigger in, and if they got over certain price, they would be triggered out? Did I read that or hear you say something like that?

Mr. GOLDWYN. No, sir.

Senator DOMENICI. Let me ask you, if we are talking about something like stability or consistency, wouldn't it be a good idea to take a look at all the tax incentives that go to Oil Patch and decide that they ought to be—I will use the word countercyclical, but I do not want to stop there, because it is hard for people to know what that means. But, essentially that the incentives would be triggered on and off, depending upon the price, which would keep us from closing down a lot of our wells and the like, if the price came tumbling down?

Mr. GOLDWYN. Without being a tax lawyer, we ought to have a rational system that does not provide incentives where none are needed, and that has them there when they are required.

Senator DOMENICI. Let me ask if either of you with the Energy Department—has the administration ever asked that there be an evaluation of all Federal lands that currently are closed to energy production, and for you to estimate what they might yield if, in fact, they were developed in an orderly and sound manner?

Mr. GOLDWYN. In two ways, I am aware that there are some analyses of what the oil productive capability of Federal lands is. I do not know whether that is a comprehensive study or not, and certainly in the preparation of a comprehensive national energy strategy, we looked at all those things, on Federal lands and non-Federal lands, and also balancing the environmental cost of exploration on Federal lands.

Senator DOMENICI. Mr. Chairman, I do not want to ask them to do that. I think that would be a major undertaking. But I think it is very important that we ultimately know what we are talking about. For instance, we know one thing. ANWR is American public lands—the ANWR reserves—and we do know there is a pitched battle as to whether or not we should make available to the American consumer and to our enterprises and our workers. Do either of you know what the estimated production of American oil would be if we developed the ANWR reserve?

Mr. HAKES. The USGS has published studies on that in the past, as I believe the EIA may have, but the Geological Service is updating some of its work, and we will be updating our work at the request of Senator Murkowski, so I believe we will be able to give you our best estimate of that in some detail, maybe in another 6 weeks or so.

Senator DOMENICI. Well, I want to state my own view for the record. It is pretty close to economic arrogance for a country like ours to say we are not going to seriously consider 16 billion barrels of oil that would come from our property, drilled for by Americans who would be employing Americans, and the cash flow would be to Americans instead of foreign countries, and that is my estimate, is 16 billion barrels. That is 30 years of Saudi imports to this country, based on today, which is not a lot. They do not send us a lot. But that is a lot of oil.

In the scheme of things, it may not be that much oil, but it is American oil, and I guess the Department of Energy clearly is not yet willing to look at that and other sources of our own oil to help show the world we are doing something for ourselves. Is that a correct statement, Mr. Goldwyn?

Mr. GOLDWYN. It is a correct statement that the administration does not support exploration in ANWR because of the environmental sensitivity of that area and the miles and miles of roads and pipe that would be required to explore there, but the administration does support development on some Federal lands, as they have in some places in Alaska; and so I think it is a question of balancing those two interests. But the administration is not opposed to exploration of oil on Federal lands.

Senator DOMENICI. Well, Mr. Chairman, the environment is not the principal jurisdiction of this Committee, but the question really is about weighing risks. There is no question you have got to look at what risks are involved in doing this versus what risks are involved in not adding to the American production of home-grown oil

for the next 25 or 30 years. I will submit some questions in writing and I thank you, Mr. Chairman.

Chairman THOMPSON. Thank you very much. I think this points out the fact that each one of these options are very controversial. You are asked what is the plan? Well, the fact of the matter is what we decide the plan is, to a certain extent, is the plan—and every one of these things are very controversial. I despair over the fact that we are obviously not going to come together with some kind of a give-and-take on these various options until we absolutely have to.

It is just like Social Security. We continue with the goodies, retirement income and things like that, take the tax off it, and we put off reform until we absolutely have to. I assume, in our case, the price will have to get even higher for a longer period of time in order for us to do some of these long-term things, whether they be ANWR or the CAFE standards or whatever they might be.

One final thing. We are talking about everybody being asleep at the switch here, but a year ago, a bipartisan request was sent to the administration for an expedited review and investigation under Section 232 of the Trade Expansion Act, into the impact of the increasing foreign oil imports on U.S. national security. There had previously been a determination by the Department in 1994, I believe, that, in fact, did impact national security.

So a year ago, a bipartisan group of Senators asked that the administration take another look at that. My understanding is that the Department of Commerce has had a report on the President's desk since November. What is your understanding about that? Is that true?

Mr. GOLDWYN. We called over to the White House this morning, anticipating that, Mr. Chairman, you might ask this question, and what we were told is that the findings of that study, which has been delivered to the White House, are being reviewed, and that we expect a report to be released soon.

Chairman THOMPSON. What about a little more than that? [Laughter.]

Mr. GOLDWYN. I know we have submitted——

Chairman THOMPSON. Don't make me go through the next two or three questions.

When is soon? Give me a range of time possibilities here.

Mr. GOLDWYN. My life expectancy shrinks by the hours while I give the White House time to do the report, but the White House is keenly aware of the urgency of this report, that it is expected here, and that indeed this morning, and even before then, that the Senator has asked for this to be delivered promptly.

Chairman THOMPSON. I am sure they know that the longer we wait, the more the presumption is going to be against them, in terms of what is in that report. So let's go ahead and get it out and factor that in. You have got a distinct advantage as a witness. This gentleman, Mr. Goldwyn, was born in Tennessee and went to school in Connecticut. So he is practically the perfect witness to come up here today.

Gentlemen, thank you very much. We are going to call the second panel. I want to ask our second panel to step forward. Our first witness will be Red Cavaney, President and Chief Executive Officer

of the American Petroleum Institute. He will be followed by Dr. Richard N. Haass, Vice President and Director of Foreign Policy Studies at the Brookings Institution; and Robert E. Ebel, Director of the Energy and National Security Program at the Center for Strategic and International Studies; William M. Flynn, Vice President, New York State Energy Research and Development Authority; Dr. John Holdren, President's Committee of Advisers on Science and Technology, Belfer Center for Science and International Affairs, Kennedy School of Government; and Adam Sieminski, Director of Deutsche Banc Alex. Brown.

Thank you, all of you, for being with us today. Mr. Cavaney, would you like to proceed with your testimony?

TESTIMONY OF RED CAVANEY,[1] PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN PETROLEUM INSTITUTE

Mr. CAVANEY. Thank you, Mr. Chairman. My name is Red Cavaney. I am President and CEO of the American Petroleum Institute, and I appreciate the opportunity to offer our assessment on the recent oil supply situation and on the impact of rising petroleum product prices on consumers. I request that my written statement be inserted into the hearing record.

Chairman THOMPSON. All statements will be made a part of the record.

Mr. CAVANEY. Thank you. America's oil and natural gas industry is committed to supplying our Nation's consumers with a reliable and affordable supply of energy for all their needs. We also pledge to provide consumers with the information they need about the current gasoline price situation, as well. Four important points need to be understood.

First, the cost of crude oil is a key determinant of prices at the gasoline pump, and crude oil prices are a function of supply and demand in the international marketplace. Second, high crude oil prices have resulted from a decrease in foreign oil production and greater demand for oil from recovering Asian economies and the continued growth of the Western economies.

Third, although prices have risen rapidly, retail prices, after adjusting for inflation, are generally well below gasoline prices in the early 1980's. Finally, the U.S. oil and natural gas industry is operating its refineries at record production levels and will continue to increase production as we approach the prime driving season. The price increases we were experiencing were brought on by short-term shocks that resulted from sudden changes in supply and demand.

Just as prices are up now, they will turn down when factors change, and change they will. We commend the Federal Government for taking a balanced approach to the current situation by encouraging more 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. We believe the government and industry can work closer together to ease some of the hardships and concerns faced by American consumers. We are pleased to learn that the Energy Information Administration has

[1] The prepared statement of Mr. Cavaney appears in the Appendix on page 75.

acted on one of our recommendations and is convening a pre-summer transportation fuels outlook conference to evaluate the status of gasoline, diesel, and jet fuel production and inventories.

We are also asking EIA to expand the scope of its winter fuels conference. API is also eager to provide additional information on market conditions. Our industry is committed to continue working closely with the Department of Energy, to monitor the situation and give Americans the latest and most accurate information available. Educated consumers are a vital asset.

In the short-term, the government should also take steps to help prevent another recurrence of the home heating oil situation. It can increase funding for the low-income home energy assistance program and more quickly and equitably release funds, as well as consider expanding Small Business Administration emergency loans to home heating oil dealers and to truckers.

In the long run, government can reduce our reliance on foreign supplies and also exert downward pressure on international crude oil prices by opening our most attractive oil and natural gas prospects to responsible exploration and development. Since 1983, access to available lands in the Western United States were nearly 67 percent of our onshore oil reserves and 40 percent of our natural gas reserves are located; that access has declined by 60 percent.

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 State and Federal lands.

Senator LIEBERMAN. Mr. Cavaney, could you just go back—excuse me for the interruption, because those are interesting and important numbers. Where is 67 percent of the domestic oil——

Mr. CAVANEY. Of our onshore oil reserves.

Senator LIEBERMAN. Onshore, and 40 percent of onshore gas.

Mr. CAVANEY. And 40 percent of our natural gas.

Senator LIEBERMAN. And where is that, generally speaking?

Mr. CAVANEY. The 10 Western States.

Senator LIEBERMAN. That is what you were talking about. OK.

Mr. CAVANEY. If you look at all that is available to us, the statistics are pretty well the same; 61 percent of the total reserves, onshore and offshore, are also basically restricted access at the present time, and that is according to USGS and MMS data.

Also, the Federal Government has imposed layer upon layer of regulations on U.S. refineries without sufficient regard as to their collective impact on a refiner's ability to meet the full range of American consumer needs. Refineries need flexibility to respond to the fast-paced changes in today's world. Overregulation reduces that flexibility.

A soon-to-be-proposed regulation to drastically lower the sulfur content of diesel fuel is an example of government action that could have significant negative consequences on our ability to supply heating oil and diesel fuel in the near future. We share the government's interest in further cleaning the air. However, reductions beyond the 90 percent we have already proposed are likely to drive up fuel manufacturing costs unnecessarily, imposing yet additional burdens on our Nation's truckers, farmers, and homeowners in the Northeast, in particular.

We have talked directly to EPA Administrator Carol Browner about our concerns, and today API and other impacted parties are visiting OMB to reiterate our opposition. In closing, we share your concern for the help and welfare of your constituents. America's oil and natural gas companies have a long and proud history of providing this country's consumer with a reliable and affordable supply of energy, to make their homes comfortable and to take them where they need to go when they want to go.

We recognize you are faced with increasing demands to address this situation. To the extent to which we can help in your efforts to better understand the possible effects of the many proposed actions under consideration, we are here to assist you.

Thank you.

Chairman THOMPSON. Thank you very much, and thank you for staying close to your time here.

Dr. Haass.

TESTIMONY OF RICHARD N. HAASS,[1] VICE PRESIDENT AND DIRECTOR OF FOREIGN POLICY STUDIES, THE BROOKINGS INSTITUTION

Mr. HAASS. Thank you, Mr. Chairman, and Senator Lieberman. I think it is clear why we are here today. It is because of the large and relatively sudden surge in oil prices from just over $10 a barrel a little more than a year ago to around $30 today. This has translated into an equally dramatic increase in retail gasoline prices. In many cases, these increases have caused real hardships for individuals, families, and businesses.

I think, though, it is important not to confuse higher oil prices with high oil prices. The recent prices, while obviously higher, are not particularly high by historical standards, especially when adjusted for inflation. Indeed, in real terms and despite the recent increases, today's energy prices are no higher and, actually compared to some years, say in the early 1980's, are actually lower, than they were over the past 3 decades.

It is important to keep in mind, as well, that one of the reasons the prices are so much higher today is because of where we were 12 months ago and the fact that oil prices had fallen so far. Still, the question arises as to whether higher prices constitute a national security problem for the United States.

Within limits, and I would suggest we are nowhere near such limits, the answer is no. It is not because higher oil prices are without impact, economically, to businesses to the economy as a whole. But in and of themselves, the sorts of prices we are experiencing do not threaten either American or global prosperity.

Indeed, what is normally more important than the specific price of oil is price stability and predictability. This conclusion has several consequences for American policy. First, and as has already been discussed, I would suggest use of the Strategic Petroleum Reserve, would not be warranted under current circumstances. I would reserve, so to speak, the Strategic Petroleum Reserve for true crises.

[1] The prepared statement of Mr. Haass appears in the Appendix on page 87.

Second, the United States ought to engage in regular consultations dealing with long-term supply and demand projections with OPEC producers. Such talks could not change market fundamentals; technology will do that, but they can prove useful in preventing and smoothing out the sort of price fluctuations we have seen.

Implicit in saying this is the notion, controversial perhaps in some places, that low prices, per se, should not be a goal of American energy policy. Low prices have an adverse impact on American businesses and communities that depend upon oil production. They obviously encourage consumption with all that that means for the balance of trade and for the environment. Low prices discourage exploration and production which, over time, exacerbate supply shortages. And low prices obviously cause great potential instability in countries that are of vital national importance to us, including Mexico and Saudi Arabia.

I, therefore, would hope that the Senate would avoid any sort of sanctions along the lines that the House has been recently considering against the oil producers, and indeed, in general, I would jettison the idea of a confrontational relationship with the OPEC producers, in part because I do think it is possible to work out a more cooperative approach to smooth out oil pricing. Second, we cannot somehow disaggregate the oil part of our relationship with these countries from everything else. Many of these countries are in a position to affect vital national interests of the United States, whether in the area of drugs or involving basic questions of foreign policy, weapons of mass destruction, and so forth.

So, what, then, should we do? Let me just suggest here, and I want to associate myself with the comments of the Chairman, that the real question of the relationship between oil and national security deals with supply and not price. There has got to be simply enough oil to meet the bulk of the world's demands. And it is not enough that the United States, alone, can meet its oil imports, because as it has already been pointed out, there is really only one global oil market. Even if somehow we could manage to meet our needs, if the needs of our major trading partners and allies were not met, we would then indirectly suffer as a result.

Senator Lieberman, as you and some of your colleagues have suggested, there is no single answer—no simple answer—to this. It is the reason that this country has had so much difficulty coming up with and implementing what you might call a comprehensive energy policy. But it touches on a whole range of issues that cuts across foreign policy and defense policy. It cuts across economic policy and it cuts across domestic policy. Again, there is no one locus of decision-making in this area, be it within this body or within the Executive Branch. But energy involves a whole range of issues, from questions of strategic reserves to conservation, to new energy sources, to finding new places to produce oil, to the Arab-Israeli issue, to the IEA and other sharing arrangements, to making sure that we have an adequate military in case there is another supply interruption threatened by Saddam Hussein or anyone else.

Let me end with two last points, as I see the red light. One is to keep an emphasis on the Persian Gulf. It is still home to two-thirds of the world's proved oil reserves, and to the extent there is

a swing region in the world oil market, it is the Persian Gulf. To the extent there is a swing producing country, it is Saudi Arabia.

Two other countries have a big potential to affect international energy, one more in the negative sense, which is Iraq, one more in the positive sense, which is Iran. In the case of Iraq, the United States cannot think of having a secure energy policy so long as Saddam Hussein is in power. And in the long run, not simply containing Iraq, but bringing about a different government in that country is very much part of a long-term energy policy for this country.

Second, and here I would welcome some of the comments made by the Secretary of State recently, I also think it argues for some new thinking about U.S. relations with Iran. Right now, U.S. policy towards Iran seems to be penalizing American oil producers, in many cases, much more than it seems to be penalizing Iran. Again, I think it is impossible to think of global energy policy in the absence of steps that would somehow get Iranian production on line, in full, with American participation. Thank you very much.

Chairman THOMPSON. Thank you. Mr. Ebel.

TESTIMONY OF ROBERT E. EBEL,[1] DIRECTOR, ENERGY AND NATIONAL SECURITY, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Mr. EBEL. Thank you, Mr. Chairman. It has been more than 25 years now, since the Arab oil embargo disrupted oil supplies in October 1973. How has the United States fared since that time? Not too badly, in fact. Our per capita use of oil has come down, but so then has our domestic crude oil production.

However, our population growth has more than offset the decline in per capita oil use. And that, unfortunately, translates into much higher dependence on oil imports, which, as noted, now surpasses 50 percent. In the interim, and in response to supply and price crises, we have worked our way through price controls, through oil import quotas, through a synthetic fuels corporation, and through subsidies and tax credits for various kinds of alternative forms of energy. But then, the market eventually adjusts itself and the remedies of the day go back on the shelf.

Today I know of no reasonable scenario which does not foretell an increasing reliance on imported oil. Does that mean our national security is more in jeopardy today than in the past, simply because of this higher dependence? How do we define national security? George Kennan has offered the least complicated definition and I quote, "The continued ability of this country to pursue its internal life without serious interference." If we accept that definition, then oil imports do threaten national security. And the greater the dependence, the greater the prospect for interference.

When we consider the world's growing appetite for oil, where will that oil come from? It will come from the Middle East, because that is where the oil is. Today's rogue states—Iran, Iraq and Libya—had well better be tomorrow's suppliers if supply is to match anticipated demand. That finding comes out of our strategic energy ini-

[1] The prepared statement of Mr. Ebel appears in the Appendix on page 90.

tiative project, of which Senator Lieberman is a congressional co-chair.

Let me list several other findings. We found that fossil fuels will continue to dominate world energy supply, at least to the year 2020. We found that there are two comparatively new influences on energy decision-making: The growing role being taken on by non-governmental organizations and the mounting concern over global warming. We found that there is an interest in renewables, and that matches concerns over global warming, but we also found that their relative contribution to world energy supply will be mostly unchanged.

Finally, we found in looking ahead, sporadic price volatility—price hikes and price declines with accompanying implications for producers and consumers. This is what business as usual in the world oil industry is all about. Policymakers come under tremendous pressures to do something about high oil prices, high heating oil prices, and high gasoline prices. And that something is usually in the form of government intervention or regulation, which tries to artificially shape economic forces. Unfortunately, these actions tend to prolong crises rather than relieve them.

Several are on the table, as mentioned this morning. One is the withdrawal from the Strategic Petroleum Reserve. I would strongly advise against withdrawals, if only because we would send the wrong message to OPEC. Those exporting companies might conclude, let the United States add to supply and we will hold firm with our cuts.

It has been suggested that, instead of withdrawals, why not a form of swaps, with withdrawals to be replaced at a later date? Swaps are difficult, however, because of pricing complications.

Finally, a third option attracting support is the establishment of a home heating oil reserve for consumers in the northeastern United States. Questions arise—how much to hold in that reserve and what triggers the release? Having set a precedent, what next? Surely other groups will be impacted by higher oil prices and they will seek relief. Farmers in the sowing season. Farmers in the harvest season. Where does it all end? A much better policy response would be to provide financial assistance programs for the low-income home heating oil consumers in the Northeast.

I would conclude with a thought that with only minor exception, the oil exporting companies are just as vulnerable as the oil importing countries. These countries are exposed to the dangers of the so-called Dutch Disease. Dutch Disease appears when one sector of an economy, such as oil, flourishes at the expense of other sectors, namely agriculture and manufacturing. Sizable revenues from exports greatly improve local currencies against others, which makes imports particularly attractive at the expense of local industries.

Clearly, unless and until all exporting countries diversify away from their inordinate dependence on oil derived income, there will always be pressure on their part to maximize revenues from the depleting source. That translates into a continued price volatility or, as I noted earlier, business as usual. Thank you, Mr. Chairman.

Chairman THOMPSON. Thank you very much. Mr. Flynn.

TESTIMONY OF WILLIAM M. FLYNN,[1] VICE PRESIDENT, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY

Mr. FLYNN. Thank you, Chairman Thompson and Senator Lieberman. On behalf of Governor George Pataki and the residents of New York State I want to thank you for the opportunity to testify today concerning the energy supply and price problems that New York State and the Northeast region have been experiencing since last January.

New York State relies on heating oil more than any other State in the Nation. We consume 20 percent of the Nation's total distillate demand—43 percent of New York's households use oil for space-heating—over 2.9 million households. In February, retail heating oil prices soared to record levels, from $1.24 per gallon on January 17 to a record-breaking $2.02 per gallon on February 7, with New York City metropolitan area customers paying $2.25 per gallon. To put this price in perspective, last year, the average price per gallon of heating oil was 91 cents.

States throughout the Northeast experienced similar price increases. The economic burden of rising oil prices is not confined to heating oil. For example, New York motorists annually consume over 5.6 billion gallons of gasoline and nearly 1 billion gallons of diesel fuel. Increasing pump prices will also significantly increase the cost of transporting people and goods in and out of New York.

What were the reasons for these price increases? There was no single definable factor that we can point to as the ultimate cause of these price increases. There are, however, a number of market factors that contributed which bear mentioning.

One, economic growth in the United States and the strengthening economies of the Pacific Rim contributed to a resurgence in the demand for petroleum at the same time OPEC and non-OPEC nations reduced production.

Two, the petroleum industry has adopted just-in-time resupply of inventories. Additionally, New York's heating oil bulk storage capacity declined by 20 percent over the past 5 years. As for gasoline over this same period in-state storage capacity fell by over 17 percent.

Three, New York and New England do not have any refineries. We rely on refineries in New Jersey, Pennsylvania, the Gulf Coast and imports to meet our needs. And, refinery utilization rates have dropped.

Four, weather—we had mild weather in December that continued into early January. When the extreme cold weather arrived in mid-January, we experienced a sharp increase in demand by all sectors, creating greater competition among buyers, including interruptible natural gas customers and electric generators.

Five, resupply problems caused by icing on the Hudson River and high seas and strong winds on Long Island Sound, delayed barge shipments to key coastal and inland oil terminals. This exasperated the already tight supply situation.

Caught up in all these market forces are consumers. While we expected prices to rise because of OPEC cutbacks, the sudden and

[1] The prepared statement of Mr. Flynn appears in the Appendix on page 97.

dramatic price increases were way above the expected norm, particularly because this winter was 9 percent warmer than normal and 1 percent warmer than last year. We estimate that just the heating oil price increase will cost New York's economy about $650 million more than last year, with nearly $450 million of this increase felt by residential heating oil customers.

Also, truckers in New York and throughout the Nation are feeling the pinch of high diesel prices, although diesel prices have dropped from a high $2.70 per gallon in February, the full effect of these prices have yet to hit the stores that rely on trucking to meet demand for their products.

As for gasoline, national inventories are 12 percent lower than year ago levels, and in the mid-Atlantic States these inventories are 20 percent lower than last year. The average retail price for a gallon of regular gasoline in New York escalated 18 cents per gallon in recent weeks. The current statewide gasoline price is 55 cents per gallon higher that last year—far exceeding the previous all-time high of $1.51 per gallon during the Persian Gulf war. Obviously, this situation deserves much attention as we come close to the summer season.

Faced with this situation, Governor Pataki directed several actions. We established emergency provisions for shelter and heating by working with the Red Cross. We were in constant contact with county energy emergency coordinators across the State, with the U.S. Coast Guard, with oil distributors, and terminal operators and oil companies to get the best available information about the supply situation. Governor Pataki called upon the Public Service Commission to voluntarily keep utility customers who could switch to oil or natural gas.

The New York State Department of Tax and Finance issued temporary certificates to heating oil distributors and trucking companies. The New York State Department of Environmental Conservation granted a 1-week waiver to allow New York City municipal facilities to use slightly higher sulfur oil to meet their heating needs.

Governor Pataki also asked the Consumer Protection Board and our authority to investigate the causes of the current shortage. Therefore, our authority is surveying heating oil distributors, terminal operators, refiners, electric generators, natural gas utilities, and interruptible customers to determine the causes. We expect to issue a report later this spring, at which time we will make it available to this Committee.

Besides the actions we took in-state, there were several Federal measures we initiated. Governor Pataki called upon the administration for an increase in LIHEAP funds. Governor Pataki then raised the LIHEAP income limits for eligibility to help the elderly and the working poor. Governor Pataki and other elected Northeast officials, also asked for the release of oil from the Strategic Petroleum Reserve in mid-February. If the administration had acted then, we would be seeing greater supplies of gas and diesel fuel today.

I would also add some humble recommendations, some of which have already been mentioned today. We need to use the United States influence with OPEC and non-OPEC to achieve a more competitive oil market. Domestic crude oil production has declined. We

need to accelerate recovery technologies and improve the economics of finding and withdrawing oil from domestic reservoirs. An important step in New York and in the Northeast is better fuel diversity. We need to study the possible expansion of natural gas pipeline capacity and we need to look at new technologies such as fuel cells and alternative fuel vehicles as a way to provide us with greater energy security.

The Federal Government must do a better job of coordinating within the Department of Energy. They must take a more active lead role. And the Federal Government should also ensure that there is adequate funding in place for Coast Guard ice breakers. These ice breakers are essential in keeping the Northeast and Midwest waterways open for the movement of petroleum.

At NYSERDA our principle mission is to promote energy efficiency and to develop New York's renewable resources. NYSERDA has and will continue to support oil heat research. We strongly support continued DOE funding for the Brookhaven National Lab oil heat research. Again, Mr. Chairman, on behalf of Governor Pataki, thank you for inviting me to testify today and I would be happy to answer any questions you may have.

Chairman THOMPSON. Thank you very much. Mr. Holdren.

TESTIMONY OF JOHN P. HOLDREN,[1] PH.D., PRESIDENT'S COMMITTEE OF ADVISORS ON SCIENCE AND TECHNOLOGY, BELFER CENTER FOR SCIENCE AND INTERNATIONAL AFFAIRS, KENNEDY SCHOOL OF GOVERNMENT

Mr. HOLDREN. Thank you for the opportunity to present my views here today. I do want to say that although, as the Chairman indicated in his introduction, I am affiliated both with Harvard University and with President Clinton's Committee of Advisors on Science and Technology, I am speaking here today as an individual and not representing any of those other organizations.

The burden of my testimony today, and I should say I have submitted for the record a much longer statement than I am going to make here, can be summarized in four points. The first one is that we should be trying both to increase domestic oil production above what it would otherwise be and trying to reduce U.S. oil consumption below what it would otherwise be.

Second, we should be trying to do these things both by using price and non-price incentives of various kinds to affect the choices that are made among the energy alternatives that are available out there now, and also by investments and incentives and other measures that promote the development of improved energy supply and energy end-use options from which we will be able to choose in the future.

My third point is that having said all of that, analysis both of recent history and of the technological possibilities suggests that there is a much larger potential in increasing efficiency of energy use and in deploying substitutes for oil than there is potential for increasing the domestic production of oil.

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[1] The prepared statement of Mr. Holdren with attachments appears in the Appendix on page 112.

My fourth point is that we are not now doing enough in any of these dimensions. We are not doing enough in terms of a sensible array of the incentives to promote appropriate choices among today's technologies. We are not doing enough in terms of investments in research, development, and demonstration of advanced technologies for energy end-use and for substitution for oil in the U.S. energy mix.

My own focus in the bulk of my testimony is on the technological potential of the various approaches and on the measures that we could and should be taking to bring that technological potential into being, but I want to urge the Committee not to neglect, in its larger deliberations, the crucial question of incentives, both in the short-term and the long-term, that affect what we deploy from the menu of technology options that are available at any given time.

Turning then to that question of the technical potential of different approaches, my written statement contains an analysis that suggests that between the time of the first Arab OPEC oil price shock in 1973 and 1999, the effect of increasing efficiency and substitution for oil in the U.S. economy was at least three times as big in terms of effective displacement of oil import dependence, as was the effort to enhance domestic production.

My rough estimate is that efficiency and substitution for oil was worth over 10 million barrels a day in 1999, in the sense that our oil demand was that much lower than it would have been had pre-1973 business-as-usual trends persisted over that period. It is harder to assess the exact contribution of the attempts to increase domestic production in that period, for which, of course, there were considerable incentives, considerable investments, and considerable technological improvements brought to bear. But if one makes a reasonable assumption about the size of the impact, it is at least three times smaller than the impact on the efficiency and non-oil supply side.

If you turn to the question of the potential for the future, as opposed to the historical performance, I think a number of useful things can be said. If we were to manage to increase the rate of decrease of the energy intensity of the U.S. economy, that is, the amount of energy it takes to generate a real dollar of gross domestic product, from its recent historical trend, which is a 1.2 percent per year decline in energy intensity of the economy, to 2.2 percent, which is halfway between where we are and where we were at the height of energy intensity declines after the second oil price shock; if one were to do that and if the U.S. economy were to grow at three percent per year real over the next three decades, we would save, as a result of that efficiency improvement, 5.5 million barrels a day in 2010 and more than 20 million barrels a day of total energy oil equivalent in 2030.

In the oil sector alone, the potential is clearly very high. If you simply look at the transport sector, which is two-thirds of U.S. oil use, and look at the prospective impact of the program on a new generation of vehicles, the study by the President's Committee of Advisers on Science and Technology (PCAST) that I led on U.S. energy research and development strategy completed in 1997, concluded that the results of PNGV could be displacing 4 million barrels a day by 2030, with comparable efforts on light trucks and

heavy trucks displacing another 2 million barrels a day, 6 million barrels a day altogether.

If you look, by comparison, on the supply side and ask what the Energy Information Administration's year 2000 energy outlook, going out to 2020, says the prospects are for enhancing domestic production, the difference between their reference case and their high world oil price case, which adds to the incentives to improve domestic production, is 800,000 barrels per day in 2020, between those two cases.

Expanding non-oil supply is a lot more promising than that. If you look at the potential, for example, to expand natural gas supply and use natural gas to displace oil in the home heating sector, in the industrial sector, and even in the motor vehicle sector, where compressed natural gas can substitute for gasoline, you find that that potential is in the multiple millions of barrels per day by 2020.

If you look at biofuels, the potential is also multiple millions of barrels per day by the period 2020 to 2030. If you look at the potential of renewable electricity generating technologies to free up more natural gas from the power generating sector to use in other sectors to replace oil, that is also in the multiple million barrel per day class by 2020 to 2030.

So the potential for replacing oil is very large, and the potential for saving oil is very large, but those potentials are not going to be realized even in the technological sense if we do not make the needed investments. When PCAST looked at the current picture of U.S. investments in energy research and development, we found that in fiscal year 1997, the U.S. energy R&D expenditures at the Federal level were at the same real level that they had been in 1973, and, of course, half that level as a fraction of the GDP.

We deemed that level of investment in energy research and development to be incommensurate with the challenges and opportunities that the energy scene is going to present in the 21st Century, and we recommended that that level of investment should roughly be doubled over the ensuing 5-year period, that is, starting in fiscal year 1999 and out to fiscal year 2003.

The Clinton Administration, in its fiscal year 1999 budget request, accepted about two-thirds of those recommendations. The Congress passed 60 percent of that, and so we ended up with 40 percent of what PCAST had recommended in enhanced investments in alternative technologies in the fiscal year 1999 budget. There was a further increase in fiscal year 2000, but the gap between the PCAST recommendations and what the administration has recommended and, in turn, the gap between what the administration recommended and the Congress passed is getting wider.

So what we have achieved in turning around the decline in U.S. energy R&D is a lot more than nothing, but it is also a lot less than, in the view of me and my colleagues, is required. We did, just to close very quickly, a follow-on report that was released in 1999 on the role of increased international cooperation in addressing these problems. The oil problem and many other aspects of the global energy predicament cannot be successfully addressed by technologies that the United States deploys domestically alone. Dr. Haass made the same point a few minutes ago.

It is in our interest to see that advanced technologies that reduce the world's dependence on imported oil and that reduce emissions of air pollutants and greenhouse gases, as well, should be deployed as widely as possible, and it is in the United States' interest to cooperate with other countries to see that that happens.

A six-page synthesis of PCAST report [1] on international cooperation has been provided to the staff and to the press and I hope that it will also be entered into the record. I will close just by saying that it does not seem to me that any of these are partisan issues. They are issues in which the national interest, as seen by Republicans and Democrats alike, is very similar. So I hope that the administration and the Congress will find it possible to work more closely together to generate the enhanced investments in achieving the potential to reduce dependence on imported oil that is out there.

Thank you very much.

Chairman THOMPSON. Thank you very much. Mr. Sieminski.

TESTIMONY OF ADAM E. SIEMINSKI,[2] DIRECTOR, DEUTSCHE BANC ALEX. BROWN

Mr. SIEMINSKI. Mr. Chairman, and Senator Lieberman, thank you. Like Dr. Holdren, my bosses at Deutsche Bank assured me that I was totally on my own up here, so I was hoping that they would not be listening in this morning, since rather than go through the 21 pages of testimony that I gave the Committee about what I knew, I thought we could spend just a minute or two on what I do not know. My dear friend and colleague, Bob Ebel, earlier today said, "Adam, if you tell them what you do not know, we are going to be here all day."

So I thought I would try to limit it to five things that I think are important in the crude oil markets today that should be of great interest to the Committee. I do not know five things that are worth half-a-million barrels a day of oil apiece.

First, is worldwide inventories. Are they falling at the normal 1.2 million barrel per day rate right now, or is it less than that, because the preliminary data says less? This is very important to OPEC.

The second thing that I do not know is whether Iraq is going to be able to quickly raise exports from its recent level of only 1.7 million barrels per day to the 2.2 million barrels per day rate that I think they are capable of doing and, in fact, they achieved in late 1999. Alternatively, we might see a cutoff in June of Iraqi exports, as we have seen nearly every 6 months when the oil-for-food program comes up for reauthorization at the United Nations.

The third thing that I do not know is whether or not higher oil prices are going to dampen the world economy and demand for oil by 200,000 to 300,000 barrels per day, or maybe have a similar but positive impact on world oil supply. On the demand side, let me just mention that just this morning, the government released the durable goods orders number for February, and it fell by 2.3 percent, including an 8.7 percent decline on the transportation side of

[1] The report appears in the Appendix on page 124.
[2] The prepared statement of Mr. Sieminski appears in the Appendix on page 130.

durable goods orders. I am beginning to wonder if maybe high prices for gasoline, diesel fuel, and jet fuel are already having an impact on the view that companies have about the future need for those pieces of equipment.

The fourth thing that I do not know is what the true short-term excess production capability is within the OPEC cartel. There is a pie chart in my testimony that shows a very uneven distribution of excess capacity within OPEC, with Saudi Arabia having more than half of it, Kuwait, the United Arab Emirates, big chunks, but other countries having less. If that is true, what that might mean is getting an agreement in OPEC to raise production this time, and it gets worse in the next required increase, maybe this summer or in the fall, because of the inability to evenly spread the increases throughout the cartel.

The fifth thing that I do not know is what the weather is going to be this summer, what it is going to be next winter or, interestingly, if the lack of additions to natural gas storage which we are seeing occurring now might end up creating a natural gas problem in the coming winter that would compound the oil problem we are going to have.

Now, the other thing that I do not want my bosses at Deutsche Banc to know is that they pay me pretty good money to try to know the answers to these things, and I spend a lot of time doing this, and if I do not know the answers, I do not think OPEC does, either, so they are in a serious bind.

Chairman THOMPSON. Isn't it refreshing, though, to come to a place where we know all the answers? [Laughter.]

Mr. SIEMINSKI. Well, so, Mr. Chairman, Senator, let me try to give you five recommendations for what you could do in the face of this uncertainty. The first thing that I think you should do is to keep funding agencies like the Energy Information Administration (Dr. Hakes, who was here this morning), and the International Energy Agency in Paris to try very hard to improve the data collection and analysis functions of those agencies. I think if good oil market information is known by everybody, including OPEC, we are all going to be better off.

The second thing I think you have to look at is lowering taxes on production-related energy activities. This was a very successfully implemented strategy in the North Sea, in the early 1990's, and caused North Sea production to rise after a lot of analysts said it would fall. You might want to look very carefully at the idea of lowering taxes at the consumer end, because that actually just goes the reverse of what you are trying to accomplish.

Chairman THOMPSON. You say look very carefully at it. You mean you would recommend against it?

Mr. SIEMINSKI. Yes. I agree with Senator Domenici, who said that the idea of taking money away from the highway program in the near term to deal with this situation is really not a particularly good idea. Most of the world looks at us and thinks we are a little silly over here in the United States complaining about gasoline prices, given that we are still getting it for $1.50 per gallon and it is $4 or $5 in most of the European countries and many countries in Asia.

The third thing I would say is do not tie up the prospective oil producing areas in Alaska, the Outer Continental Shelf, and the western lands, because we need it. Be careful about environmental rules. Environmental rules make sense generally, but I think you can get carried away with that and it can get very expensive. I think we should take a more accommodating attitude towards mergers, simply because bigger companies, I believe, are going to have a better ability to deal effectively, not just with OPEC, but with all of the non-OPEC countries that they are going to have to operate in over the coming years.

Fourth, I think we should encourage the flow of capital overseas. I believe we should reverse the trend towards imposing unilateral sanctions here in the United States. Over the last 5 years, most of the growth in non-OPEC oil came from Norway, the United Kingdom, Canada, Brazil, Mexico, and Columbia. My projections for the next 5 years say it is going to be Angola, Sudan, Russia, Azerbaijan, Kazakhstan, Yemen, Chad, and a number of other countries where I think that we first want to encourage investments to go in there, and second, I think we do not want to impose sanctions on so many of these countries that we will not get the oil out.

Finally, actually, there is another one. I think we ought to be prepared (I think as New York State did) to temporarily suspend fuel regulations if we have a gasoline problem. You could get imports of gasoline feed stocks from Europe and Asia to help a crisis if we see one, if the fuel specifications were relaxed for a short period of time.

Finally, the Strategic Petroleum Reserve. Look, I agree that the petroleum reserve ought to be reserved for emergencies. The problem is, nobody can define what the emergency is. If you have a free market, you never have a shortage, because prices go up, and that deals with the situation. So what I would suggest is that the Department of Energy ought to look into the idea of using a more market-oriented approach to the Strategic Petroleum Reserve. As an example, if the trigger mechanism were tied to the difference between where prices are now versus where they look like they are going to be in the futures market a year or two down the road, at any particular time, you could use that difference as the trigger mechanism to define the degree of an emergency or a shortage.

If that type of approach had been taken over the course of the last 10 years, the Strategic Petroleum Reserve would have only been used three times, maybe four. One of those would have coincided with the release (sale) that did take place by the Department of Energy in 1996. The other two would have been purchases or borrowing of oil into the Strategic Petroleum Reserve (when prices were low) that would have taken place in June 1993 and in late June-December 1998.

Using the amount of difference between the front end and back end of the futures curve as the trigger mechanism, we would have been lending oil out into the markets over the course of the last month or two under this kind of a plan. I agree that it is a good idea to preserve the Strategic Petroleum Reserve for a true supply crisis, but I think it is almost impossible to define what that is politically, and I would rather let the markets define it.

Note that this does not have anything to do with absolute price. Just as an example, if oil was $40 today, but the future price a year or two down the line was $50, we would be buying oil for the strategic reserve, not selling it.

Thank you.

Chairman THOMPSON. So basically, what you are saying is that in a free market, there can never be a shortage, even if OPEC totally shut us down and did not give us anything, there would be enough in the world market, it would just be at an astronomically high price.

Mr. SIEMINSKI. Right, and I assure you that that would not last for a very long time, but this trigger mechanism could actually deal with that. The near-term price could go to $100 per barrel, but probably most companies and analysts would say that, well, it is not going to last and certainly within a year or two, it is going to be back down to $20 or $25.

Chairman THOMPSON. Thank you.

Senator Lieberman, I know you have to go.

Senator LIEBERMAN. Thanks very much for your courtesy, Mr. Chairman. Very interesting idea. Incidentally, the panel has been superb. I think you really each contributed to our understanding of the problem and hopefully to the public's understanding. We might hope they would read the transcript. It is more likely they will see you on C–SPAN, but you have been excellent.

On this last interesting idea about a trigger mechanism for the reserve, what is the gap between what oil is costing now and what it would cost in the futures market a year from now that you would set as a standard?

Mr. SIEMINSKI. Senator, the gap right now is probably—it varies from day to day, but it is up over $6. It is probably $6 to $8 per barrel, so that current price that is $28 in the market, a year from now or 18 months from now is about $20.

Senator LIEBERMAN. So what is the gap that would trigger the reserve?

Mr. SIEMINSKI. With a 95 percent confidence level, so in other words, you are only dealing with that five percent that you want to deal with; the trigger would probably come in somewhere around $4 per barrel when oil is low and about $5 dollars or so per barrel when prices are high.

Senator LIEBERMAN. That is about the standard you used in saying that it would only have had been used three times.

Mr. SIEMINSKI. That is correct.

Senator LIEBERMAN. Including in December of last year, 1999.

Mr. SIEMINSKI. Well, yes. We would have had something happen sometime over the course of the last couple of months.

Senator LIEBERMAN. What I am asking you, Mr. Sieminski, I take it from what you said about this question of the unevenness of spare production capacity in OPEC, and the internal political difficulties that creates in OPEC, that you expect they will not make a decision to increase supply next week, adequately to meet world demand.

Mr. SIEMINSKI. I think that OPEC is going to act on the side of caution, because they are very afraid of having a renewal of what happened in late 1997, when there was too much oil on the market,

and that uneven capacity issue comes into play, as well. I think the market needs a minimum of 1.5 barrels a day, and I think that we are likely to see something a little bit less than that coming from the OPEC countries.

Senator LIEBERMAN. Thanks. Mr. Cavaney, thanks for your testimony. I am correct, I believe, in saying that API has been opposed to using the Strategic Petroleum Reserve.

Mr. CAVANEY. We believe it should be reserved for its intended purpose and not to intervene in the market.

Senator LIEBERMAN. Is there a different position or a more open position on the question of swaps, because when that has been talked about, there is a suggestion, though I have never heard it made explicit, that the oil industry is more open to swaps than to an actual release of oil from the reserve?

Mr. CAVANEY. Philosophically, that is still a measure of market intervention, but we would be prepared to sit down, and explore and discuss in further detail how that might work, because how the mechanisms kick in and so forth would have an impact.

Senator LIEBERMAN. OK. I appreciate that. Let me ask if you can sketch for us, and this is real difficult. We tried to do it a little bit earlier. As we talk about trying to have a new national energy policy and creating more energy independence, American energy independence, through all the means we are talking about here, renewables, alternatives, and more production of oil and gas within our control, what the potential is domestically? You mention the percentages in terms of the western States, but in terms of barrels?

Mr. CAVANEY. I can share with you, this data that I am about to give you is from 1995 U.S. Geological Survey and Minerals Management Service estimate, the U.S. undiscovered potential reserves are 78 billion barrels of oil and 885,000 TCF.

Senator LIEBERMAN. What is that?

Mr. CAVANEY. TCF, trillion of cubic feet of natural gas. So, oil alone, which has what has been principally the discussion today, is 78 billion barrels. That, as you noticed just recently, the Geological Survey updated the non-U.S. supply potential and increased it by about 20 percent. If you look historically at their revisions, they have all been upward.

As was mentioned earlier by the EIA, they soon expect to come out with another revision. We expect it will be upward, so it may well be more than 78 billion barrels in the near future.

Senator LIEBERMAN. I want to ask you a question next that is pretty hard to answer, because it is highly subjective, and if I asked it in the crudest fashion, I would say how much of that is not environmentally controversial? In other words, how much of it is not being developed for economic reasons, and then I would ask what economic incentives, apart from market price, could we create to encourage the development of those resources?

Mr. CAVANEY. It is difficult to answer. To some people, any drilling is a concern, and, to others, it can be done in an environmentally sensitive way, and we should maximize that. What concerns us in the macro sense, by any use of mathematics, about 60 to 61 percent of the reserves are basically restricted and not available. That reduces, by a very large amount, the capacity to basically take market risk.

As you are aware, people have to invest huge amounts of money in order to both first explore and then bring production online and then, ultimately, deliver it to a refiner to make it into heating oil, diesel fuel, crude oil, whatever the case may be. So what you do, since you have opportunities to look worldwide, and what has been the trend of late, is increasingly U.S. producers, because of the obstacles here in the United States, the long-term and costly permitting process and, in some cases, the inability to get permits, increasingly U.S. producers have gone to foreign countries, and we are not as attractive a place as we were 20 years ago.

There are things that can be done, by easing the regulatory burden for permitting, by opening up some of these lands, by looking at whether or not the United States provides a level playing field in its tax policy with other countries, because there are ample reserves there for us to be able to bring on a good deal more domestic production and, therefore, ease some of the price pressures we have right now with the strong reliance on foreign oil production.

Senator LIEBERMAN. Thanks. Hopefully, we are in a climate where we could figure out ways to do some of that. Some of the battles we are fighting, I understand there are strong opinions on both sides, at least in the foreseeable future, such as ANWR, it is hard to see them getting anywhere. But I hope there are other areas of potential that we all might work on that are less confrontational.

Mr. CAVANEY. These areas that I have mentioned include all the Rocky Mountain States, very attractive, particularly for gas, the Gulf of Mexico, very attractive there, all of Alaska, not just the ANWR part, and offshore, both on the East Coast and on the West Coast. So there are ample opportunities there to look.

Senator LIEBERMAN. Dr. Haass, I wanted to ask you, at the foreign policy level, you are right, of course, that we have ongoing relations with OPEC and other oil-producing nations that are important, and they are important to us strategically and in other ways. Of course, we are important to them. Obviously, we went into Operation Desert Storm to protect a group of them. We have been involved in economic assistance, disaster assistance, to our Central American, Latin American neighbors and allies who produce oil.

There is a mood here now, and it is somewhat reflected, although it has been moderated in the House bill, to strike back, and it is an understandable mood. I want to ask you how you strike the balance here? And when I say how do you strike the balance, I mean, it is certainly, generally speaking, as I listen to the experts in this area who pretty much feel that, although the market is the market, the world price going up to $34 per barrel is excessive; that $10 was too low, and it is not just splitting the difference, but most of the people you listen to seem to say, "Well, $18, $20, to $22 a barrel seems to be kind of a consensus preferred rate."

So in the midst of that kind of excessive pricing, what do we do with our allies? There is a tendency, understand, not to be vindictive, but to say, "Hey, you know, we sent half-a-million of our soldiers over there to protect you 10 years ago. We gave you aid when you had a disaster. We helped you out when you had an economic crisis. Why are you squeezing us now?"

Mr. HAASS. I understand the sentiment. I think the producers understand it, as well, and they are uncomfortable with it. It is one

of the reasons you will see them responding. Indeed, I do not think they ever thought prices would get to the point they have gotten. They were extremely unhappy, for obvious reasons, with $10 per barrel oil. I have no reason to believe that any of them actually thought we were heading north of $30 per barrel, in part for the reason you warned. They are worried about the political reaction, and they understand their own economic future is somewhat intertwined with the world's economic future.

So the idea that they would bring down the temple is not in their interest, either. I would just say two things, though, Senator. First of all, you might say our moral authority to weigh in with them would be somewhat greater if we had shown a little bit of concern about low oil prices. It is not enough for the Secretary of Energy to get on his bicycle when oil prices are at $30 and say bring them down. He has also got to get on his bicycle when the prices are $10 and say, "We understand this is causing hardship for you. It actually could cause national security problems for us, so let's talk about how we avoid that."

You heard it from the panel today—greater transparency is key here. To the extent producers and consumers can sit down and talk about long-term projections of supply and demand, to add transparency to calculations, people then can adjust levels of output in order to anticipate these changes and, as a result, hopefully avoid them. In many ways, it is akin to the same logic that you heard with the petroleum reserve.

To the extent you look at the future, you can anticipate it and take steps, in the process helping to prevent undesirable futures from coming about. But it means, therefore, to some extent eschewing a confrontational relationship with OPEC and become somewhat more cooperative.

Senator LIEBERMAN. That is a helpful thought and it has obviously not happened at this point. Maybe that is another lesson to be learned from this crisis, to be on a more continuing basis of discussion with the oil-producing nations, to avoid these extremes, both up-and-down, which are not good for either the producers or the consumers. I was going to ask you, Dr. Holdren, a lot of questions, but you answered them all. I just think your testimony was very interesting in terms of the enormous potential for energy savings in the investments we are making in the new technology vehicles, for instance, next generation, new generation vehicles, and in some of the renewables and conservation. So I thank you.

I just wonder, Mr. Chairman, if I may read into the record. Dr. Hakes asked a question earlier about the extent to which we depend on OPEC for our daily oil supply, and he did not have the number right off the top of his head, but he dropped it off at the desk before he left. His figures say that U.S. crude use is 14.8 million barrels per day, and that the OPEC-imported crude is 4.8 million barrels per day, and the total U.S. crude imports are 8.59. So OPEC is about half, 49 percent, of our imported crude, and about 28 percent of our total use, so it gives us interesting dimensions.

Mr. Chairman, I apologize for having to go. I was supposed to be somewhere 15 minutes ago. I thank you for your courtesy in letting me go first and in holding the hearing. I hope and I believe that we have contributed to the dialogue in a thoughtful way, and most

importantly, I think you have each given us—and the two witnesses before—some material to work with now as we go forward, both in terms of our international relations and also in terms of our domestic policy. So I thank you very much.

Chairman THOMPSON. Thank you very much.

You pointed out that the United States gets about half of its oil from OPEC, and I believe it was Dr. Holdren's written statement that said half of that comes from the Persian Gulf; is that correct?

Mr. HOLDREN. Right

Chairman THOMPSON. In listening to the interchange with Dr. Haass here, it occurred to me that is why it seems to me that, I do not want to say the long run, but generally speaking, that market forces will win out in this thing, not because we remind our friends in the Gulf area of what we have done for them or anything or because we prick their conscience, but because it is in their self-interest, not only to maintain the relationship with us, and I do not think they kid themselves as to why we were down there in Desert Storm, but also in terms of the international marketplace.

So I think, if they are enlightened at all, they take all those things into consideration and that works in our favor, maybe not as rapidly as we would like and, as Dr. Haass points out, that does not keep us from talking and trying to take the sharp edges off maybe in the process, but it looks to me like it is a very much of a good news situation. That is not the bigger long-term problem, if they are going to be so unenlightened as to do things that are outrageous.

I think the bigger problem is, as you point out, potential problem, is things that the leadership in some of our friends' countries can maybe do very little about, and that is internal economic problems. It was pointed out that they are so dependent on oil. You think we are dependent on oil. They are the ones that are dependent on the oil, in terms of their income, so it was very good to be reminded, I think, of that interrelationship.

Would all of you agree that, generally speaking, with Dr. Haass' comment that historically, prices are not particularly high by historical standards, not higher than in past decades, especially in the early 1980's, I believe, was where you put in some cases, some years where—compared to some years, it is actually lower? Is that a fair assessment?

Mr. CAVANEY. If you look at the gasoline data nationwide and adjust it for inflation, it is about 40 percent lower than it was at its height, which was in the early 1980's.

Chairman THOMPSON. Talking about the Gulf area there, which you, Dr. Haass, I think you have broadened the discussion to what our real attention ought to be on here. Do you welcome the recent overtures that we have made toward Iran, for example? Does that contribute toward your view as to what we should be doing to maybe open that part of the world up for us? Does it make any difference?

Mr. HAASS. In general, I do welcome it, but I say that without great confidence one way or the other about what dividends it will yield. But I think it's worthy as an investment. We are not risking a lot by importing rugs or pistachios, and Iran is one of the key countries in one of the key regions of the world. It is hard for me

to see how, in the long run, U.S. national security interests are served by the United States and Iran being estranged.

So, to the extent this may lead to some momentum with what is clearly a more reformist government in that country, good. But we have also got to recognize that the hold of the reformers in Iran on the policy of their own country is clearly less than complete.

There are independent centers of decision making in their country which may have, as their principal objective when they get up every morning, to frustrate any rapprochement or normalization between our two countries. So I predict it is going to be one of those "steps backwards for every step forwards" type of process. But I believe the administration was correct in moving away from dual containment and in not tarring Iran and Iraq with the same brush. Having a differentiated policy and essentially investing a little bit in the Iran relationship to see what might come of it makes sense.

Chairman THOMPSON. All right. But, specifically, I take it from your statement that our long-range goal there is to free up some oil from that area.

Mr. HAASS. Right. Iran is one of the principal producers of the world. U.S. companies do not participate in it. Iran is producing a significant amount of oil now. I would think they could produce perhaps a bit more were the United States to be involved. Put it this way: Whatever penalty Iran pays from our non-participation is overwhelmed by the increase in the price of oil.

For every dollar that oil goes up per barrel, I estimate that Iran's revenues go up by somewhere between $1 billion and $1.5 billion. So, oil price fluctuations overwhelm any potential impact of American sanctions.

Chairman THOMPSON. What do you think is going to happen with regard to Iraq, both in the longer term play, influence they have down there with regard to our allies, ourselves, but also in terms of what they do with their oil production as we lift sanctions?

Mr. HAASS. I think Iraqi oil production will, for the most part, continue to come up. The regime wants this, particularly to the extent it can smuggle oil, because that allows them to get the revenues and escape the controls of the international community, which is obviously what Saddam Hussein wants to do. He wants to avoid as much of his revenues being captured as he can, because to the extent we capture the revenues in this U.N.-overseen account, we can then have some handle on how that money is spent.

But there is a bigger question about Iraq. It is a bad penny about to turn up. We are living on borrowed time. It is more a question of when, and not if, Saddam Hussein pops up and presents us with a weapons-of-mass-destruction problem.

Mr. SIEMINSKI. Senator, if I could come back to your question about oil prices.

Chairman THOMPSON. Yes, sir.

Mr. SIEMINSKI. On page 21 of my testimony, there is a chart that shows oil prices in today's dollars, going back to 1960. With oil at $30 or over $30, that is higher than it has been at just about any time since 1980, 1981 or 1982, so at that level, it is pretty high. Now, if prices come down and average lower than that for the year, then I think you could say that prices are not that bad compared

to where they have been in the past, but if prices stay at $30 or go higher, and they could, there is an issue.

The other thing I would like to mention is again back to this point of what is called backwardation in the oil markets, the gap between where prices are today and where the futures market is saying prices will be a year from now is the highest that it has ever been. So, what that says, in relative terms, is this a big problem, and that is obviously what consumers are feeling.

Chairman THOMPSON. I see. Well, let me ask you this first, on another subject. Dr. Holdren, you state that, in your opinion, that we have had better success in decreasing consumption than we have in increasing production. Is that generally——

Mr. HOLDREN. Yes, that is the finding, and that is not to say we should not continue to try to strengthen domestic production.

Chairman THOMPSON. Does anyone take issue with——

Mr. HOLDREN Ultimate magnitudes?

Chairman THOMPSON. Does anyone take issue with that really? My question there is why do you think that is? Is it because of the efforts that we have made or not made, or is it because of the inherent problems with production, or why do you think that has been historically true?

Mr. HOLDREN. I think increasing domestic production is a very hard problem. A very distinguished geophysicist, M. King Hubbert, many years ago did a series of analyses based on assessments of discovery rates and the likely amount of oil to be found, and so on and so forth, in which he predicted that the peak of U.S. domestic oil production would occur around 1970. He predicted that in the 1950's and became a prophet in his own time when it happened.

M. King Hubbert would have argued that the reason for that, again, was not inadequacy of our efforts, but the fact that there is a certain amount of high-quality, accessible oil out there to be found, and after you spent a lot of effort at it, you found a certain fraction of it and your capacity to find more is constrained by the fact that you have already found and used a lot of it.

There are differences of opinion about how much more remains to be found and how long you can stave off a steeper decline. The Energy Information Administration's year 2000 outlook out to 2020 basically said that with continuing technological innovation—and there has been a lot in seismic exploration, horizontal drilling, secondary recovery—we could expect to hold it flat between 2005 and 2020 at about 7.3 million barrels per day, and they estimated further that if the price of oil were as high as $28 per barrel in 1998 money, that you could add about 800,000 barrels to that in 2020.

Now, if the price of oil were higher still, obviously you could do better than that. If the country made the judgement that every conceivable place you should look for oil should be opened to exploration and production, you could do better still. The EIA forecast did not assume that the——

Chairman THOMPSON. That is not going to happen, of course, but what about a modest opening up of restricted lands?

Mr. HOLDREN. Well, if you opened up—I mean, I say in my testimony that sort of the middle of the road estimates of what you are likely to find in the coastal plain of the Arctic National Wildlife Refuge might be comparable to Prudhoe Bay, and if you look at the

production history of Prudhoe Bay, it peaked around 2 million barrels a day, with a long tail at 1 million barrels a day, so you might suppose if you did that you could be getting an extra million barrels a day during the decade stretching out from 2010 to 2020 and more.

That would be worth having. The difficult dilemma that the policy makers have to face is whether that addition to domestic production is worth the costs and the risks, environmentally, against the possibilities of getting considerably larger amounts with considerably less effort and less environmental risk on some of these high-leverage opportunities for oil displacement by alternative technologies.

Chairman THOMPSON. Well, that gets to my next question. Mr. Cavaney, do you have anything to add to that, thoughts that cross your mind?

Mr. CAVANEY. No. I think, in general, what you are going to do is you are going to look for the oil that is the most inexpensive to lift, because it is a competitive global market. New technology, though, has had a dramatic impact in reducing those costs and making old fields good.

So, I think give people the opportunity, and the industry has proven it has been very resourceful, and I think you will see figures in excess of that.

Mr. EBEL. Mr. Chairman, could I jump in?

Chairman THOMPSON. Yes, sir.

Mr. EBEL. Two points I'd like to make: One, we have talked about the advances of technology and how it has allowed us to find oil cheaper and quicker, and that is great. But there is a downside to these advances in technology which have not been discussed, and that is it also allows us to deplete our fields faster, which has a downside impact.

Second, I think any additional barrel of domestic oil that we could add to supply is worthwhile. We just have to be careful not to delude ourselves that it is going to reverse our increasing dependence on foreign oil. It is not going to happen.

Chairman THOMPSON. So do you think there is really nothing we can do, as a practical matter, to substantially reduce our dependence?

Mr. EBEL. We can slow down our increasing reliance on foreign oil. But I do not see a situation arising where this new oil coming from ANWR or from some offshore area would allow us to reverse our increasing dependence——

Chairman THOMPSON. Would you be willing to guess at any realistic percentages? If we start doing some things better than we have done, and all these things have tradeoffs, you talk about ANWR. But you start talking about CAFE standards on the other side. Everything has tradeoffs. Can you foresee a time, if we started doing some things better, we could get down to 40 percent, 30 percent, on any continuing basis?

Mr. EBEL. I doubt that very much.

Chairman THOMPSON. Really?

Mr. EBEL. I do not think that is a realistic goal at all. When we go out to look for oil, it is like throwing a forward pass in a football game. Three things can happen, and two of them are bad. One is

that you can drill a well and you find nothing or you drill a well and you find something, but it is not producible at today's price and today's technologies. If you are lucky, you find something that is.

So there are more than adequate risks out there in the exploration side, and we can talk about the potential of these areas which are denied to us now, but there is only one way to find out whether that potential is real or not, and that is to drill a well. It was not too long ago that the media was hyping the potential to be found in the Caspian Sea and central Asia, many stories that we have at last found an alternative to the Persian Gulf.

Well, reality has set in and we have not found an alternative to the Persian Gulf. We perhaps have found something comparable to the North Sea, but, by the year 2010, if exploration efforts are successful, if pipelines have been built and are operating, we might see a contribution to the world oil supply on the order of two to three percent, important at the margin, but not——

Mr. HOLDREN. Mr. Chairman, could I just augment that for one second?

Chairman THOMPSON. Yes.

Mr. HOLDREN. I think Mr. Ebel is absolutely right in saying that there is no prospect that efforts to enhance domestic production could reverse our growing dependence on imports, but I very strongly believe, and argued in my testimony, that efforts to increase the efficiency of oil use and to displace it with non-oil alternatives could certainly reduce our dependence on foreign imports.

It is a question of whether we will make the choices to move in that direction.

Chairman THOMPSON. What do you think about that, Mr. Ebel?

Mr. EBEL. Well, in my oral remarks, I mentioned about how we responded in the past to oil supply crises, to price crises, where we trotted out renewed attention to alternatives. We tried our hand at a synfuels corporation, but then the market adjusted itself, and these new approaches get put back on the shelf, to be trotted out at the time of the next crisis.

Our findings are that alternative fuels, yes, will grow in absolute terms, but in relative importance to our total energy supply, will be about the same 20 years from now as it is today.

Chairman THOMPSON. Yes?

Mr. HOLDREN. That will depend on choices that we can make. If we make different choices, we could have a different outcome.

Chairman THOMPSON. I will get to you in just a minute, Mr. Cavaney. The question always, I guess, is how dramatic would the choices have to be and to what extent? We have not made any tough choices yet, and according, I believe, to your figures, Mr. Holdren, that we are getting 7.5 percent of our energy supply from renewables; half of that is hydro, biomass, geothermals, solar, wind. You know, everybody wants some cost-free solution.

But here we are, after all this time, with these extremely low percentages in these areas. Obviously, we can do more. I have heard some people say we are spending about as many research dollars in these areas as we can effectively utilize. Is it really realistic to think that we are going to do that much better, as far as renewables are concerned?

Mr. HOLDREN. Although some people say this, I do not agree at all that we are spending research dollars at the rate we could effectively utilize. The PCAST panel that wrote the 1997 report, which had 21 members, a very large proportion of them from the private sector—people experienced in oil, gas, nuclear, renewables, efficiency—reached the unanimous conclusion that we could be very cost-effectively spending twice as much as we are spending today on Federal energy R&D, taking into account what the private sector is doing (which is very important) and is likely to continue to do.

We concluded further that, if we did that, the gains would be quite substantial in the array of technologies that could be brought to the point of commercialization. But there does remain the question of incentives. The fact is that for most of the period after the early 1980's, the price of oil has been low; the price of natural gas has been low.

It is very hard for renewables or even for coal and nuclear power to compete with natural gas when natural gas-fired electricity generation can make electricity for three cents a kilowatt hour. It is hard to touch it. Natural gas will not always be that cheap. We may not always be willing to put the amount of carbon dioxide into the atmosphere that that approach to electricity generation puts in. But as long as it is that cheap, and as long as no policy measures to narrow the gap are put in place, based on the public benefits perceived from having a wider, more diverse portfolio, you are not going to see the penetration of alternatives.

So I said in my testimony and I will say again, we need the R&D to develop a more diverse array of energy technology options, both for supply and for increased end-use efficiency. We also need incentives that will cause us to deploy them, and until we are ready, I believe, to talk about the dreaded T-word or its equivalent, that is gasoline taxes, and carbon taxes, we won't get the job done. You can reduce income taxes and capital gains taxes to compensate for the energy tax revenue, to make it revenue-neutral. The economy would probably do better if you do that than it would under business as usual, that is, if you raise the taxes on bads and decrease them on goods.

But if we are not willing to talk about measures of that sort, we will continue to be vulnerable to an overdependence on imported oil and to overreliance on other energy technologies that are running big environmental risks.

Chairman THOMPSON. Well, listening to you, you could make the case that what we really need is much higher prices for a long period of time in order for us to do the right thing.

Mr. HOLDREN. I would say certainly somewhat higher prices for those energy sources that bring big external costs, either in terms of the environment or in terms of foreign policy, military policy, national security and so on.

Chairman THOMPSON. That would certainly include oil; wouldn't it?

Mr. HOLDREN. I would include oil.

Chairman THOMPSON. I mean, does anybody really disagree with that, in terms of just objective analysis? I guess you would be better at it if you were a political scientist more than some of your

other specialties, because a lot of it has to do with what we do up here, what the next President does and so forth.

But does anybody really think that anything is going to be done in terms of renewables or anything else unless we have something dramatic happen in the price area?

Mr. EBEL. Let me respond to that, and I think it goes back to the interest that you expressed as the first panel was coming to an end. But, as you wanted to know, what happened to that Section 232 report? Well, it is sitting in somebody's in-box in the White House.

Back in the 1980's, I had the pleasure—well, responsibility of preparing a Section 232 petition, which took a year for the government to respond to, and the answer was yes, our oil imports threaten our national security, but present policies suffice. I would not be a bit surprised if that is the answer you are going to get when this one comes out of the in-box.

Chairman THOMPSON. At first blush, that does not look like it makes much sense; does it?

Mr. EBEL. But that is the response, present policies suffice.

Chairman THOMPSON. Is that the correct response, in your opinion?

Mr. EBEL. Well, it is what we have been talking about. If that is not the correct response, what is the correct response? If you cannot do anything on the supply side, on the domestic supply side, what can you do on the domestic demand side? But as long as oil is going to be relatively cheap, it will be hard to get the public and the Congress to focus on that issue.

Chairman THOMPSON. Mr. Cavaney.

Mr. CAVANEY. Mr. Chairman, as I had mentioned earlier when talking about undiscovered reserves and the like, one of the things we should not overlook is natural gas. The United States has a tremendous abundance, 885 trillion cubic feet.

Chairman THOMPSON. What is the problem with that? Why aren't we utilizing natural gas more?

Mr. CAVANEY. Several things. Again, a large part of it is in areas that are restricted for use; the other is basically you need significant investment to go after it, because, as was mentioned by Mr. Ebel, is that technology allows you to find this and better pinpoint it, but it also allows you to more quickly use up those reserves, so you have to keep peddling faster and faster.

So, we need to be able to recognize that the extent to which we can integrate natural gas more into the economy, particularly in the industrial sector and in the Northeast, in areas—in homes or other areas—we will create more demand and that will attract more capital, and therefore we will have more growth in natural gas.

Chairman THOMPSON. Any further observations? Oh, I did have one more, Mr. Sieminski—to ask you to elaborate on one more point before we quit. You mentioned—I believe—the excess capacity that the Saudis had, in comparison with some of the other Persian Gulf countries or OPEC countries. I am not sure I got the significance of that. Could you go through that again?

Mr. SIEMINSKI. The estimates of excess capacity, that is, the ability of the OPEC countries to raise production immediately, range

from about 4 million barrels a day up to as high as 6 million barrels a day. Most of the forecasters or analysts that look at that think that Saudi Arabia alone is about half of that capability. So, the Saudis could increase production by at least 2 million barrels a day, maybe as much as 3 million barrels a day.

If the world really needs 2 million barrels a day more right now, the Saudi share within OPEC is typically about 30 percent of OPEC's output the Saudies could easily make up their portion of a large production increase to meet worldwide demand over the next year or two, or whatever.

The problem for the cartel is going to be that a number of countries, Indonesia, Libya, right now Iran, Nigeria, maybe even Venezuela, do not have the capability to go up as much as Saudi Arabia, Kuwait, and the United Arab Emirates. So, that creates a political problem within the cartel in terms of getting an agreement to the production increase.

Chairman THOMPSON. So the Saudis are going to be more likely to want to loosen than some of the other countries?

Mr. SIEMINSKI. Exactly, and the others are going to hold back because——

Chairman THOMPSON. Unless the others are persuaded that their long-term, overall global interests——

Mr. SIEMINSKI. Right. Senator, I would like to point out one last thing, back to this swap idea and the SPR, so that I do not get into trouble with my friends in the producing industry here in the United States. Of the four times that the SPR could have been used in a situation that was out of the normal range over the last 9 years, two of those would have been times when oil would have been added to the SPR.

I would also point out that in a swap, oil in the SPR ultimately would be greater; that is, oil would be added to the SPR, whether it was being lent out in a time of shortage that you have now or borrowed in at a time of excess supply, like we had in 1993 and 1998.

The way the swap agreement would work, taking advantage of the futures market, is that Strategic Petroleum Reserve would get more oil back in both cases than they had——

Chairman THOMPSON. Let me see if I understand——

Mr. SIEMINSKI. So, actually, the taxpayer could get more oil and not have to pay for it.

Chairman THOMPSON. Let me see if I understand this. That is premised on the notion that we would lock in a price, that we would trade expensive oil for cheap oil and we can wind up with more oil at the same price.

Mr. SIEMINSKI. Exactly.

Chairman THOMPSON. What if we are wrong and everyone is wrong, and prices, instead of dropping, increase? We would get ours back at the lower price, but we would be doing it at a time that we would be taking that much money out of the market. Wouldn't that increase even further to the higher prices that would be occurring at that time and exacerbating the problem?

Mr. SIEMINSKI. If you had a second problem at the time that the oil was supposed to be returned a year or two later, if the markets were still in serious or significant backwardation, you could just

simply implement the program again, lend more oil out of the SPR at that time, defer the return.

In fact, Senator Akaka from Hawaii had mentioned the royalty on-line program. Right now, we are actually adding oil into the Strategic Petroleum Reserve, and frankly, I think that that is a good program, but bad timing. I think it ought to be continued, but if I were running the SPR, what I would do is make a deal with those producers to let them keep that and return that oil to me a year from now and I would get more barrels and we would have a little bit more supply.

Chairman THOMPSON. You would just keep doing it until the price dropped?

Mr. SIEMINSKI. Yes, sir; I would. Now, the risk would actually be borne by the futures market. Let the speculators or OPEC pay for this. Let's not let the taxpayer pay for it.

Chairman THOMPSON. Well, I understand that. I am more interested in what it does to the world market, what it would do to the world market. I don't know. Maybe it is not enough to make that much difference.

Mr. SIEMINSKI. This trigger mechanism is one of the things that the Department of Energy could do in trying to implement this. It is a touchy situation. I mean, there are lots of good reasons for not using the SPR, saving it for that "super crisis."

Chairman THOMPSON. For what it was intended for.

Mr. SIEMINSKI. For what it was—yes.

Chairman THOMPSON. I think that is a happy note to end on.

Mr. SIEMINSKI. I was actually thinking about this, Senator, the question of what is that huge horrendous problem that we are going to have. When the SPR was originally set up, it was part of the International Energy Agency agreements to share oil around and the idea was that you needed a countervailing force to OPEC, and I am not sure that we should not consider at least using it from time to time, just to let producers or a cartel know that they cannot get away with everything.

Chairman THOMPSON. OPEC could also be a countervailing force to our decisions to use the——

Mr. SIEMINSKI. They could. The SPR is capable of doing 4 million barrels a day for 90 days. Now, I do not think anybody would recommend that that is what we should do if there is a gasoline price problem in May or June, but you could actually publish right now that if the backwardation in the market—and the other word that is used in the futures market is contango. That is when prices are real low, like $10 in January 1999 and but the futures market is rising, maybe up to $15 a couple of years out.

When backwardation or contango is very steep, the SPR would just automatically release a couple hundred thousand barrels a day or bring in a couple hundred thousand barrels a day if it is in contango, and let the market decide. The DOE could publish a schedule, that at a low level of backwardation, that there would be this much available, if anybody wanted to take advantage of it. As backwardation increases; that is, as that near-term——

Chairman THOMPSON. Everybody would look at that and make decisions based on what they knew was going to happen at a particular time. I think we need to get a whole lot smarter before we

start doing that kind of stuff. But you have the last word. Mr Flynn does, maybe.

Mr. FLYNN. Thank you, Senator. I thought I would jump in on the discussion here. It is a follow-up to what Mr. Ebel was saying before. I think what is very important—that what we are doing here today is bringing a focus on the other alternative uses of energy.

At our authority in New York State, we have been talking about oil heat research, and we believe we are the only State in the Nation that does this type of research. As a matter of fact, at our authority, we do over $1 million a year in oil heat research. But how we do it is we do collaborative efforts, not only with the petroleum industry, but with the gas industry and the renewables industry.

We feel that this type of effort, the collaborative effort, prepares us for the future. The only way that we are going to be taking the emphasis off of the oil industry is leaders such as yourself who are going to have to trumpet the cause to the American people, so that they stop focusing just on oil and that there are other fuel uses that can be used to help us in these dire times.

Chairman THOMPSON. Well, some of these things that you are doing at the State level can be a good example for us.

Thank you very much, gentlemen. This has been extremely helpful to us. Thank you for being here with us. The record will remain open for 10 days following the close of the hearing. We are adjourned.

[Whereupon, at 1:25 p.m., the Committee was adjourned.]

APPENDIX

Testimony of

David L. Goldwyn

Assistant Secretary for International Affairs

U.S. Department of Energy

Before the

Committee on Governmental Affairs

United States Senate

March 24, 2000

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

I am pleased to appear before you today. Thank you for giving me the opportunity to address the current situation in the world oil market, and the short and long-term solutions that have been advanced by the Department of Energy and the Administration to respond to the situation with which we are now faced. The measures that we have taken are substantial and they seek to protect our economic, security and national interests.

The Administration is concerned about oil price volatility. Oil inventories have fallen to levels that could put global economic growth at risk unless OPEC and other producers increase production soon. OPEC will have its chance to act when it next meets on March 27.

Many of you, and your constituents, are asking how did this happen, why are prices so high and what is our government doing about it. My testimony will seek to respond to each of these questions. I hope that I will be able to reassure you and the American people that the Department of Energy led by Secretary Richardson, is concerned, is taking measures to deal with the problem, and that we do have an energy strategy in place to deal with the current situation and to respond in the future.

The Administration is concerned about the impact of the recent price spikes on consumers, businesses, and truckers. When prices jump like this, there's little warning and options are not plentiful. We have been monitoring the situation carefully since we first saw indications of a problem in October and are acting aggressively to address the problem.

But it's important to keep this price spike in context and not overreact with policies that will worsen the situation or create a different set of problems. I am pleased to note that oil futures

prices closed at $27.46 on Wednesday and I feel this is an indication that the market believes that more production is forthcoming.

On the whole, competitive markets have provided consumers low average prices, but clearly there is concern about the price volatility that we have been seeing in the market. This volatility brought us $10 per barrel a little over a year ago and over $30 per barrel oil earlier this month. This volatility hurts both consuming and producing nations. We felt the sting here at home. In America's oil patch, wells were shut in and independent oil producers were going bankrupt when prices were low.

The nations of the Middle East watched $50 billion of investment vanish in Asia, and their oil revenues plummeted. In Venezuela, 70 percent of annual federal revenue was at risk. Other developing countries were harmed by dramatic decreases in oil revenue. What we want is a more stable market, and our energy policies are focused on ensuring stability in the long-term and addressing the recent volatility that we've been seeing.

Let me take a moment to briefly outline the basis for our energy policy.

Our energy policy is based on:

- Market forces -- not artificial pricing.
- Pursuing diverse sources of supply and strong diplomatic relations with energy producing nations.
- Working to improve the efficiency of production and use of traditional fuels through new technology development.
- Working to diversify our energy sources through long-term investment in alternative fuels and energy sources.
- Maintaining and strengthening our insurance policy against supply disruptions – the Strategic Petroleum Reserve.

These are the foundations of the Clinton Administration's energy policies – and over the long-term they work to provide affordable, secure supplies of energy.

The Reason Behind the Hike

As you are well aware, people are hurting with today's higher prices and we need to address the underlying problem creating these artificially high prices.

The problem we're facing today is low inventories caused by cutbacks in production by OPEC nations. We have low stocks at the same time the world is consuming 75 million barrels per day while producing only 73 million barrels per day. I think it is important to note that these production cutbacks were not intended to be antagonistic. Rather, they were a defensive response to the extremely low prices last year that were eroding the economies of the oil producing nations. While OPEC may have overshot their mark, I think the Secretary has convinced most members that volatile or excessive prices are not in anyone's best interest.

What we need to do is increase production, rebuild stocks, and work to increase efficiency in the way we use energy. That means looking for oil producers who have what's called "excess capacity" -- the ability to increase production immediately without additional drilling or exploration. And it means reducing the energy waste in our economy.

OPEC has 5.5 million barrels per day of excess capacity and that is why Secretary Richardson and others have been working intensively with OPEC nations to get them to bring that excess capacity on line. And we've been making some very important progress in this area.

Energy Diplomacy

The United States was out in front in recognizing the problem. Signals from our Energy Information Administration prompted the beginning of early diplomatic action. And because of our efforts we are no longer the lone voice calling for action – there is now a growing consensus among leading oil producers to increase production.

I think there has been a shift of producers' views in the last month, in fact, since I testified before the House Committee on International Relations last month. Just a month or so ago, many energy producing nations believed there was no problem in the oil markets – that stock levels were adequate, prices were fine, the world's economy was not suffering.

Secretary Richardson went to Mexico, Norway, Saudi Arabia, Kuwait, and met with the minister from Venezuela. I accompanied him on a number of these stops. He returned from this diplomatic mission with strong joint statements that reflected a common understanding that volatility is bad -- that stability is in the interest of producing and consuming nations. And an agreement from these key producing nations to reevaluate data on current oil market conditions to help avoid market volatility and preserve world economic growth. The momentum continues: Kuwait, Venezuela, Saudi Arabia, Iran, Mexico, and Norway are now all saying they support production increases.

This week, the Secretary's energy diplomacy continues in earnest. He has visited Nigeria, Algeria, and Norway and met with the Organization for Economic Cooperation and Development (OECD) Ambassadors in Paris. We have worked closely with the International Energy Agency, the OECD, and the European Union. And, last week I met with senior officials in Japan and Korea. It is clear that the concern over high prices has reached outside of our borders. We urged the ministers to increase production levels to address the near record low stock levels and to understand that the potential consequences - - a global economic slump, increased inflation, and a bad investment environment are as dangerous for them as they are for us. They know they risk decreasing demand as well as a loss of market share as other producing nations start competing for business from reliable partners.

So we're now in an environment where the question has gone from if or when to increase production to how much.

Why Markets Should Dictate Prices

The Clinton Administration firmly believes that consumers – families, truckers, businesses – are best served when markets dictate prices. We are opposed to government intervention in these markets. I'm sure that many of you remember what happened in the 1970s when the government tried to use price controls to deal with rising oil prices – the results were gas lines and shortages.

Allowing market forces to work – even when dealing with a cartel like OPEC – is the most effective approach over the long run. History has shown that when cartels limit production and raise prices they lose market share.

For example, since the U.S. government has taken a more market-based approach, OPEC's share of world oil markets has fallen, from 49% in 1977 to 40% today. Last year, we imported 4.85 million barrels of oil per day from OPEC, down 22% from the 6.19 million barrels of oil per day we imported from OPEC in 1977.

Improving energy security

Secretary Richardson has worked to improve our nation's energy security since taking the helm at DOE. He was concerned about price volatility when prices were at $10 a barrel and remains concerned today with prices topping $30. When prices were at $10 a barrel, he was concerned about the effects on domestic producers and in February 1999, we took several steps to strengthen domestic production and improve America's energy security for the long term.

To increase our nation's energy security and shore up our insurance policy against supply problems, we began adding 28 million barrels of royalty oil to the Strategic Petroleum Reserve. When prices rose sharply, we renegotiated these contracts to keep more oil in the domestic market.

To support domestic production, we streamlined procedures, provided administrative and accounting relief to small producers, and invested in technology for recovery in endangered or hard to produce oil reservoirs. We started an energy efficient motors pilot program in six states to reduce use of electricity and thereby lower costs of oil production. We established a marginal well producer program to assist small producers; and helped establish an on-line oil and gas permitting pilot program in Texas, to eliminate costly paper filings and permitting.

Diversity of Supply

We've also been working to diversify world oil supplies so we're not dependent exclusively on any one region. This means:

- Maintaining strong relationships with the major oil and gas producing nations, and encouraging their continued movement toward open markets, privatization and regulatory reform;

- Promoting the development of new sources of supply and the infrastructure to support them – in the Caspian and Africa, sponsoring Energy Ministerial meetings; promoting regional integration and infrastructure;

- Encouraging the creation and maintenance of strategic reserves, through organizations like the IEA and APEC; and

- Investing in domestic alternative fuels such as biofuels.

There's concrete evidence that this approach is working. Since 1974, U.S. petroleum consumption has increased 17% while the economy has grown nearly 120%. Our top supplier of oil varies from week to week among Canada, Venezuela, Saudi Arabia and Mexico. We are less dependent on OPEC oil and last year imported crude oil from 40 different countries.

Domestic Response

I've talked a lot about what we are doing internationally to deal with this situation and I would now like to turn to what we are doing domestically.

This past weekend, the President announced a series of steps to address the current situation, strengthen our energy security, and reduce our reliance on foreign oil. To reduce the likelihood that future heating oil shortages will harm consumers as they did this winter, the Administration is proposing the creation of an environmentally sound home heating oil reserve in the Northeast that could supply additional heating oil in the event of a shortage. To ensure that we have the necessary tools available in the event of a crisis, the President also called on Congress to re-authorize the Strategic Petroleum Reserve (SPR) through enactment of an extension of the Energy Policy and Conservation Act, due to expire next week.

The President also proposed a comprehensive package of tax incentives to improve our energy efficiency, to promote the use of alternative fuels, and to support increased domestic oil production. He also called on Congress to fully fund the more than $1 billion that the Administration has requested to accelerate the research and development of more efficient energy technologies.

Over the past month, the Administration has also made a number of aggressive, short-term moves to ease the current situation. The President released almost $300 million in funds for low-income individuals to pay their higher heating bills. He asked for $600 million more in Low Income Housing Energy Assistance funds and he's seeking an additional $19 million from Congress for low-income home weatherization. We've addressed the issue of oil supply through a variety of measures including: increased Coast Guard support for tankers, small business loans for heating oil distributors and other small businesses impacted by high prices, and encouraging refiners to produce as much heating oil as safely possible.

The President also directed the Department to study the longer-term issue of heating oil supply shortages and price hikes by examining possible ways to reduce regional reliance on heating oil, mainly through the increased use of natural gas. We are also examining the impacts of

interruptible natural gas contracts on heating oil supply. These studies will be completed late next month.

We are also making important investments to increase efficiency and the use of alternative fuels. If we continue to follow current policies on advanced vehicle technologies and alternative fuels, we can reduce oil consumption by 700,000 barrels per day by 2010 and 1.5 million barrels per day by 2020.

We're working to:

- reduce the cost of production of ethanol by accelerating development of new plants to produce ethanol from agricultural forest residues and wastes;
- replace diesel-generated electricity, particularly in rural areas, with renewable energy sources;
- substitute natural gas vehicles for petroleum-based ones, particularly in fleets and niche markets;
- accelerate the development and use of high-efficiency automobiles under the Partnership for a New Generation of Vehicles to triple fuel economy for mid-size vehicles without sacrificing comfort, convenience or safety;
- accelerate R&D to develop more fuel-efficient trucks, ranging from pickups and sport utility vehicles to 18-wheelers -- something that will help truckers hold costs down;
- improve building energy efficiency, particularly where oil is used, through programs like low-income weatherization; and
- improve the federal government's own energy use (2% of all U.S. energy) in 500,000 buildings and 520,000 vehicles through enhanced energy efficiency measures and the use of alternative fuel vehicles.

These are concrete measures whose impact in the future can be significant.

Future Responses

We have already begun the process of analyzing the conditions which have led to the current situation and we want to look closely at what we, as a Department, might do differently in the future should supply shortages occur.

The Department has begun the process of re-establishing an Energy Emergency Office to enable the federal government to work more closely with states to anticipate, plan, and respond in an immediate and more coordinated way when energy crises occur, including heating oil shortages, power outages, and pipeline emergencies. The heating oil reserve proposed by the President will reduce the likelihood that future heating oil shortages will harm consumers in the Northeast.

In January, we convened a meeting in Houston of renowned oil market experts to look at the issue of oil data adequacy and transparency, with a focus on how to get better information on world oil inventories. And the Secretary has suggested the development of global data regimes to give producing and consuming nations an "early warning system" when supplies and production levels get out of balance with demand and consumption needs.

Conclusion

Mr. Chairman, I hope that my review today of the current state of the oil market and our response will reassure you and the members of your Committee.

In just a few short days, the OPEC ministers will meet in Vienna. We expect OPEC and its allies to agree to increase oil production effective April 1st. The oil market seems to share this view, as oil prices have come down over the past two weeks, falling below $30 per barrel. Still, the question remains as to what the magnitude of the production increase and the all-important timetable will be. With enough additional supply, we might expect some further easing of crude oil prices in the next few weeks, though it will take a while for the increased oil supplies to reach customers.

We will have to assess what OPEC does, what non-OPEC producers do, and how the market reacts. Secretary Richardson and the rest of the Administration will assess what additional steps, if any, need be taken at that time.

We have seen in the past few weeks the value of maintaining close consultative contacts with oil producers with which we share broad common interests. We intend to build on this experience and make these discussions part of our regular policy dialogue with oil producing nations.

This concludes my prepared testimony. I would be pleased to answer any questions.

STATEMENT OF

JAY HAKES

ADMINISTRATOR

ENERGY INFORMATION ADMINISTRATION

Increases in Crude Oil, Distillate Fuels and Gasoline Prices

I wish to thank the Committee for the opportunity to testify on the status of the global crude oil market and its effects on the U.S. heating oil, diesel fuel, and gasoline markets and prices. As I will illustrate, world demand exceeded crude oil production in 1999, largely as a result of the decline in production by the Organization of Petroleum Exporting Countries (OPEC) and several other exporting countries. Inventories were used to meet the excess demand, and prices rose in response. Today, world inventory levels are very low, resulting in high prices to consumers and leaving markets vulnerable to price spikes, such as that experienced earlier this year for heating oil and diesel fuel in the Northeast.

U.S. Dependence on Petroleum

Today, the United States is still heavily dependent on crude oil, in spite of the growth in use of other fuels like natural gas and coal. In 1998, petroleum supplied 39% of our energy needs. Since 1985, domestic crude oil production has been declining while oil product consumption has been increasing, resulting in a growing reliance on imports. Oil products are generally delivered at moderate average prices, that is, at prices that increase at or less than the rate of inflation. Because crude oil prices are set in a global commodity market, reflecting worldwide supply and demand, crude oil and thus product prices can take dramatic swings between low and high points, when overall supplies fall significantly above or below global demand.

Crude Oil Market and Recent Price Increases

Crude prices have changed significantly over the past year. Prices for West Texas Intermediate, a benchmark crude oil, have risen more than $20 per barrel (48 cents per gallon) from under $12 per barrel in mid February 1999 to peak over $34 per barrel on March 7, 2000. Prices have moderated somewhat with the April delivery futures contract expiring at $28 per barrel this past Tuesday. To put this in perspective, while $34 per barrel represents the highest price since the Persian Gulf War, crude oil prices peaked in 1981 at $70 per barrel in today's dollars ($39 per barrel in nominal terms). Recent EIA forecasts show that these high prices have resulted in a decline in OPEC's market share of over 1% from fourth quarter 1999. Non-OPEC production in the fourth quarter was higher than expected, indicating higher oil prices may be stimulating more non-OPEC production than many analysts predicted.

Nevertheless, crude oil markets tightened throughout 1999 as OPEC and several other oil-exporting countries reduced supply, and, at the same time, recovery of Asian economies increased demand growth. In 1999, world oil demand exceeded production by over 1 million barrels per day for the year, reducing world inventories by nearly 400 million barrels. If OPEC were to keep production in the year 2000 at the levels seen in the first quarter, EIA estimates the shortfall in 2000 could be up to 2 million barrels per day. Should such production levels be sustained, the resulting higher prices would have adverse impacts on inflation and economic growth.

During 1999, crude oil prices rose faster than product prices, reducing refining margins. The squeeze on margins, on top of high crude oil prices, encouraged refiners to constrain crude oil purchases, restrict product output, and draw down inventory. By the

end of 1999, world crude oil and product stocks sank to very low levels, and U.S. inventories were no exception. This pattern can be clearly seen in Figure 1.

Heating Oil Price Spike

Retail heating oil and diesel fuel prices (distillate prices) climbed steadily from early 1999 through the middle of January 2000, largely as a result of increases in crude oil prices. But distillate prices in the Northeast[1] turned sharply upward in the third week of January. In a three-week period, New England residential heating oil prices, as shown in Figure 2, rose 78 cents (66 percent) to $1.96 per gallon. During the same three-week period, New England retail diesel fuel prices (Figure 3) rose 68 cents per gallon (47 percent), to peak at $2.12 per gallon. While Northeast prices were surging at the end of January, heating oil and distillate product prices in other parts of the country rose relatively little.

Prices peaked in early February, and are now dropping. By March 13 (the most recent data available), New England residential heating oil prices fell 61 cents to $1.35 per gallon. As of March 20, New England highway diesel fuel was $1.55 per gallon, down 57 cents from its peak. Since these are similar products, their prices usually move together.

Retail heating oil and diesel fuel prices follow the spot distillate markets, which had been driven by crude oil prices until recently. Figure 4 shows that spot crude oil prices for West Texas Intermediate (WTI) changed relatively little, even as No. 2 heating oil spot prices in the Northeast spiked dramatically. New York Harbor spot heating oil prices rose from about 76 cents per gallon on January 14 to peak at $1.77 February 4

before falling back. Gulf Coast prices did not spike, but were probably pulled slightly higher as the New York Harbor market began to draw on product from other areas, again indicating the Northeast focus of this problem.

The late-January heating oil and diesel fuel price surges in the Northeast resulted from a unique combination of low inventories, weather, and supply problems. Low stocks leave little cushion to absorb sudden changes in supply or demand. Distillate stocks fell rapidly in late November through December as high crude oil prices and margin pressure discouraged production. By the beginning of January, East Coast inventories were running almost 4 million barrels, or 8 percent, below the low end of the normal range.

During the last half of January, cold weather in the Northeast not only increased demand, but also caused supply problems, with frozen rivers and high winds hindering the arrival of new supply. It was reported that utilities were buying distillate both for peaking power and, along with industrial and commercial users, to substitute for interruptible natural gas supplies, further adding to the market pressure.

Thus, with new supply being delayed and little inventory to cover the increased demand, prices spiked. Within weeks, a flood of imports attracted by the higher prices, along with domestic resupply, stopped the inventory decline, and prices dropped substantially. Although stocks remain low, with currently mild weather and only a few weeks of the traditional heating season remaining, a price surge like that seen in late January is unlikely.

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[1] The Northeast includes New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont) and the Mid-Atlantic region (Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania).

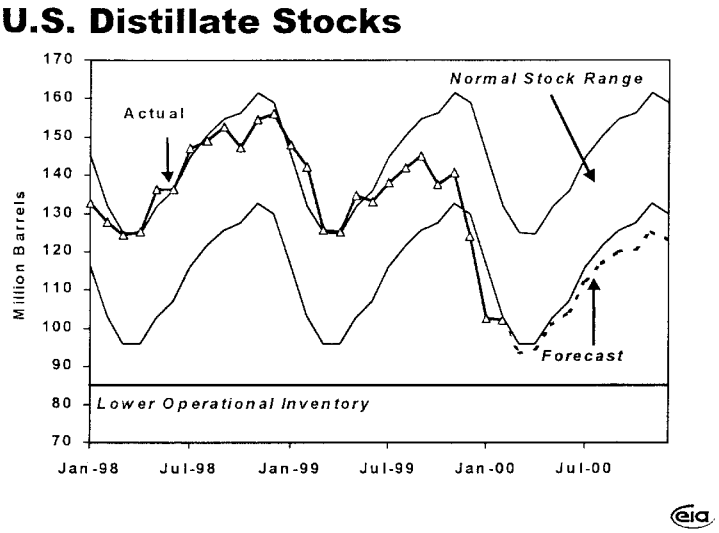
I would like to conclude my testimony by focusing on the outlook for gasoline. The tight crude oil market is also affecting the gasoline market. U.S. gasoline prices averaged $1.53 this past Monday, an increase of 26 cents per gallon since the beginning of this year. Today, both U.S. crude oil and gasoline stocks are at very low levels (Figure 5) -- levels not seen for decades during this time of year. The same squeeze on margins that brought distillate stocks down to low levels also reduced gasoline stocks.

I would like you to focus on two time periods -- spring and summer. During March and April, refineries need to increase crude oil inputs by over 1 million barrels per day (Figure 6). With low stocks and a market short on crude oil, the situation is ripe for gasoline price volatility. Spot gasoline prices are already reflecting the tight gasoline supply-demand balance. In early March, spot gasoline prices on the Gulf Coast averaged almost 20 cents per gallon higher than crude oil prices -- a spread that is about 2 times the average for this time of year. While the Gulf Coast gasoline spread has fallen back now, the swing illustrates the volatility that can accompany low stocks.

But even after we get through the spring, we may see price volatility this summer as well. EIA expects to see high refinery utilization rates on top of precariously low gasoline stocks. This combination leaves little room for the unexpected. Unplanned refinery outages, delivery interruptions, import delays or demand increases can create price surges above levels shown in the EIA forecast. EIA is currently projecting regular gasoline prices to peak at $1.56 per gallon this summer. Price volatility can result in a 20-25 cent per gallon price surge such as those seen in California historically, which brings the price to $1.80 for a time. Although these prices are far from record highs in real terms, they have risen rapidly over a short period of time, attracting a great deal of consumer attention.

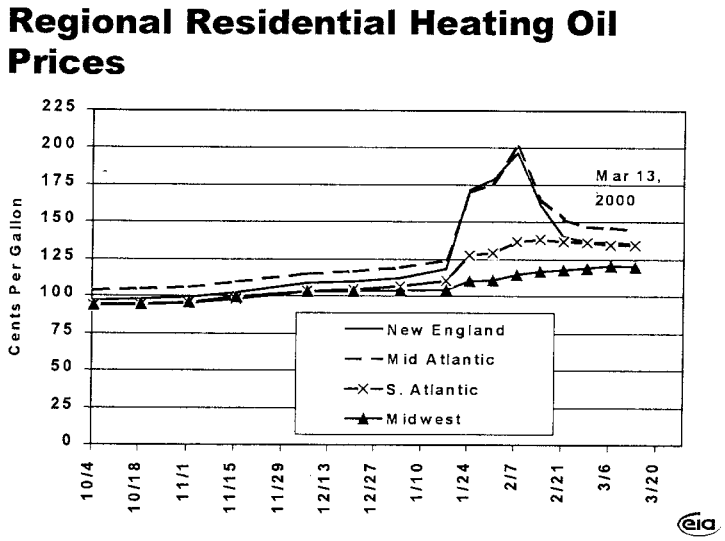
This concludes my testimony. I would be glad to answer any questions that you might have.

Figure 1



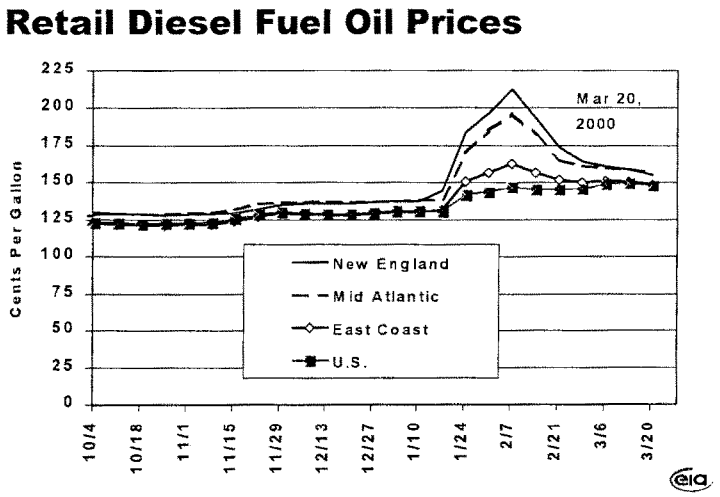
Source: Energy Information Administration

Figure 2



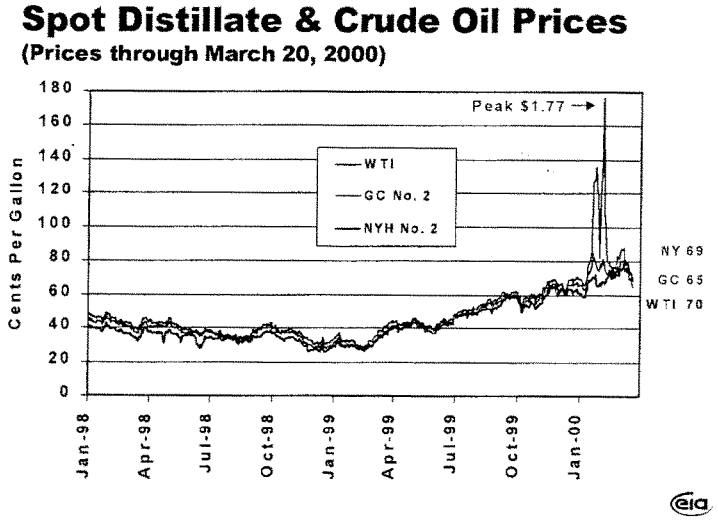
Source: Energy Information Administration

Figure 3



Source: Energy Information Administration

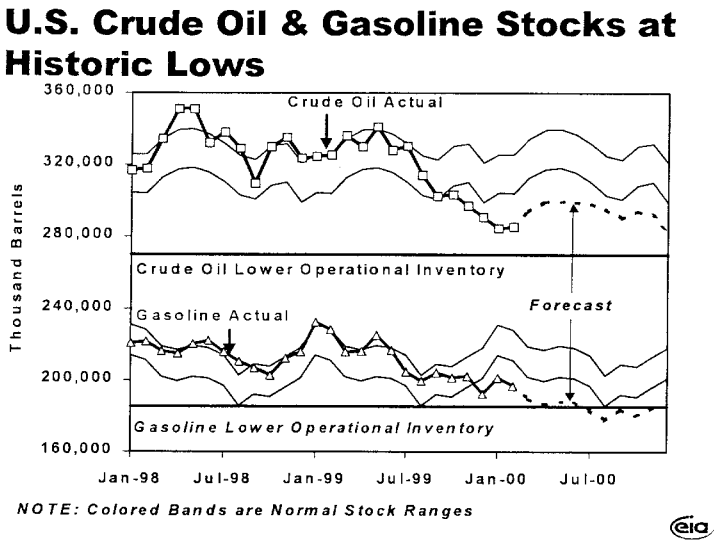
Figure 4



Note: WTI – West Texas Intermediate; GC -- Gulf Coast; NYH -- New York Harbor; No. 2 – No. 2 Fuel Oil

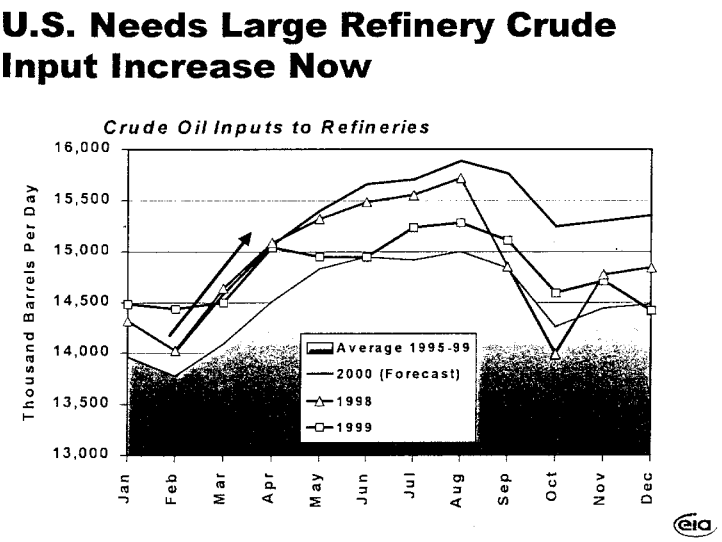
Source: Reuters

Figure 5



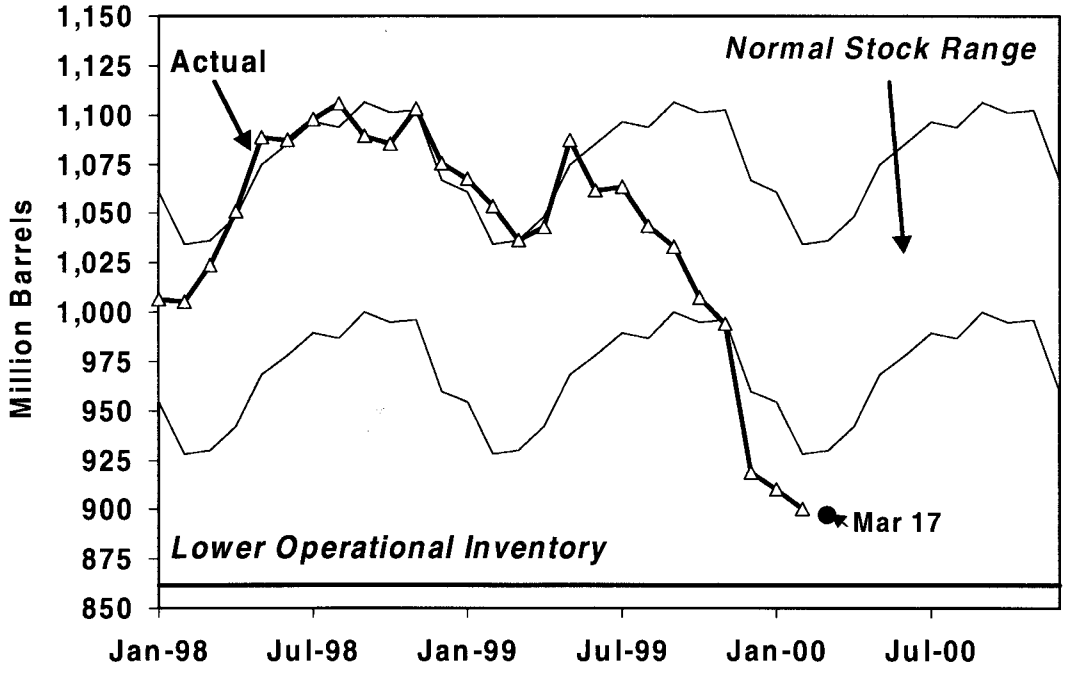
Source: Energy Information Administration

Figure 6



Source: Energy Information Administration

U.S. Total Petroleum Inventory



Prepared Statement of the American Petroleum Institute
Submitted by Red Cavaney, President and Chief Executive Officer

The American Petroleum Institute (API) is pleased to have the opportunity to present a statement on the oil supply situation in the United States, and on the impact of rising prices on consumers of petroleum products. 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.

At the outset, we wish to emphasize that America's oil and natural gas industry is committed to continue supplying American consumers with a reliable and affordable supply of energy for all their needs. We also pledge to provide consumers with the information they need about the current gasoline price situation and any concerns regarding fuel supply.

We share your concern about the current oil supply situation, and your desire to reduce its impact on your constituents. We are taking what actions we can to improve conditions, and also have suggestions to offer for actions that can be taken by government and by consumers themselves.

Let me take a moment to frame the situation. Contrary to the views of some, the age of petroleum is far from over. While research and development continue on alternative sources of energy, gasoline and diesel fuel remain the most cost-effective and prevalent fuels for our transportation needs. To be specific, 97

percent of all transportation is fueled by petroleum products. These fuels, and the infrastructure built to fuel a nation of cars and trucks, allow us to get to where we need to go. Whether we need to go to work, take a school bus, get produce to market, or fly for business or pleasure, oil plays a crucial role in our daily lives – and will continue to do so for decades to come.

Four important points should be understood about the current situation:

- 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 have risen rapidly, retail prices, after adjusting for inflation, are generally well below the prices of the early 80s.
- Finally, 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 as we approach the prime drive season when the demand for gasoline is at its highest.

Let me address these points in more detail:

The price increases we are experiencing were brought on by short-term shocks that resulted from sudden changes in supply and demand. Just as prices are up now, they will turn down when factors change. Already, the price of crude oil has dropped $5.00 over the past several weeks.

In a free-market economy, we have seen time and again that price movements ultimately create balance between supply and demand. We are confident that if we continue to allow the marketplace to work, this balance will be maintained. And, history shows us that the longer-term cost of the product is less than otherwise would be the case.

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 commend the federal government for taking 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 15 months have 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 has contributed to increases in the prices for petroleum products of about 70 percent. These

changes have 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 set records for the month of February, and distillate oil production may set a record for this heating season.

A fair question is: "How did we get to this point?"

The answer is relatively straightforward. We have experienced twenty 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 about 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.

I would like to share with you how 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 set a record for the month of February. It was 14 percent above average, approximately about one million barrels more per day.

Refinery production of distillate oil (such as heating oil and diesel fuel) set a record for the month of February as well. It is on pace to set a record for this heating season.

Refinery utilization is currently above average for this time of the year and exceeded 90 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 at the present time.

Because of the world prices for crude oil, we are faced with higher product prices, however all customers are being served.

Given these conditions, what should be done?

What government can do

The most important action that the government can take is to provide information to citizens on petroleum market conditions. In that vein, we are urging the Energy Information Administration (EIA) of the U.S. Department of Energy to convene a "Summer Fuels Conference" to evaluate the status of gasoline, diesel and jet fuel production and inventories. We are also asking that the EIA expand the scope of its "Winter Fuels Conference" next fall to give the agency the opportunity to share information on winter fuel production, inventories and imports with all stakeholders.

API is also eager to provide additional information on market conditions. Americans have a right to know as much as possible about this environment. Our industry is committed to working closely with the Department of Energy to monitor the situation and give Americans the latest and most accurate information available. We have participated in the Department of Energy's meetings on heating oil conditions and stand ready to provide whatever information is needed on current market conditions. API continues publishing

its *Weekly Statistical Bulletin* covering production, imports, inventories and other data. Educated consumers are our best asset. We will seek to develop a joint effort with DOE to provide consumers the best and most up-to-date information available, and to help them explore ways to better cope with the fluctuation in prices.

In the short term, the government can also consider a number of actions to help prevent another recurrence of the home-heating oil situation. It can increase funding for the Low-Income Home Energy Assistance Program and more quickly and equitably release funds; and consider expanding Small Business Administration emergency loans to home heating oil dealers and truckers.

We also think it's imperative that Congress quickly reauthorize the Energy Policy and Conservation Act that provides authorization for the Strategic Petroleum Reserve and U.S. participation in the International Energy Agency.

In the long run, government can and should also take steps to strengthen our domestic oil and natural gas producing industry. Because the U.S. imports some 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. 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 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 thoroughly 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 less 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 8,000 feet in areas far offshore.

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. Refineries need flexibility to respond to the fast-paced changes in today's world. Over-regulation reduces flexibility. A soon-to-be proposed regulation 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 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.

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. With little evidence that unilateral sanctions produce desired outcomes, is there not a better way?

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.

What consumers can do

While it may be easier to see what government policymakers and the industry can do to improve the current situation, many consumers can help reduce the impact on their budgets by embracing ways to use less fuel. The industry will be doing its part to share advice for conserving fuel use in the hope that some families can benefit:

Examples of the types of changes drivers can make include: maintaining their vehicles properly, combining trips to reduce fuel consumption from cold starts of automobiles; accelerating slowly and decelerating rather than multiple braking to stop; and, in a two-car family, having the family member who does the most driving use the most fuel-efficient car. Many families will be surprised at the fuel economy benefits they can achieve from these simple changes. While they certainly won't offset the higher cost of gasoline, they should help families get where they need to go at less cost until purchasing conditions improve.

Conclusion

In closing, we share your concern for the health and welfare of your constituents. America's oil and natural gas companies have a long and proud history of providing this country's consumers 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 petroleum products have kept America's factories running and provided the fuel to move goods from manufacturers to retailer and, ultimately, into America's homes and offices.

It is because of this history of service that we understand the impact of rising prices on this nation's consumers – our customers. We are cognizant, too, of the

concerns of our nation's truckers and farmers, who also have been adversely affected by these increases in fuel prices.

Finally, we recognize that you are faced with increasing demands to address this situation. To the extent to which we can help in your efforts to better understand the possible effects of the many proposed actions under consideration, we are here to assist you.

3/24/00

Statement of Dr. Richard N. Haass
Vice President & Director of Foreign Policy Studies
The Brookings Institution
on
Economic and Security Implications of Oil Price Increases
before the
Senate Committee on Governmental Affairs
March 24, 2000

Mr. Chairman:

I would like to thank you and your colleagues for the opportunity to appear before this committee. The bulk of my statement will focus on national security aspects of energy, especially as they relate to matters of price and supply of oil.

Let us be clear on why we are meeting here today. It is because of the large and relatively sudden surge in oil prices, from just over $10 a barrel little more than a year ago to around $30 today. This has translated into a dramatic increase in retail gasoline prices, from less than $1 a gallon throughout most of the United States to more than $1.50. In many cases, these increases have caused real hardship for both individuals and businesses.

I mention all this at the outset of my statement because it is important not to confuse *higher* oil prices with *high* oil prices. Recent prices, while obviously higher, are not particularly high by historical standards, especially when they are adjusted for inflation. In real terms, and despite recent increases, today's energy prices are no higher (and, compared to some years, are actually lower) than they were over the past nearly three decades and in the early 1980s in particular.

It is important, too, to keep in mind that one reason prices are so much higher today than they were only 12 months ago is that the price then had fallen to a level that represented a modern nadir. A number of factors accounted for that situation, including the Asian economic crisis and resulting falling of demand for oil, warmer weather patterns, and increases in oil output from a number of producing states, including but not limited to OPEC members. Not surprisingly, it was a change in a number of these same factors—above all, in the revival of Asian economies and the implementation of the decision by OPEC oil ministers meeting in March 1999 to reduce oil output by some two million barrels a day—that brought about a different supply/demand balance in the world and triggered the higher prices.

But do higher prices constitute a national security problem? Within limits—and we are nowhere near such limits—I would suggest not. This is not to say that higher energy prices are without impact, be it at a macro level on inflation or at a micro level in complicating the balance sheet of businesses or the budgets of families. But today's prices in and of themselves do not threaten American or global prosperity. Indeed, what is normally more important than the specific price of oil is price stability and predictability. Both are needed for planning and budgeting.

This conclusion has several consequences for policy. First, it suggests that use of the Strategic Petroleum Reserve would not be warranted under current circumstances. The SPR ought to be reserved to deal with true supply crises, not price-related problems. Second, the United States should engage in regular consultations with OPEC producers, who collectively account for some 40% of the oil produced in the world. Such talks cannot determine what might be described as market fundamentals—technology and larger economic trends will account for these—but they can prove useful in dealing with major market fluctuations such as those we have seen over the past year.

Implicit in this suggestion is an acceptance of the notion that low prices *per se* should not be a goal of American energy policy. I say this for reasons that go beyond the adverse impact of low prices on American businesses and communities that depend on income from oil production or from the reality that low prices encourage consumption with all that does to worsen the balance of payments and the environment. Low prices also discourage exploration and production, which over time all but guarantees supply shortages and higher prices. In addition, low prices, such as existed a year ago, cause great economic, social, and political hardship for producer countries, including Mexico and Saudi Arabia, whose stability is arguably a vital national interest of the United States.

In this regard, I would also advise that the Senate reject the notion being put forward in the House of Representatives that the United States threaten sanctions (reducing or cutting off economic and military assistance) against those producers who join to constraint output. Such sanctions would in many cases be redundant, in that a good many U.S. economic sanctions already target countries that happen to produce energy. But what is more, such a confrontational approach would be inconsistent with the reality that we need to cooperate with many of these same governments on a range of national security and economic undertakings ranging from efforts to counter the flow of drugs and weapons of mass destruction to the need to promote their ability to work with us against internal and external challenges to their security.

This last point leads naturally to another, namely, that today's understandable focus on price should not obscure what is arguably the more important consideration (from the national security perspective) of supply. What matters is that there is enough oil available to meet the bulk of the world's demand. It is not simply that the United States now imports more than half the oil it consumes daily, but also that the U.S. economy could not prosper amidst a world recession, something that would be triggered

by a shortage of supply even if U.S. import needs were somehow met. In the end, there is only one global oil market; major supply shortages from any source will affect us all.

There is no single answer or solution to this challenge. The policy response cuts across what is normally seen as the separate spheres of foreign and defense policy, economic policy and domestic policy, and involves such matters as maintaining and tapping strategic reserves, encouraging conservation, diversification of energy sources, multiplication of oil producers, progress on the Arab-Israeli front, international sharing or pooling arrangements, adequate military preparations, and encouraging producers to undertake needed social, political and economic reforms so as to make domestic challenges less likely.

Somewhat more specifically, this interest places a premium on the stability of the Persian Gulf area, home to approximately two-thirds of the world's proven oil reserves, and to Saudi Arabia in particular, for now and the foreseeable future the world's single largest producer of oil. This in turn argues for continued efforts to weaken—and ultimately change—the Iraqi regime, the greatest threat to that region's stability. It also suggests the need to reconsider current U.S. policy toward Iran, a policy that all but precludes U.S. participation in the Iranian oil industry. Concerns over Iranian support for terrorism and development of weapons of mass destruction are well founded, but movement in the price of oil overwhelms any impact of U.S. sanctions. U.S. oil companies are being penalized far more than the government of Iran is being constrained.

Last, let me end where I began, on the matter of price. It was just a year ago this month that *The Economist* ran a cover story titled "Drowning In Oil" in which it thoughtfully explained the mixed consequences of low energy prices and predicted that we had yet to see the bottom. As we know, that prediction proved incorrect. But where will price move with time? As Yogi Berra is alleged to have said, predictions are always difficult, especially about the future. What is certain is that world demand for oil is growing. But several other factors are also at work. New technologies are increasing the amount of oil that is known and can be recovered. Meanwhile, other new technologies—for example, in the automobile sector—will reduce the use of gasoline. And changing economic patterns are weakening the link between economic growth and energy consumption.

In short, no one should make predictions in this realm with any degree of confidence. Prices for oil in world markets are already more than 10% below where they were just a few weeks ago. Clearly, what is moving the price is the expectation that OPEC oil ministers will agree to boost production when they meet in a few days. Such price movements are both inevitable and acceptable, and do not raise national security problems. But it would help economic policy and smooth out foreign policy if more were done to reduce price volatility on the scale we have recently experienced.

Thank you.

Center for Strategic & International Studies
Washington, DC

Comments on the Economic and Security Implications Of Recent Developments in the World Oil Market

By

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Before the United States Senate
Committee on Governmental Affairs

Washington, D. C.
March 24, 2000

It has been more than twenty-five years since the Arab oil embargo disrupted world oil supplies in October, 1973. How has the United States fared since then? Not too badly, in fact. Our per capita use of oil has come down but so then has domestic crude oil production. However, our population growth has more than offset the decline in per capita oil use. Which unfortunately translates into much higher dependence on oil imports, which now surpasses 50 percent. We are truly hooked on cheap oil.

During years past and in response to supply and price crises, we have worked our way through price controls, through oil import quotas, through a Synthetic Fuels Corporation, and through subsidies and tax credits for various kinds of alternative sources of energy. But then, the market eventually adjusts itself, and the remedies of the day go back onto the shelf, to be trotted out at another time when prices rise to levels unacceptable to consumers or fall to levels unacceptable to producers.

Oil Imports and National Security

I know of no reasonable scenario which does not foretell further substantial reliance by the United States on foreign oil. Let me remind you that in 1973, the United States imported 6.2 million b/d of crude oil and petroleum products, accounting for 36 percent of total consumption. Do you also recall that, three weeks after the oil embargo of 1973, President Nixon announced that by the end of the 1970s, the United States would have developed the potential to meet its own energy needs without depending on any foreign energy sources? How? Project Independence sought to achieve this goal by increasing domestic oil supplies, primarily through higher prices, and by rapidly expanding the development of nuclear energy. Project Independence now gathers dust on bookshelves around Washington, long forgotten, long replaced by the impact of unforeseen events.

Today, at the beginning of the new millennium, more than 50 percent of the oil we consume originates outside the United States, produced in countries whose national interests may not always coincide with ours.

Does that mean our national security is more in jeopardy today than it was in the past, simply because of our higher dependence on imported oil? The easy answer of course would be "yes." Such high dependence on the foreign supply of any commodity as essential to our way of life as oil clearly is unacceptable.

We should ask at this point, how do we define national security? National security may mean different things to different people. George Kennan has offered perhaps the least complicated definition: "the continued ability of this country to pursue its internal life without serious interference."

If we accept Kennan's definition, then oil imports do threaten national security, for the prospect of disruption, for whatever the reason, raises the prospect of serious interference in the ability of the United States to pursue its internal life. And the greater the dependence, the greater the prospect for interference.

However, the general public does not see it that way at all. Indeed, in their judgement, what is the problem? Not so many months ago gasoline was as cheap as most buyers could remember. After

all, isn't that the way most consumers judge the oil industry? When they pull into their favorite filling station, if they do not have to stand in line, if the price is basically the same as it was last time, then there is no problem. The fact that more than one-half the crude oil refined to produce the gasoline they buy comes from someplace outside the United States is of no concern.

But let the price of a gallon of gasoline rise even marginally, and dark clouds begin to appear. And when gasoline prices move beyond $1.50 per gallon, enroute to $2.00, then government intervention is called for, now, not later.

Nor does our government see a problem. In December 1996 the Government Accounting Office released a report entitled *Evaluating U.S. Vulnerability to Oil Supply Disruptions and Options for Mitigating Their Effects.* In sum, the GAO found that the benefits of imports exceeds the costs of imports, and that substituting domestic oil production for imports does not lower costs.

Thus, for most policy makers today, there seemingly is no link between oil imports and national security. To the contrary, imports of comparatively cheap foreign oil are deemed advantageous to our economy. With only limited exception, there is little interest in Congress in taking steps to reduce our dependence.

Energy Wars

Recently one of my colleagues at the Center raised a particularly intriguing question: Are energy wars still possible?

In the past, he said, discussions of energy wars centered around three factors: the level of U.S. dependence on oil imports, the memories of the oil embargo, and scenarios involving massive interruptions in the flow of oil out of the Persian Gulf. But, he cautioned, the situation today is more complex, although these factors still apply.

Oil is now a global commodity, he reminded me. The United States as a major importer is vulnerable, and we will have to compete for what is left of world supply in a crisis. Yes, the Persian Gulf still holds the bulk of world oil reserves, and yes, these countries have become heavily dependent on oil income, but the bad news is that regional tensions still exist which can explode into regional conflict and civil wars. Interruption of oil flows out of the Gulf is still our worst case scenario. Interruption can come about in 2 ways: either disruption in the production of oil, or closure of the Strait of Hormuz, through which more than 14 million b/d of oil passes **every day.**

When considering the world's growing appetite for oil, where will that oil come from? It will come from the Middle East, because that is where the oil reserves are. And as my colleague emphasized, today's rogue states--Iran, Iraq, Libya--had well better be tomorrow's suppliers, if supply is to match anticipated demand.

That finding comes out of our **Strategic Energy Initiative** project. I would like to share with you certain of our other findings, and I offer them in no particular order of priority.

- Fossil fuels will continue to dominate world energy supply, at least to the year 2020. At the same time, the resource base is more than adequate to meet future demand, if timely and adequate investment is forthcoming.

- Global energy demand is expected to rise more than 50 percent by 2020, with the developing world demand exceeding that of the industrialized world by that time.

- Two comparatively new influences on energy decision-making are emerging. First, there is the growing role being taken on by non-governmental organizations in shaping policy. Second, mounting concern over global warming clearly will exert its own influence on how the public and private sectors respond to supply and demand requirements.

- Interest in renewables matches concerns over global warming, but their relative contribution to world energy supply will be mostly unchanged. Despite its non-polluting characteristics, the contribution of nuclear electric power worldwide is expected to decline.

- Currently available technology will not permit reaching the Kyoto protocols without measurable economic sacrifice.

- If the supply of natural gas is to match anticipated demand, massive infrastructure investments must be forthcoming. But, construction of long-distance international gas pipelines will translate into transit risks.

- There will be sporadic price volatility—price hikes and price declines—with accompanying implications for producers and consumers. This is what "business as usual" in the world oil market means.

- Threats to internal energy security may be of greater consequence than most external threats. The electric power grid, oil storage facilities and refineries, water supply, and communications networks (including the Internet) will offer attractive targets to terrorists.

Michael Lynch of M.I.T. has recalled the use of war elephants in ancient times. Soldiers facing them for the first time were terrified and reacted accordingly. However, having once faced the elephant, they were much better at dealing with them in the future. Unfortunately, as Lynch has pointed out, the more time passes since the last major oil crisis, the greater the likelihood that the next disruption will be managed by actors in oil companies, oil-exporting governments, and oil-importing governments who have never faced the elephant.

The Swinging Pendulum

I have heard it said that some 350 years ago the Pilgrims migrated from Old England to New England not because of political or religious persecution, but in order to stay warm. Where else, certainly not in Old England, was firewood so plentiful and so cheap. Even then, it would appear, the consumer followed the energy trail, seeking maximum supply at minimum prices. That trail since then has led us to the historic oil fields of East Texas, to the sands of Arabia, to the stormy

waters of the North Sea, to the barren lands of the Arctic, to the tundra of Western Siberia. Where does that trail take us now? To the once forbidden regions in and around the Caspian Sea.

Let me paraphrase the commentary of the historian Thomas Macaulay who, some 180 years ago, wrote that we cannot absolutely prove that those are in error who tell us that society has reached a turning point, that we have seen our best days. But on what principle is it that, when we see nothing but improvement behind us, we are expected to see nothing but deterioration before us?

In the aftermath of the Iranian revolution in 1979 and the subsequent run-up in oil prices., it was a commonly held attitude that consumers everywhere had nothing but deterioration before them in terms of their energy future. A bare 7 years later, prices had collapsed and the pendulum had swung in favor of the consumer.

In 1998 and in early 1999, the oil pendulum had again swung in favor of the consumer, as supply outstripped demand. Then, because of successful efforts by the oil exporters to limit supply, just as quickly the pendulum swung back.

What To Do?

Mr. Chairman, you and I hold personal perceptions of our energy future and I am sure that among us this perception covers the full spectrum of unabated optimism to sheer pessimism, with a dash of cynicism thrown in. Experience tells us that these perceptions will change over time and the dire predictions or optimistic forecasts will be forgotten and replaced by others reflecting current realities.

But, policy makers in governments everywhere take their perceptions and translate them into policies to protect and advance national interests--policies which may be designed to develop new energy supplies on a crash basis, or--perish the thought--policies designed to allow the market place to be the center of the decision-making process. Policy makers come under tremendous pressures to "do something," as in earlier this year to do something about high heating oil prices, and now to do something about high gasoline prices.

That "something" unfortunately is usually some form of government intervention or regulation which tries to artificially shape economic forces. That is true of the United States and it is equally true for foreign governments. Unfortunately, more often than not, these actions tend to prolong crises, rather than relieve them.

A number of options have been put on the table as to how we might be able to mitigate oil prices, apart from the oil exporters agreeing to increase supply. First among these options appears to revolve around withdrawals of oil from our Strategic Petroleum Reserve (SPR) which today holds about 570 million barrels. I would advise strongly against withdrawals from the SPR, if only that such would send the wrong message to OPEC and others. These oil exporting countries might then conclude, let the United States add to supply, we will hold firm with our cuts, and we clearly can outlast the United States in this regard.

It has been suggested that instead of direct withdrawals from the SPR, why not a form of swaps, with withdrawals to be replaced, with comparable volumes, at a later date. Swaps are difficult however because of pricing complications. Once again, we are reacting rather than taking steps to prepare for the next fuel crisis, which will surely appear.

A third option attracting support is the establishment of a home heating oil reserve for consumers in northeastern United States. There are arguments for and against this option, but importantly, how much to hold in reserve and what triggers a release are difficult to define. But, having set a precedent for heating oil consumers in the Northeast, what next? Surely other groups impacted by high oil prices will seek relief in some fashion, for example, farmers in the sowing season, farmers in the harvest season. Where does it all end? A much better policy response would be to provide financial assistance programs for the low income, home heating oil consumers in the Northeast.

A fourth option being promoted is the opening up of ANWR and certain offshore areas to exploration. If allowed, and if exploration were successful, our growing reliance on imported oil might be temporarily slowed, but not reversed.

There have been proposals to halt the export of oil produced on the North Slope of Alaska as a means of reducing gasoline prices, particularly along the western coast of the United States. At present about 60,000 b/d of oil are exported to markets in Asia. Refining 60,000 b/d of crude oil would yield approximately 27,000 b/d of gasoline, clearly insufficient to influence price. Diversion of oil intended for export is not supportive of our free trade policy.

The oil exporters agreed to cut supplies by 4.3 million b/d and the levels of compliance have been surprisingly high. I would note, Mr. Chairman, that in discussions of reductions in oil supply, the contribution of one country has been overlooked. And that is the contribution of the United States, an unwilling contributor, to be sure. Nonetheless, U.S. domestic oil production declined in 1999 by 330,000 b/d, a reduction of 5.6 percent, roughly comparable to the pledged cuts of the United Arab Emirates, of Kuwait, and of Nigeria, and at least double the pledged cuts of Algeria, Libya, Indonesia, and Qatar.

The Value Of Oil

We often speak of the "special relationship" between the United States and Saudi Arabia. Just what justifies this special relationship? Nothing more than our recognition that Saudi Arabia has more oil reserves than anyone else and, with limited domestic demand, can use these reserves externally to influence the world political and economic scene for years to come. Saudi Arabia, as do others, understands the power of oil and will use that power to advance, to protect its national interests whenever it must.

Just what is the power of oil? The world oil scene has been relatively quiet since the 4-day Gulf War, which now seems a long time ago. But I would emphasize that

> Oil is high profile stuff, for it fuels much more than automobiles and airplanes. Oil fuels military power, national treasuries, and international politics. Because of this it is no longer a commodity to be bought and sold within the confines of traditional energy supply and

demand balances. Rather, it has been transformed into a determinant of well-being, of national security, and international power for those who possess this vital resource, and the converse for those who do not.

Nations are prisoners of geography, and no one nation enjoys in unlimited fashion all of the fruits that geography can bestow. Some, by accident of nature, are rich in energy resources, but totally lacking in other strengths. Some are dynamic in all of the virtues we may respect but poor in natural resources. This makes for a shrinking and increasingly interdependent world. At the same time, it also makes for conflicts among nations, as each seeks to maximize strengths and minimize weaknesses, while preserving and hopefully enhancing its stature among its peers.

It is out of this conflict that the issues of today and tomorrow emerge. But we should conclude that we are far less capable of arriving at some reasonable understanding of the future than we have ever been. The uncertainties are much greater today than before, in part because we can now look back upon the experiences of what can happen on both sides of the supply-demand equation. All this dims the prospect for a stable future.

A Concluding Thought

With only minor exception, the oil exporting countries are just as vulnerable as the oil importing countries, but with that vulnerability expressed in a quite different way. These countries are exposed to the dangers of the so-called "Dutch disease." Dutch disease appears when one sector of an economy—such as oil or natural gas, for example—flourishes at the expense of other sectors, namely agriculture and manufacturing. Sizeable revenues from the export of oil or natural gas greatly improve local currencies against others which make imports particularly attractive at the expense of any expansion of local industries.

Clearly, unless and until the oil exporting countries diversify away from their inordinate dependence on oil-derived income, there will always be pressure on their part to maximize revenues from a depleting source. That translates into continued price volatility or, as noted earlier, "business as usual."

Mr. Chairman, as recent events clearly emphasize, the vulnerability accompanying our growing reliance on imported oil has been further complicated today by the vulnerability linked to the amounts of oil we consume on a daily basis and the price we pay for that oil. It is a vulnerability which, given the geopolitics of oil, will be difficult to shed.

Testimony of
William M. Flynn, Vice President
New York State Energy Research and Development Authority

before the

United States Senate
Committee on Governmental Affairs

March 24, 2000

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Chairman Thompson, Senator Lieberman, distinguished committee members, and guests. On behalf of Governor Pataki and the residents of New York State, I thank you for the opportunity to testify today concerning the energy supply and price problems that New York State and the Northeast region have been experiencing since late January.

There is not another state in the union that relies on heating oil more than New York to meet its heating needs. Forty-three percent of New York's households use oil for space heating. That's 2.9 million households. Nearly 80% of those homes are concentrated in the New York City Metropolitan area, including Long Island. New York's residential sector is the largest consumer of heating oil and kerosene, or distillate fuels, in the nation. New York State accounts for 20% of the total U.S. distillate demand. As you can see from those numbers, New York's residential customers bear the brunt of any increase in heating oil prices.

As a side note, let me say here that the economic burden associated with spiraling oil prices is not confined to just heating oil. New York consumers use more than 5.6 billion gallons of gasoline, and nearly a billion gallons of diesel fuel annually, accounting for 4.5% and 2.7% respectively of national demand for these two motor fuels. The current surge in retail pump prices is significantly increasing the cost of commuting and transporting goods in New York.

Returning to heating oil issues, after a slow steady climb through the fourth quarter of 1999, home heating oil prices soared to record high levels beginning in late January. At the height of the price spike, the statewide average price for heating oil increased by more than 75 cents per gallon. On January 17, 2000, the statewide average price was $1.24; on Monday February 7th, that price was $2.02 per gallon. To put this statewide price in perspective, last year at that time, the average price for a gallon of heating oil was 91 cents. Since February 7th, we have seen

this $2.02/gallon price decrease about 51 cents a gallon, but that retail price is still nearly 67% above the 90-cents-a-gallon year-ago level. (See attached chart)

As I mentioned just a minute ago, the concentration of residential heating oil customers in the State is in the New York City metropolitan area and on Long Island. In early February, heating oil prices in this region were running at about $2.25 a gallon, more than double that of a year ago.

That's critical in New York, because over the four-month winter heating season, from November through February, New York's residential, commercial, and industrial customers combined, consume, on average, 13.1 **million** gallons of distillate fuel **per day.** At its peak in January, demand hit a high of approximately 17 million gallons a day.

A small portion of that demand was for kerosene, which is an important fuel in the Northeast. Kerosene is used as a blending agent for heating oil and diesel fuel to prevent gelling and improve viscosity in low winter temperature, with a relatively small amount being used for space heating purposes. Kerosene aside, when you look at the enormous amount of daily distillate fuel use, you can begin to see the huge economic impact that we have been faced with.

Let me say that New York State has not been alone in feeling these effects. Throughout this period, we have been sharing information regarding prices, supplies, and strategies with other northeastern states through the Coalition of Northeastern Governors and the National Association of State Energy Officials on a weekly basis. This information sharing proved invaluable in helping to assess the supply and price situation throughout the Northeast.

While I don't believe there is a definable single factor that you can point

to as the ultimate cause of the price spike, there were a number of market factors that contributed which bear mentioning.

From a historical perspective, we can look back at the second quarter of 1999 when crude oil prices began to rise from a low of $11 a barrel at the beginning of the year, to nearly $30 a barrel (173% increase) during the last week of January. Recently oil prices climbed to more than $34 a barrel in February although they are now hovering in the $27-28 a barrel range. Certainly, this price escalation was influenced by several factors. While domestic economic growth and economic recovery in the Pacific rim contributed, the most significant factor was production cutbacks by OPEC and non-OPEC producers that began in March 1999. This worldwide reduction of between 4 to 5 million barrels per day in crude oil production resulted in a corresponding reduction in petroleum products, which meant that the system had less slack to meet higher demand levels when the sustained cold weather snap arrived.

I just used the term "slack" to describe a market situation where additional supplies are not just sitting around waiting to be used. The petroleum industry, like other industries, has adopted "just in time re-supply" of inventories. This change in industry practice that developed over the last several years has had a large impact in New York. According to New York State Department of Environmental Conservation data, New York's total petroleum bulk storage capacity has declined by 15% and our heating oil storage capacity has declined by nearly 20% over the past five years. Additionally, over this same period, in-state storage capacity for gasoline has fallen over 17%. I understand that New York is not alone in seeing its storage capacity being reduced. There are several reasons for this decline in New York, including the high costs associated with meeting more stringent environmental regulations, increasing insurance and carrying costs to hold petroleum products, and the lack of market incentives to build and maintain new facilities.

As anyone from the Northeast can tell you, winter is fickle. This past December saw record temperatures roll in, but not record cold temperatures, they were record mild temperatures that continued into early January. When the extreme cold weather arrived in the middle of January we experienced a sharp increase in demand by all sectors simultaneously. For the two-week period ending January 29, the temperature was 56% colder than last year at that time, and 18% colder than normal. This spike in demand was critical because, following on the heels of extremely mild December weather, sufficient supplies were not available. The latest available data indicates that this has not been a harsh winter. October 1, 1999 through March 18, 2000 data shows that temperatures have been 9% warmer than normal, and one percent warmer than last year.

The combination of increased demand and insufficient supplies created greater competition among buyers, including interruptible natural gas customers and electric generators, that served to drive already high prices higher. An interruptible gas customer is generally a large fuel user who contracts for below-market natural gas prices throughout the year in exchange for switching to an alternative fuel when the utility needs gas capacity or when the temperature reaches a designated degree number.

However, some believe that interruptible natural gas customers and electric generators were major contributors to the sharp increase in demand and the corresponding higher prices for petroleum products. We are looking into this situation in New York to see what effect interruptible gas customers and electric generators had on the supply and price of petroleum products. Early indications are that an additional 3.4 million gallons a day of distillate fuel were consumed by traditional customers. Another incremental 1 million gallons a day was consumed by interruptibles; 720,000 gallons used by electric generators, and 320,000 gallons used by tariff customers, those switched by a

temperature trigger. Demand by these customers occurred at the same time that supplies were dwindling and prices were sky-rocketing.

The competition for product that occurred during the cold snap, and the fact that competition was driven in part by low regional supply stocks throughout the entire winter season, leads me to another major market force that has played an important role: refinery utilization.

New York does not have any refineries within the State. We rely on refineries in New Jersey, Pennsylvania, the Gulf Coast, and overseas to meet our product needs. National refinery utilization rates dropped to about 84% in early February, and have only rebounded to 90% by mid-March. At the end of December, refineries were operating at 89.7% of capacity. A year ago, when the oil markets were calm, the comparable utilization rate was 94%. Heating oil production on a national basis was down 16% from a year ago in early February. On the East Coast, heating oil production was down 46% from year-ago levels at the beginning of February. While refinery utilization began to rise in late February in response to increased pressure, questions still remain as to why there was low utilization when the demand for heating oil was so robust. Switching concerns for a moment, today domestic gasoline output approximates 7.9 million barrels a day. That's about 5% more than last March, but national inventories remain lower than a year ago.

These refining patterns raise questions both nationally and regionally. Before the January cold snap, national heating oil stocks were nearly 30% lower compared to last year, and Middle Atlantic States' (NY, NJ, Delaware, Pennsylvania) heating oil inventories were 16% lower than a year earlier. By the third week in January, these heating oil reserves had shrunk to nearly 15 million barrels, or 50% less than a year ago and below any comparable level of the past seven years. At the same time however, diesel fuel production on a national level increased more than 7% and on the East Coast by more than 23%.

Today, gasoline stocks nationally are down 12% from a year ago levels, but in the Middle Atlantic states inventories are 20% lower than last year. The result is that the price of unleaded regular in New York has escalated 17 cents a gallon in recent weeks from $1.43 at the end of January, to $1.60 in mid-March. The current statewide average gasoline price exceeds the previous all time high of $1.51 gallon established in early December 1990, during the Persian Gulf War.

Caught up in all of these market forces were the consumers. Everyone from residential heating customers to hospitals, public health and safety agencies, trucking firms, small businesses, large fuel oil dealers, and the motoring public are feeling the effects of these price increases. Particularly hard hit during that period, and still looking for relief from high diesel fuel prices is the trucking industry. There are reports that the average retail price of a gallon of diesel fuel rose over 63% in the Northeast from $1.35 in early January to $2.06 during the latter half of the month and reached the $2.29 to $2.69 range by the first week of February. Trucking companies have been unable to absorb these astronomical price hikes and we are now seeing these higher costs passed along to customers. Following the retail chain downward, these customers are then forced to raise the prices of the goods they sell to households and other commercial businesses, creating a major economic impact that is still rippling through the region's economy.

While some predictions were made about possible price increases due to known factors like the OPEC cutbacks, the sudden and dramatic price increases we saw were way outside the expected norm.

Take for example, the fact that the average price difference between a gallon of #2 heating oil and crude oil over the past year hovered around 52 cents per gallon. For the month of February, the price differential equaled $1.01, 49 cents over the historical price spread. While that

number has dropped to 74 cents during the past three weeks, it's still 22 cents over the normal price spread. (See attached chart)

Needless to say, Governor Pataki is concerned about the economic consequences of this unprecedented rise in petroleum prices and the effects on New York's citizens, particularly our elderly, working poor, and low-income consumers. I will discuss the economic impact in further detail later in my testimony. Certainly at the onset, New York's first concern was with public health and safety issues.

Quoting Governor Pataki, "New York is no stranger to adversity" and thankfully so. During the past few years New York has seen nature's forces take a toll on our State with floods, ice storms, and other natural disasters. Those crisis situations have helped the State refine its emergency response capabilities and this most recent threat to the health and safety of our residents was no different.

From our first contact with industry officials about impending home heating oil shortages, the State's emergency response was initiated. Governor Pataki directed NYSERDA, the State Emergency Management Office, the Public Service Commission, and the Consumer Protection Board to establish an around-the-clock coordinated effort. Telephone hotlines were established immediately to handle emergency calls for shelter or heating assistance and to report suspected instances of price gouging. State officials began contacting county energy emergency coordinators across the State to assess their local situation. Daily contact with the U.S. Coast Guard was established. The Coast Guard is responsible for ice-breaking activities in New York harbor and the 150 miles northward to upstate markets on the Hudson River to ensure delivery of available fuel supplies. Daily calls were also placed to dealers to assess supply problems and price trends. Heating oil distributors were also supplied with emergency contact information for their customers in the event they experienced a shortfall in supply.

The Governor also took action on a number of regulatory fronts to help overcome some of the supply and resupply problems that New York encountered. These included:

* Directing the State Public Service Commission to work with New York's utilities to voluntarily keep their interruptible natural gas customers on natural gas rather than switch to fuel oil;

* Directing the State Department of Taxation and Finance to issue temporary interstate certificates to in-state heating oil distributors and trucking companies to allow them to import heating oil;

* The State Department of Environmental Conservation in conjunction with NYSERDA granted one-week waivers to allow New York City municipal facilities to use slightly higher sulfur content fuel oil to meet their heating needs;

* The Governor also asked the State Consumer Protection Board and NYSERDA to investigate the causes of the current shortage and recommend measures to prevent a re-occurrence.

Besides initiating a comprehensive State action plan to help our residents, Governor Pataki was also active on the national level. Early on, Governor Pataki asked the Clinton Administration for an immediate investigation into the factors that drove the price increases and supply shortages. He also asked at that time for additional Low-Income Home Energy Assistance Program (LIHEAP) emergency aid to be released as well.

The Federal LIHEAP program is extremely important to New York because we have more than 1.4 million eligible households within the

State. This year, 500,000 to 600,000 households will be served by the program. When Governor Pataki requested federal assistance, funds were critically needed to help New York's struggling families meet the rising cost of fuel. In response, the Department of Health and Human Services released $45 million in emergency LIHEAP funds to 10 Northeastern states. New York did very poorly in that initial allocation. That prompted a second letter from Governor Pataki, and I'm pleased to say that, in the ensuing two emergency allocation rounds, New York fared much better.

Besides easing the financial burden on those eligible for LIHEAP assistance, the heating oil price problem extended beyond low-income households to families and small commercial customers who have had trouble meeting their oil cost obligations. To address that issue, Governor Pataki has taken action to increase the Home Energy Assistance Program eligibility levels in New York to 60% of the State's median income from the current 150% of poverty level.

The estimated impact this heating season on New York's economy will be about $650 million dollars higher than last year. About $450 million of that increase will be borne by New York's heating oil customers. A family that typically uses 900 gallons of fuel oil during the winter heating season will pay an additional $350 dollars this year. If you were unfortunate enough to have received a 225-gallon delivery during February, you paid about $216 dollars more than a year ago at that time.

These additional costs are now causing a ripple effect among the states' fuel oil dealers who, in many instances, had customers that could not make full payment for deliveries. This, in turn, created cash-flow and bank line-of-credit problems, which is causing concern about the increased potential for personal and corporate bankruptcies that could weaken the oil distribution systems. A recent survey by NYSERDA and the NYS Consumer Protection Board found that dealers are extremely

concerned about their receivables. One dealer stated, " We experienced extra borrowing to cover the purchase of higher priced oil and to cover the increase in accounts receivable. We also expect a large volume of customers who will never pay us, which will result in increases to our yearly bad debt expense." While some assistance may be available from the Small Business Administration, we are hearing that a quicker means to make funds available to dealers is desperately needed.

Why did we find ourselves in this position, and what actions need to be taken so that we don't have a re-occurrence down the road?

First, let me say that I was pleased to see that many of the steps that the Pataki administration took in New York, were incorporated into the Administration's actions that were announced on February 10th when a second round of LIHEAP funds were released. Hopefully those actions will now be put in place as part of a federal action plan for the future so that nobody is caught off guard if it should happen again.

Certainly in the short term, we need to use our influence with the OPEC and non-OPEC cartel producers to increase production. This is critical. Cartel control of production has created the perception of a shortage which is a major factor in driving these price increases. This situation created calls in some areas for Government to allocate fuels. That would be extremely difficult, and someplace I hope we never have to go. We must take whatever steps are necessary to protect our energy security and the public's health and safety.

On February 14th, Governor Pataki called on the Federal Department of Energy to immediately release oil from the Strategic Petroleum Reserve (SPR). Secretary Richardson heard the same message from elected officials from all over the Northeast on February 16th at the Northeast Heating summit held in Boston. There was a consensus that moving SPR oil from Gulf Coast salt domes into the market would signal that United

States citizens will not be held hostage to the whims of oil-producing nations. If we took that significant step then to expand available oil supplies, world oil prices would already have started to decline, and the oil-producing nations would have been encouraged to come to the table with greater levels of oil production.

Also, releasing SPR oil now will prevent a repeat of the tight supply conditions that disrupted the heating season from extending to gasoline and diesel fuel availability as we approach the spring and summer driving season. I'm concerned that we have yet to see any results from the Administration's "Oil Diplomacy Strategy" as we enter the summer driving season. Had we released these supplies in February, this oil would be in the marketplace now.

Another important step the Federal government can take to help New York and other New England states is to ensure that adequate funding is in place for Coast Guard icebreakers that work to keep New York's waterways clear for the movement of petroleum products and other commerce. We are hearing rumors that by next winter services may be cut back by the Federal Department of Transportation, the parent agency of the Coast Guard. Should the number of Coast Guard icebreakers be reduced, it would definitely imperil health and safety. Part of this winter's crisis was attributable to resupply difficulties, and if not for the Coast Guard's commitment to ensure that these critical vessels continue to work to keep our waterways open, we would have been much worse off than we were. There is truly no other mode of transportation available other than barges to deliver the quantity of fuel necessary to supply the New York market, and parts of Vermont and Massachusetts that are supplied from New York terminals.

Another area of critical importance is for the federal government to do a better job of working with the states with respect to planning and responding to emergencies. Within the Department of Energy, the

Energy Information Administration does a professional job of collecting data and disseminating it to the states, but there is an obvious disconnect in-house. That information needs to be used by the Department to work with major oil suppliers and refiners in advance of crisis situations to make the necessary course corrections. Government cannot allow supply disruptions to occur that threaten the public health and safety of our citizens. The Department of Energy needs to play a much more pro-active role then it did.
We are pleased that the Department of Energy now believes that energy emergency planning is an essential government function.

An important step that we are looking at in New York State is better fuel diversity. Looking at the factors that came together to create the current situation, it's apparent that we need to take a close look at expanding natural gas pipeline capacity in the State and in the Northeast. The Federal Energy Regulatory Commission can play an important role in helping states like New York with expediting certification and approval of new and expanded pipeline capacity into the Northeast.

As a matter of public trust, the Federal Government must do a thorough investigation to determine if oil markets were manipulated and profits were made on people's misery. People in New York and throughout the Northeast want to understand what happened to their hard-earned dollars. We believe they need an answer. In New York, Governor Pataki has directed the State Consumer Protection Board to vigorously investigate any reports of price gouging involving anyone or any business taking advantage of this severe, extreme weather by demanding sky-high prices for basic necessities, including the fuels we use to heat our homes. However, a full-scale Federal investigation is warranted and needed.
Last, but certainly not least, I would be remiss if I did not comment on the need to diversify our sources of energy supplies. We must redouble efforts to develop domestic oil reserves, renewable energy resources,

alternative-fuel technology, and to promote energy efficiency.

We must increase domestic oil production if we have any hope in the future of lessening our dependence on foreign oil and ensuring our energy security. Perhaps you don't think of New York when you think of natural gas and oil production, but we do have a vibrant research and development program in place that is funding research to demonstrate increased natural gas production and enhanced oil recovery technology. Working with groups like the Independent Oil and Gas Association and the New York State Oil Producers Association, we are experimenting with new mapping programs and horizontal drilling techniques on Appalachian natural gas and oil reserves. We must look for every opportunity to increase domestic production, but states can't do it alone. It will take a commitment on the part of Congress and the Department of Energy to join the states as partners in this effort.

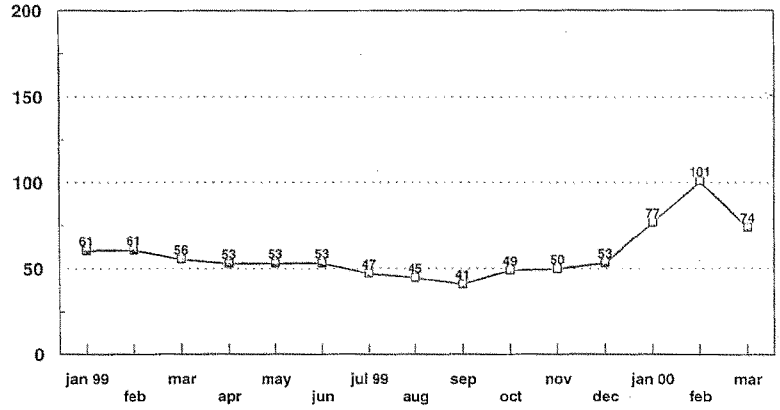
In addition to encouraging domestic production, we must also increase funding for energy efficiency initiatives. At NYSERDA we also fund a wide-range of R&D initiatives to improve the efficiency of oil heating equipment.

Currently, the DOE has a $6 billion budget, but only a nominal amount of that is dedicated energy-efficiency funding. New York State has increased funding four-fold for R&D and energy efficiency as part of our transition to competition. We have tremendous potential, and situations like the one that has happened in the Northeast should serve as the lighting rod to spur us to action, ensuring that we have a secure energy future for our children and their children.

Once again, on behalf of Governor Pataki and the citizens of New York, I want to thank you Chairman Thompson for the opportunity to testify today.

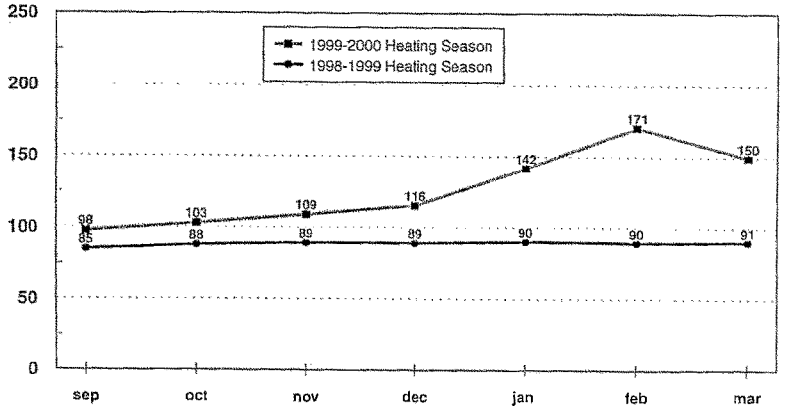
I would be more than happy to answer any questions you may have.

Price Differential Between NY - No. 2 Retail Heating Oil Prices and WTI - Spot Prices of Crude Oil
cents per gallon - monthly average



Source: NYSERDA, Energy Analysis Program, NYS SHOPP Survey Data

NY - No. 2 Home Heating Oil Prices
cents per gallon - monthly average



Source: NYSERDA, Energy Analysis Program, NYS SHOPP Survey Data

U.S. VULNERABILITY TO OIL-PRICE SHOCKS AND SUPPLY CONSTRICTIONS... AND HOW TO REDUCE IT

TESTIMONY OF
JOHN P. HOLDREN
FOR THE
COMMITTEE ON GOVERNMENTAL AFFAIRS
UNITES STATES SENATE

OVERSIGHT HEARINGS ON RECENT OIL-PRICE INCREASES

MARCH 24, 2000
(written statement revised March 30, 2000)

MR. CHAIRMAN, MEMBERS, LADIES AND GENTLEMEN: I am John P. Holdren, a professor at Harvard in both the Kennedy School of Government and the Department of Earth and Planetary Sciences. Since 1996 I have directed the Kennedy School's Program on Science, Technology, and Public Policy, and for 23 years before that I co-led the interdisciplinary graduate program in Energy and Resources at the University of California, Berkeley. Also germane to today's topic, I am a member of President Clinton's Committee of Advisors on Science and Technology (PCAST) and served as chairman of the 1997 PCAST study of "Federal Energy Research and Development for the Challenges of the 21st Century" and the 1999 PCAST study of "Powerful Partnerships: The Federal Role in International Cooperation on Energy Research, Development, Demonstration, and Deployment". A more complete biographical sketch is appended to this statement. The opinions I will offer here are my own and not necessarily those of any of the organizations with which I am associated. I very much appreciate the opportunity to testify this morning on this timely and important subject.

* * * * *

The recent run-up of world oil prices and its reverberations in U.S. markets for gasoline and fuel oil underline a degree of U.S. dependence on imported oil — with associated vulnerability to externally induced oil-price shocks and supply constrictions — that has been growing since 1985. In that year, the United States was importing just under 30% of the oil it used, down from the previous all-time peak of 49% reached in 1977. By 1990, our dependence on imports for our oil was back up to 46% — the result of slowly growing national oil consumption and slowly declining domestic production — and by 1998 our oil-import dependence had reached 55%.[1]

The economic impact of U.S. oil-import dependence is not as great as it was in the late 1970s and early 1980s, however, because the share of oil in our total energy mix has fallen since then, because the total amount of energy needed to make a dollar of GDP has also fallen, and because the real price of oil, even after the recent run-up, remains far below what it was then. Oil (domestic plus imported) constituted 46% of U.S. energy supply in 1979 but only 39% in 1999. The amount of energy needed to make an inflation-corrected dollar of GDP in the United States fell by 30% between

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[1] There are many minor variations in the way such percentages are computed and reported. These figures and most others in this testimony are from the U.S. Energy Information Administration's *Annual Energy Review 1998*, published in July 1999, augmented by the February 2000 edition of the EIA's *Monthly Energy Report*.

1979 and 1999, and the amount of oil per dollar of GDP fell by 40%. The cost of U.S. net oil imports in 1979 was $112 billion (expressed in 1999 dollars) or 2.1 percent of GDP, whereas the corresponding figure in 1999 was $60 billion, amounting to 0.7 percent of GDP.

That the impact of oil-import expenditures on the total U.S. economy is not as great as it once was should not console us much in the current situation, for several reasons. First, as recent events make plain, the impact can still be great in the specific sectors of the economy that remain heavily dependent on oil, most notably the transport sector nationwide and home heating in the Northeast. Second, U.S. dependence on oil imports as a fraction of national energy supply is more than high enough, at around 21 percent, to make the possibility of externally imposed supply constrictions a matter of great concern; indeed, it is seen as imposing requirements on our capacity to defend our access to foreign oil by the use of military force if need be, and hence is a source of military budget requirements as well as a potential source of actual conflict. Third, our 1999 foreign-oil expenditure of 0.7% of GDP is by no means an upper limit: if oil prices stayed near the $34 per barrel figure they reached in early 2000 and U.S. oil imports nonetheless did not decline, U.S. oil-import costs would reach about 1.3% of GDP. Under "business as usual", moreover, U.S. oil imports are projected to continue to rise, and the price per barrel could go up further still.

It must also be a matter of concern for the future that the fractions of U.S. oil imports (and everybody else's) coming from the OPEC cartel and, within it, from the politically volatile Persian Gulf are more likely to increase with time than to decrease. Currently, the United States gets half of its oil imports from OPEC and half of that amount — a quarter overall — from the Persian Gulf. Worldwide, OPEC accounts for 43% of world crude oil production and 62% of the oil traded internationally, but holds 78% of the world's proved oil reserves. The Persian Gulf alone has almost 30% of world production, 43% of exports, and 65% of proved reserves. That OPEC and the Persian Gulf hold larger shares of reserves than of current production and exports means that their shares of production and exports are likely to increase over time. The prospect of increasing dependence on these unpredictable partners for oil imports — and not just by the United States but also by our friends and some of our potential adversaries — is not reassuring in either economic or national-security terms.

The costs and dangers of the overdependence of the United States and others on imported oil are clearly considerable, and they are likely to grow unless successful evasive action is taken. What have we been doing in this direction and what has it accomplished? What more could and should we be doing now and in the future, and what leverage against the problem might these additional measures yield?

The problem of reducing oil imports below what they would otherwise be can be addressed by (1) decreasing oil consumption below what it would otherwise be, (2) increasing domestic oil production above what it would otherwise be, or (of course) a combination of these. Leaving aside the option of reducing economic activity below what it would otherwise be (which would be seen as part of the problem rather than part of the solution), the possibilities for decreasing oil consumption consist of (1.a) increasing the efficiencies with which oil is converted to end-use forms and used to produce economic goods and services and (1.b) substituting other energy forms for oil. The possibilities for increasing domestic oil production consist of (2.a) finding and developing new oil fields and (2.b) increasing the quantities of oil recovered from existing fields. In all cases, these outcomes can be pursued through a combination of (i) incentives, investments, and other measures

that affect the choices made within the available array of technological options and (ii) incentives, investments, and other measures that lead to improvement of the available array of technological options through research, development, and demonstration.

All of these approaches have been employed in varying degrees over the past two decades, and all of them have a role to play in the decades ahead. All of them can and should be strengthened with further policy initiatives. But analysis of recent history and of the prospects for the future indicates that much larger gains are to be expected from reducing consumption through efficiency increases and substitution than from increasing domestic production.

Consider first the history of efficiency increases and substitution. In the period from 1955 to 1972 (the year before the first Arab-OPEC oil-price shock), the energy intensity of the U.S. economy stayed essentially constant, at about 20 quadrillion Btu per trillion 1992 dollars of GDP. But between 1972 and 1979 (the year of the second and larger oil-price shock), the energy intensity of the economy fell at an average rate of nearly 1.7% per year. Total U.S. energy use in 1979 was 10 quadrillion Btu lower than it would have been if energy intensity had remained at the 1972 value. If oil's share of U.S. energy supply had stayed constant at the 1972 figure of 45.3%, then oil's share of the 10 quadrillion Btu savings attributable in 1979 to post-1972 efficiency improvements would be 4.53 quadrillion Btu, equivalent to 2.1 million barrels per day of crude petroleum.

The share of U.S. energy supplied by oil had fluctuated between 43 and 44 percent from 1955 to 1970, but it rose from the 1970 value of 43.5% to 45.3% in 1972 and 46.0% in 1973. If the 1970-73 rate of increase were taken to be the pre-oil-shock "business as usual" trend (in contrast to the constancy of oil's share in the 15 years from 1955 to 1970), then the oil dependence of the U.S. economy under business as usual would have reached 51.4% by 1979, compared to the actual 1979 value of 45.8%. One may question, however, whether oil's share could have continued to grow at the 1970-73 rate even in the absence of oil price shocks, and I am going to assume for the purposes of these very rough estimates that its share would have leveled off at 50%. (The actual peak, reached in 1977, was 47.5%.) If 50% is taken as the 1985 "business as usual" value, the savings in 1979 attributable to efficiency increases and substitution for oil combined would amount to 4.0 million barrels per day of crude.

From 1979 to 1985 (just before oil prices went into sharp decline), the energy intensity of the U.S. economy fell at an average rate of almost 3.2% per year (reaching 14.4 quadrillion Btu per trillion 1992 dollars in 1985), and oil's share of total U.S. energy supply also fell steadily (reaching 40.3% in 1985). If it is assumed that "business as usual" (no oil price shocks at all) would have resulted in energy intensity continuing to remain at its 1972 value through 1985, and if it is further assumed that oil's share of total energy would have remained at the 50% figure assumed above for 1979, then the oil savings in 1985 attributable to energy efficiency improvements and substitution for oil combined in the period 1972-1985 would be 10 million barrels per day.

From 1985 to 1999 (a period of generally declining real oil prices), the energy intensity of the U.S. economy dropped further to 12.2 quadrillion Btu per trillion 1992 dollars, and oil's share of U.S. energy supply fell a bit further, too, to 39.1%. Compared to what oil use in 1999 would have been at the 1972 energy intensity and a 50% oil share, savings in 1999 amounted to the equivalent of almost 19 million barrels of crude per day — meaning that under "business as usual", U.S. oil consumption in 1999 could have been twice as large as it actually was.

The effects of price and policy on domestic oil production over the same time period are more difficult to estimate. U.S. domestic production of crude petroleum plus natural gas plant liquids (together characterized as "total petroleum") peaked in 1970 at 11.3 million barrels per day and by 1973 had declined to 11.0 million barrels per day. Notwithstanding the price signals and other incentives to increase domestic production after the first oil-price shock in 1973, domestic production continued to decline through 1976, when it averaged 9.8 million barrels per day. With the help of the ramp-up of production from Alaska's Prudhoe Bay field, it then increased to a secondary peak of 10.6 million barrels per day in 1985, falling more or less steadily thereafter to 8.1 million barrels per day in 1999. (Alaskan production peaked at 2.0 million barrels per day in 1987 and 1988 and has since declined to 1.0 million barrels per day).

Aside from this Alaskan contribution, without which our domestic production today would be 7 million rather than 8 million barrels per day, it is hard to estimate in any simple way the amount by which price- and policy-induced bolstering of domestic production made the decline in domestic production slower than it otherwise would have been. Advances in seismic exploration, horizontal drilling, and secondary recovery are generally mentioned, but it would take a closer student of these matters than I have been to offer a quantitative estimate of how many barrels per day these advances are currently adding to U.S. production. If they were as much as doubling the current U.S. rate of crude oil production from what it would otherwise be (6 million barrels per day instead of 3 million), their contribution would still be only a sixth as big as my rough estimate of the gains from 1972 to 1999 from improvements in energy efficiency and substitution for oil in the overall energy mix.

What have been the changes in the U.S. energy-supply mix? The increase in coal consumption from 1972 to 1998 was 9.5 quadrillion Btu per year, equivalent to 4.5 million barrels per day of oil; coal's share of U.S. energy supply increased in this period from 16.6% of the total to 22.9%. U.S. natural gas consumption fell from an all-time high of 22.7 quadrillion Btu per year in 1972 to 16.7 quadrillion Btu per year in 1986, then rose again to 21.8 quadrillion Btu per year in 1998; its share of total U.S. energy supply was 31.2% in 1972, only 23.2% in 1998. U.S. nuclear -energy use rose from 0.6 quadrillion Btu per year in 1972 to 7.2 quadrillion Btu per year in 1998, a difference equivalent to 3.1 million barrels per day of oil;[2] the nuclear share of U.S. energy supply went from 0.8 percent in 1973 to almost 8 percent in 1998. U.S. use of renewable energy sources, finally, grew from 4.5 quadrillion Btu per year in 1973 (two thirds of it hydropower, nearly all of the rest biomass) to 7.1 quadrillion Btu per year (51% hydro, 43% biomass, 4% geothermal, 1% solar, 0.5% wind), the growth over this interval being equivalent to 1.2 million barrels of oil per day in 1998; the renewable share in the U.S. energy mix was 6.1% at the beginning of this period and 7.5% at the end.

What can be said, then, about the potential for reducing U.S. oil-import dependence in the future?

First, by far the biggest immediate and short-term leverage — as well as a very sizable share of the leverage in the longer term — lies in increasing the efficiencies of oil use (which helps directly)

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[2] Oil use for electricity generation, which is the main application where nuclear energy currently substitutes directly for oil, was only 1.5 million barrels per day in 1973 and by 1998 had fallen to 0.6 million barrels per day. The implications of this for the future leverage of nuclear-energy expansion against oil-dependence are discussed below.

and of energy use overall (which frees up non-oil sources of supply that can then, in principal, substitute for oil). Notwithstanding the impressive efficiency gains between 1972 and today, the technical potential for further improvements remains very large. Rates of reduction in energy intensity were low from 1985 through 1995 (averaging only 0.6% per year), presumably because energy prices declined and the countervailing effects of non-price policies and other factors promoting efficiency improvements were insufficient in this period to offset this. But from 1995 to 1999, the energy intensity of the U.S. economy fell at an average of 2.3% per year (many think because of the increasing role of the low-energy-intensity information economy in driving U.S. economic growth). If this higher rate of decline in energy intensity were maintained after 1999, and if the real rate of growth of the U.S. economy after 1999 averaged 3% per year, total energy use in 2010 would be 21 quadrillion Btu lower in 2010 than if energy intensity declined at only 0.6% per year. If oil's share of total energy use remained at 39%, this difference would be worth 3.9 million barrels per day of crude in 2010. The corresponding differences between these high- and low-efficiency futures in 2030 would be 82 quadrillion Btu in total annual energy use and 15 million barrels per day of crude in avoided oil use.

The technical potential for efficiency improvements is nowhere more apparent than in the oil sector itself, where over 12 million barrels per day of petroleum products were being used in 1998 for transportation, 8 million barrels per day of that in the form of gasoline (used mostly in cars, light truck, and motorcycles) and 2 million barrels per day of it diesel fuel (used mostly in heavy trucks and buses). Average automotive fuel economy in the United States has been essentially constant since 1991, at about 21 miles per gallon, the previous trend of improvement having been capped by the combination of low gasoline prices, the absence in recent year's of increases in the Corporate Average Fuel Economy (CAFE) standards, and the growing proportion, in the personal-vehicle mix, of sport utility vehicles and pick-up trucks for which the current CAFE standards are lower than for ordinary cars.

But perfectly comfortable and affordable hybrid cars already on the market get 60 to 70 miles per gallon; and fuel-cell powered cars that, with the help of the government-industry Partnership for a New Generation of Vehicles, could be on the market before 2010 should be able to get 80 to 100 miles per gallon, ultimately perhaps more. The arithmetic is simple: doubling the average fuel economy in a fleet of gasoline-burning vehicles the size of today's would save 4 million barrels of oil per day, more in the larger fleet that is likely to exist tomorrow. In the 1997 PCAST study I led on US energy research and development strategy, we estimated that PNGV research culminating in commercial production of advanced vehicles in 2010 could be saving 4 million barrels per day in the United States by 2030. Research to improve the fuel efficiency of light and heavy trucks, also assumed to culminate in commercialization in 2010, was estimated to be able to save another 2 million barrels per day by 2030. (Of course, none of this will happen if the R&D is not done, or if incentives to commercialize the resulting innovations are absent; more about that below.)

On the supply side, the potential to abate the slide in domestic oil production seems quite limited by comparison. Under the "reference" scenario of the Energy Information Administration's *Annual Energy Outlook 2000*, which assumes a degree of continuing technological innovation in domestic oil production, domestic oil production declines by 0.6 million barrels per day between 1998 and 2005 and then remains flat at around 7.3 million barrels per day from 2005 until 2020. An alternative scenario in which the world oil price in 2020 reaches $28 per barrel (in 1998 dollars, compared to $22 per barrel in these constant dollars in the reference scenario) yields domestic

production in 2020 only 0.8 million barrels per day higher than in the reference scenario, barely more than the 1998 level. (In the EIA scenarios, oil imports in 2020 in the reference case are 17.2 million barrels per day, and in the higher-oil-price case they are 15.4 million barrels per day.) The 1997 PCAST energy R&D study projected that application of the additional R&D it recommended on exploiting marginal domestic petroleum resources would yield only about an extra million barrels per day in 2010, which would not increase further out through 2030.

Some are suggesting that important leverage on the domestic-oil-production side of the problem could be gained by opening the coastal shelf of the Arctic National Wildlife Refuge (ANWR) to oil development (from which, it appears, no contribution was assumed in any of the EIA scenarios). The numbers do not suggest that this is a high-leverage proposition, however. It is not certain that oil would be found in the ANWR. Estimates of how much might be recoverable, if it is found there, have ranged from 3 billion barrels (by the Congressional Office of Technology Assessment in 1989), to 3.6 billion barrels (by the Department of Interior in 1991), to 4-12 billion barrels (by the USGS in 1998). This means, in round numbers (and assuming oil would be found there in one of the indicated quantities), that ANWR could provide between 6 months and 2 years' current US oil supply, or 1 to 4 years' current imports, or 4 to 16 years' current imports from the Persian Gulf.

To anticipate an actual oil-production trajectory, one may note that, at the upper end of the range of estimates, the ANWR would be comparable to the Prudhoe Bay field; if that were so, a production trajectory similar to Prudhoe Bay's would presumably ensue — a couple of decades of production at 1.5-2 million barrels per day and a few decades thereafter at around 1 million barrels per day. The question that policy makers must answer is whether the *possibility* of a contribution of this magnitude justifies the modest but certain environmental damage of exploration — and the certainty of larger environmental damage from production and transport if oil is found. Given that a comparable contribution to oil-import reduction could be obtained by pushing only modestly harder for efficiency increases, and given that doing the job with efficiency instead would have large ancillary environmental benefits (such as reductions in emissions of air pollutants and greenhouse gases) rather than major environmental costs, my own view is that the right answer on ANWR is "no".

The supply-side options with the largest short-term and medium-term potential to directly displace oil in the U.S. energy mix are natural gas and biofuels. Natural gas could displace oil in a number of industrial applications, in home heating, and in motor vehicles (where engines have been modified to run on compressed natural gas, or on methanol made from natural gas, or where fuel cells running on hydrogen made from natural gas have replaced combustion engines). The 1997 PCAST energy R&D study discussed these possibilities but did not offer specific estimates of potential contributions over time.

The EIA Annual Energy Outlook 2000 scenarios for 2020 include contributions of natural gas as motor-vehicle fuel up to some 200,000 barrels per day. The potential is clearly larger, however. The source of the natural gas for these oil-displacing transport-fuel options could be displacement of gas from electricity generation by other non-oil options (about which more below) or extra domestic natural-gas production resulting from increased rates of technical innovation in gas exploration and recovery. (The difference in domestic natural-gas production in 2020 between the "high technological change" and "low technological change" EIA scenarios is 4 quadrillion Btu per year, the equivalent of almost 2 million barrels of crude oil per day.)

As for liquid fuels from biomass, the 1997 PCAST study estimated that an aggressive program to produce ethanol from cellulosic biomass could be displacing 2.5 million barrels per day of oil by 2030 and over 3 million barrels per day in 2035. The PCAST report also identified other biofuels options for this time period without attempting to estimate their potential quantitatively. This indicates that the 2.5-3 million barrel per day range by 2030-35 is not an upper limit. The EIA scenarios, by contrast, only show about 125,000 barrels per day of motor-fuel displacement by ethanol in 2020, but that study did not give much attention to possibilities for rapidly expanding non-electric renewable-energy technologies. I believe the PCAST assessment gives a more meaningful indicator of the direct oil-displacement potential of biomass fuels.

The Administration's initiative on "Promoting Bio-based Products and Technologies", announced last August, posed a target of tripling use of energy and products from biomass in the United States by 2010. (This would include the use of biomass for electricity generation and cogeneration, about which more below, as well as production of high-value chemicals.) Inasmuch as biomass energy use in this country in 1998 was about 3 quadrillion Btu per year, the stated goal implies an addition of 6 quadrillion Btu per year by 2010, equivalent in energy content to almost 3 million barrels per day of crude oil.

Production of liquid hydrocarbon fuels from coal is technically feasible using a variety of relatively well developed approaches, but it is not economically competitive with oil at recent or current oil prices, nor is it currently competitive with production of liquid fuels from natural gas. In addition, production of liquid fuels from coal using existing technology results in carbon dioxide emissions to the atmosphere about twice as large, per barrel, as for petroleum, which would be a major drawback in light of the desirability of minimizing climate-change risks. As oil and natural gas become more expensive over time, advanced coal-to-liquids technologies that can capture and sequester carbon dioxide rather than releasing it to the atmosphere may eventually become attractive. The 1997 PCAST study concluded that "indirect" liquefaction of coal (which entails gasifying it first and then making liquid fuels from the gas) is far more promising in its combination of economic and environmental characteristics than "direct" liquefaction; we recommended phasing out DOE's research on direct liquefaction and shifting the funds into the gasification-based "Vision 21" program for advanced coal technology and into R&D on carbon sequestration and other forms of emissions reduction.

There is some potential for reducing U.S. oil consumption by replacing oil-fired electricity generation with other fuels, but it is quite limited. In 1998, oil generated only 3.6% of U.S. electricity, and doing so accounted for only about 3% of U.S. oil consumption (about 600,000 barrels per day). Most of the potential that this represents is captured in the EIA reference scenario, where a 3-fold drop between 1998 and 2020 in oil use for electricity generation reduces oil use by 400,000 barrels per day. Much of the rest of the leverage of the electricity sector against oil consumption is indirect, through the potential of alternative electricity options to displace natural gas from electricity generation, which as noted above could in turn displace oil in the industrial, residential, and transport sectors. Electricity can also displace oil through the electrification of some of the end-uses that oil serves, such as replacing residential oil-fired heaters with electric heat pumps and shifting commuters out of their cars and into electricity-powered public transit systems. The latter has so far proven very difficult to achieve on a large scale, however, and the former represents only a modest market nationally: home heating with oil uses only about 1.1 quadrillion Btu per year, corresponding to an average of some 500,000 barrels per day if pro-rated over the year.

Total U.S. electricity generation in 1998 was 3620 billion kilowatt-hours, of which 1872 billion kWh came from coal, 674 billion kWh from nuclear energy, 532 billion kWh from natural gas, 129 billion kWh from oil, 324 billion kWh from hydropower, 55 billion kWh from biomass, 14 billion kWh from geothermal, 3.5 billion kWh from wind, and 0.9 billion kWh from solar energy. In the EIA's reference scenario for 2020, coal-fired electricity generation increases to about 2300 billion kWh, gas-fired generation increases to nearly 1300 billion kWh, nuclear energy declines to about 425 billion kWh (because of retirements of some of the existing nuclear power plants in the absence of replacement by new ones), and renewable-based electricity generation in aggregate stays roughly constant.

From an environmental standpoint and quite possibly also from an economic one, the most attractive candidates to displace some of the growth of gas-fired generation envisioned in the EIA scenario (and thereby make gas available to displace oil in other sectors) are the non-hydro renewables. A very conservative estimate of their potential for doing so out to 2020 is provided by the EIA "high renewables" scenario, which in 2020 obtains 112 billion kWh from biomass, 62 billion kWh from wind, 40 billion kWh from geothermal, and 2.7 billion kWh from solar. The additional non-hydro renewable generation in this scenario, compared to the 1998 figure, totals 140 billion kWh — equivalent to about 700,000 barrels per day of oil.

This EIA estimate of renewable-electric potential is conservative because the EIA study did not consider the possibility of world oil-price increases above 28 1998 dollars per barrel or the possibility of major policy changes that would have the effect of sharply increasing the incentives for expanding the use of non-fossil-fuel options. The 1997 PCAST study made some estimates of what might be achievable from renewable-electric options under prices or policies that encouraged these options very strongly, and the resulting figures were far higher than those in the EIA scenario: they included as much as 1100 billion kWh by 2025 from wind systems with storage technologies, similar quantities by 2035 from photovoltaic and solar-thermal-electric systems with storage, 800 TWh by 2035 from biopower, and 1500 TWh by 2050 from hot-dry-rock geothermal. These are described as possibilities, not predictions, but the figures are indicative of very large potential: 1000 billion kWh per year is the equivalent of about 5 million barrels of oil per day.

Because there are no new nuclear power plants on order in the United States — and not likely to be as long as gas-fired electricity generation remains much cheaper than nuclear generation — the range of nuclear contributions in 2020 in the EIA scenarios depends only on the rate of nuclear-plant retirements versus license extensions for additional years of operation. The difference between the EIA's "high nuclear" and "low nuclear" variations in these respects amounts to 200 billion kWh in 2020, equivalent to 1 million barrels of oil per day. The 1997 PCAST study recommended a modest increase in Federal nuclear-energy R&D in order to clarify safety issues associated with license extension, and it recommended a somewhat larger and longer-term Nuclear Energy Research Initiative focused on clarifying the prospects for improvements in the cost, safety, waste-management, and proliferation-resistance characteristics that will determine whether deploying a new generation of nuclear reactors in the United States in the longer term becomes a real option. PCAST also recommended an increase in the funding for R&D on fusion energy, which although it remains far from commercialization today could conceivably make a large contribution to electricity generation in the second half of the 21st century.

The overall technical potential to reduce U.S. oil dependence through the use of a wide range of currently available and still to be fully developed alternative technologies is clearly very large. The key to the use of the currently available options is incentives, about which more below. The keys to achieving the potential of the emerging options are, first, research, development, and demonstration; and, second, incentives to help bring about the commercialization and widespread deployment of the innovations that result from research, development, and demonstration.

Concerning energy research and development, the 1997 PCAST study argued that such R&D is valuable for a range of reasons. Not only can innovation in energy technology help reduce costly and dangerous overdependence on foreign oil, PCAST said, but it can reduce consumer costs for energy supplies and services below what they would otherwise be, increase the productivity of U.S. manufacturing, improve U.S. competitiveness in the multi-hundred-billion-dollar-per-year world market for energy technologies, improve air and water quality, improve the safety and proliferation resistance of nuclear energy operations around the world, help position this country and the world to cost-effectively reduce greenhouse-gas emissions to whatever degree our societies ultimately deem necessary, and enhance the prospects for environmentally sustainable and politically stabilizing economic development in many of the world's potential trouble spots.

Many of these benefits fall under the heading of "public goods", meaning that the private sector is not likely to invest as much to attain them as the public's interest warrants. That is one of the principle reasons why, even though the private sector does and will continue to do a great deal of valuable energy R&D, there remains a powerful rationale for government support for and participation in such R&D, as well. I should perhaps emphasize at this point that there was strong industry representation on the PCAST energy R&D panel -- and balance across the fossil-fuel, nuclear, renewables, and end-use-efficiency sectors. I also want to emphasize that many of the recommendations involved the expansion of public-private partnerships in energy research, development, and demonstration, helping to ensure an appropriate combination of market relevance and public benefits in the results.

Notwithstanding the indicated benefits of strong government participation in energy research, development, and demonstration, the PCAST panel found that Federal funding for applied energy-technology R&D had declined drastically in the preceding two decades. Just prior to the first oil-price shock in 1973, this spending had totaled about $1.3 billion per year (converted to constant 1997 dollars), more than 80 percent of it for nuclear fission and fusion and most of the rest in fossil-fuel technologies. Between 1974 and 1978, the total shot up to over 6 billion 1997 dollars, in pursuit of "Project Independence" — independence, that is, from foreign oil. This large expansion in Federal energy R&D was accompanied by a great diversification, with large increments for renewables and efficiency in addition to expansion of the nuclear and fossil-fuel efforts. But after 1978, these expenditures went into a long decline, interrupted briefly and modestly in 1987-92 by an expansion of public-private partnerships in clean-coal R&D; by FY1997, Federal investments in applied energy-technology R&D were back to the 1973 level — $1.3 billion per year in constant 1997 dollars. (The diversity of the FY1997 program was much greater than that of FY1973, however, being quite evenly split among nuclear energy, fossil fuels, renewables, and efficiency; within the nuclear part, fission had almost disappeared, with fusion dominant. As a fraction of real GDP of course, the 1997 energy technology R&D funding was only about half that of 1973.)

Although some of the post-1978 reductions represented cancellations of oversized development projects that deserved this fate, the PCAST panel concluded that the Federal energy-technology R&D programs that remained in 1997 were "not commensurate in scope and scale with the energy challenges and opportunities that the twenty-first century will present", taking into account "the contributions to energy R&D that can reasonably be expected to be made by the private sector under market conditions similar to today's". Accordingly, the panel recommended modifications to DOE's applied energy-technology (fossil, nuclear, renewable, efficiency) R&D programs that would increase funding in these categories from their FY1997 and FY1998 level of $1.3 billion per year to $1.8 billion in FY 1999 and $2.4 billion in FY 2003. The principal recommended increases were (in descending order) in efficiency, renewable, and nuclear (fusion and fission) technologies; recommended initiatives in the fossil category were largely offset by recommended phase-outs. The proposed R&D portfolio addressed the full range of economic, environmental, and national-security challenges related to energy, in their shorter-term and longer-term dimensions. Also recommended were a number of improvements in DOE's management of its R&D efforts. Notwithstanding the diversity of the panel and the complexity of the issue, all of these recommendations were unanimous; there were no dissenting views.

The administration embodied a considerable fraction of this advice in its FY1999 budget request (which contained a total increment about two-thirds of what PCAST recommended for that year) and the Congress appropriated a considerable fraction of that (about 60 percent of the increment requested by the administration). The net result was an increment about 40 percent as large as PCAST recommended for FY1999. The overall PCAST recommendations for FY1999 through FY2003 and their fate in administration requests and Congressional appropriations so far are summarized in the following table. As is apparent there, the requests and the appropriations are growing, but not nearly as rapidly as PCAST recommended. What has been achieved is much better than nothing; but it is not enough.

Table 1. Federal Energy Technology R&D: Congressional Appropriations, Administration Requests, PCAST Recommendations (as-spent dollars)

	effic	renew	foss	nucl fiss	nucl fusn	total
FY98 appropriation	430	272	356	7	217	1282
FY99 appropriation	503	336	384	30	222	1475
Admin request	594	372	383	44	228	1621
PCAST reccmdtn	615	475	379	66	250	1785
FY00 appropriation	546	315	395	40	253	1549
Admin request	655	398	340	41	222	1656
PCAST reccmdtn	690	585	406	86	270	2037
FY01 Admin request	630	410	385	52	247	1724
PCAST reccmdtn	770	620	433	101	290	2214
FY02 PCAST reccmdtn	820	636	437	116	320	2329
FY03 PCAST reccmdtn	880	652	433	119	328	2412

As a follow-up to a recommendation in the 1997 study that more attention should be devoted to the opportunities for strengthening international cooperation on energy innovation, PCAST conducted in 1998-99, at the President's request, an additional study (which I also chaired) focused on the rationales for and ingredients of an appropriate Federal role in supporting such cooperation. The resulting 1999 report, "Powerful Partnerships", noted that many characteristics of the global energy situation that affect U.S. interests will not be adequately addressed if responses are confined to the United States, or to the industrialized nations as a group. The oil-import problem is one compelling example of this, insofar as the pressures on the world oil market — and the disruptive potential residing in the concentration of the world's oil resources in the Persian Gulf — depend on the extent to which many other countries besides the United States are relying on imported oil. The solution therefore depends on the pace at which oil-import-displacing energy options are deployed in other countries, not just in the United States.

The panel found that the world oil problem is far from the only reason for international cooperation on energy-technology innovation, however. This case was summarized in the letter of transmittal as follows:

> *How the global energy system evolves in the decades ahead will determine the extent of world dependence on imported oil and the potential for conflict over access to it; the performance of nuclear energy systems on whose safety and proliferation resistance the whole world depends; the pace of global climate change induced by greenhouse-gas emissions from fossil-fuel combustion; and the prospects for environmentally sustainable economic development that will build markets for U.S. products and reduce the role of economic deprivation as a cause of conflict. U.S. participation in international energy-technology cooperation, in forms and degrees beyond what can or will be undertaken by the private sector alone, is also likely to be crucial in gaining and maintaining access for U.S. firms to many of the fastest-growing segments of the multi-hundred-billion-dollar- per-year global energy-technology market.*

The panel found further (this from the Executive Summary) that

> *existing Federal activities in support of international cooperation on energy innovation — carried out by DOE, USAID, and a variety of other agencies and spending altogether about $250 million per year — are generally well focused and effective. But they are not commensurate in scope and scale with the challenges and opportunities that the international energy arena presents, and they suffer from the lack of an over-arching strategic vision and corresponding coordination to link the activities within and across the agencies into a coherent whole. A particularly conspicuous gap in the government's energy-cooperation activities exists in the demonstration and cost-buy-down stages of the innovation process (between R&D, where DOE's efforts are mainly focused, and deployment, where the activities of the trade-promotion and development agencies are mainly focused). The dearth of activities in this category is substantially slowing the pace at which advanced energy technologies reach commercial viability.*

It recommended

> *substantially strengthening these Federal efforts -- expanding their coverage, increasing their funding, improving the processes for their evaluation, and providing for them an over-arching strategic vision and a mechanism for coordinating its implementation. We propose specific initiatives for strengthening the foundations of energy-technology innovation and international cooperation relating to it (including capacity building, energy-sector reform, and mechanisms for*

demonstration, cost-buy-down, and financing of advanced technologies); for increased cooperation on research, development, demonstration, and deployment (RD^3) of technologies governing the efficiency of energy use in buildings, energy-intensive industries, and small vehicles and buses, as well as of cogeneration of heat and power; and for increased cooperation on RD^3 of fossil-fuels-decarbonization and carbon-sequestration technologies, biomass-energy and other renewable-energy technologies, and nuclear fission and fusion. Most importantly – for without this none of the other initiatives we propose are likely to achieve their potential – we recommend creation of a new Interagency Working Group on Strategic Energy Cooperation, under the auspices of the National Science and Technology Council, to provide a strategic vision of and coordination for the government's efforts in international cooperation on energy-technology innovation. The government's contribution to this expansion of international energy cooperation activities would be provided by a new Strategic Energy Cooperation Fund amounting to $250 million for FY2001 and increasing to $500 million in FY2005, the proposed allocation of which to the relevant agencies in the President's budget request would be determined with the help of the Interagency Working Group.

In a decision memorandum last September responding to the report, President Clinton directed that the indicated interagency working group be formed and that the relevant agencies consider the PCAST panel's funding recommendations in preparing their FY2001 budget requests. All this was done. The budget request ultimately submitted by the administration to the Congress contains $100 million in FY2001 for initiatives arising from the new PCAST recommendations. I very much hope the Congress will treat these initiatives favorably, because I believe that they — along with the national energy R&D initiatives recommended in the 1997 PCAST study — represent indispensable ingredients of the technology component of an appropriate strategy for addressing the oil-import challenge as well as many other ingredients of the energy/economy/environment problem.

Another crucial ingredient of such a strategy is the array of price and non-price incentives and other policies that will shape the pace at which the best available technologies for reducing oil imports get deployed (as well as affecting the pace of private-sector research to improve such technologies)...but that is a matter for another day. I thank you for the opportunity to put these views before the Committee.

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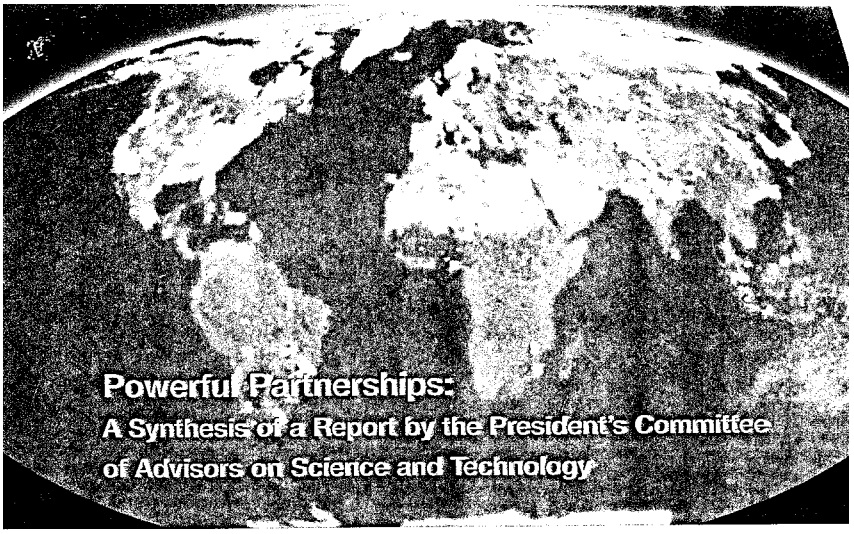


"Advanced energy technologies can help meet the challenges of economic development, national security, and environmental quality." President Bill Clinton, July 23, 1998

It is in our fundamental National interest to greatly strengthen international cooperation in energy innovation. The President's Committee of Advisors on Science and Technology (PCAST) concluded that continuing our current energy trajectory would be "problem plagued and potentially disastrous." Unless innovation to increase energy end-use efficiency and to improve energy supply technologies is both rapid and global, world energy demand is likely to soar in the next century to four times today's level, entailing higher consumer costs for energy, greater oil-import dependence, worse local and regional air pollution, more pronounced climate disruption from greenhouse gases, and bigger nuclear energy risks than today. And if the United States abdicates leadership in international cooperation on energy technology while others forge ahead, it will cost U.S. firms dearly in their share of the multi-hundred-billion-dollar-per-year global market in energy-supply technologies, most of which is and will remain overseas. As the world heads into the next millenium, however, there is a window of opportunity — open now but closing fast — to move the world off this troublesome path. The choices the United States makes today will influence the evolution of the global energy system for many decades to come (Box I). The United States has strong stakes in the future economic, national security, and environmental course of world energy development. (See references 1,2.)

Initiatives are recommended in four areas:

- Strengthening capacities for energy technology innovation through education and training; creation and support of regional centers for energy research and deployment; promotion of energy sector reform that attracts private capital while protecting the public interest; and creation of mechanisms for demonstration, cost-reduction, and financing of advanced energy technologies;
- Promoting technologies to limit energy demand by increasing efficiency of energy use, particularly in buildings and appliances, small vehicles and buses, energy-intensive industries, and cogeneration of electricity;
- Promoting technologies for a cleaner energy supply, with emphasis on biomass, wind, solar, and other renewable energy sources, using fossil fuels far more efficiently, developing technologies to capture and store carbon, and nuclear fission and fusion; and
- Improving management of the Federal portfolio, including with external oversight.

These programs go beyond spurring research and development; they are designed to catalyze and facilitate efforts of the private sector, and will launch advanced energy technologies into substantial international markets, free of the need for ongoing government subsidies.

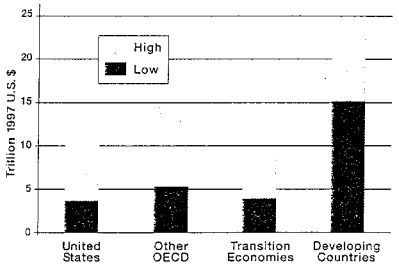
August 1999

Energy use will grow dramatically worldwide—particularly in developing nations. Most of the twenty-fold world energy growth since 1850 has occurred in the industrial countries, and fossil fuels account for 78 percent of the world's energy supply (Figure 2). In the next two decades, however, over half of global energy growth will be in the developing and transition economies as those nations improve their standard of living. This growth will reduce the disparities in present per capita energy use (Figure 3) and improve well-being for the poorer inhabitants of the planet, but this rapid growth in total world energy use could further exacerbate the energy-linked problems and challenges already of great concern today.

Technological innovation and the policies adopted to promote efficient and clean energy technologies will determine the quantity of energy used in the future and the impact of that energy use. An energy future that continues recent trends, including heavy reliance on conventional fossil fuel technologies, would commit the world to increased smog, acid rain, and other conventional air pollution problems, as well as the risk of climate change from increasing atmospheric carbon dioxide, approaching levels not seen on the planet for millions of years. Vigorous deployment of energy efficiency technologies, on the other hand, would mean the difference between doubling and quadrupling world energy supply by 2100 — a quantity of energy equal to the current oil output of nearly 50 Saudi Arabias — reducing the economic and national security consequences of such massive growth. Use of clean fossil, nuclear and renewable energy technologies means avoiding many of the environmental impacts looming in the coming century (Figure 2).

A significant portion of the demand for new energy technologies will be outside of the United States under any future scenario. Between now and 2050, investments in new energy technologies in developing nations will likely approach $15 to $25 trillion dollars, accounting for more than half of the global investments in energy supply (Figure 1). Ninety percent of the markets for coal, nuclear, and renewable energy technologies are expected to be outside of the United States in the coming decades. Strategic investments today — by the U.S. government and the private sector — will assist strong participation in those markets tomorrow.

Figure 1: Projected Total Investment in Energy-Supply

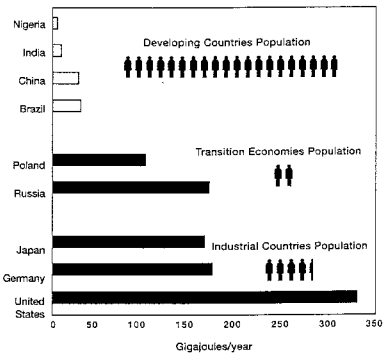


Future investments in energy supply technologies will be much larger outside the United States. Developing countries will account for the largest share—roughly $15-25 trillion from 1990-2050. Energy efficiency investments will be of similar magnitude as countries develop their buildings, industry, and transport infrastructures. Adapted from (3).

Box 2: The Window of Opportunity

- ***Energy-sector restructuring and regulatory reform*** **in many countries will be largely completed over the next decade and will "lock in" the mechanisms determining success or failure in the dual aims of attracting private capital and addressing public benefits.**
- ***Rapid urbanization*** **will "lock in" land-use patterns and infrastructure — including the configuration of urban transportation networks, patterns of urban sprawl, and building design — for a century or more.**
- ***Investments in energy research, development, demonstration, and deployment made today*** **will influence the characteristics of the world energy system for many decades. Many energy technologies deployed between now and 2020 will still be in operation in 2050. Investments made today in research and development will determine the new technologies available for deployment between 2020 and 2050. Thus, today's choices will strongly influence energy costs, greenhouse gas emissions, oil dependence, proliferation resistance, and public-health impacts for the balance of the next century.**

Figure 3: Per Capita Energy Use and Population



Current per capita energy use shown for selected countries and total population in developing countries, reforming economies, and OECD countries. (Excludes traditional biomass.) One ☨ = 200 million people. 1 Gigajoule = 0.95 million Btus = 7 gallons of gasoline. Data drawn from (4).

Government has a critical and legitimate role to play. The private sector plays the major role in energy innovation and related international cooperation. Private-sector investments alone, however, will not adequately capture the full range of public benefits — like reduced pollution, increased energy security, long-term technology innovation, and developmental equity issues. Government activities focused on filling the gaps in private-sector investment can achieve significant benefits for the United States.

Current government programs cannot meet the challenges of future global energy growth. In 1997, government expenditures on international cooperation on energy innovation amounted to about $250 million per year, but these funds were primarily in nuclear fission and fusion. The government has few programs to bridge the gap between R&D and commercial deployment. The lack of government programs for the middle part of the technology innovation "pipeline" — demonstration and early deployment — impedes the commercialization of innovative energy technologies (Figure 4). To address the full spectrum of energy technology needs, PCAST recommends doubling the present funding for federal programs in international energy cooperation in FY 2001, focusing on programs that build stronger foundations for energy technology innovation, promote innovation in energy end-use, and promote clean and efficient energy supply. (See Table.)

Strengthening North-South cooperation on clean and advanced energy technologies is a promising approach to helping secure developing country participation in an international framework for addressing global climate change. The United Nations Framework Convention on Climate Change — signed by President Bush and ratified by the U.S. Senate — calls explicitly for such cooperation. This cooperation would help provide the alliances, information, and foundations needed to achieve specific developing nation commitments to greenhouse gas emissions-reductions targets and timetables.

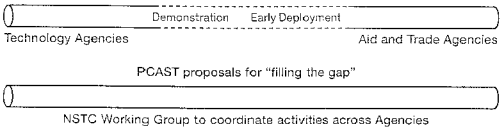
Greater cooperation with other industrial countries can help build the scientific and technological basis for more rapid innovation in the energy sector. Industrial country cooperation can also play a key role in developing the competitive mechanisms needed to bridge the gap in the innovation pipeline (Figure 4) for technologies with significant public benefits.

A unified vision and coordinated management structure will enhance U.S. international cooperative efforts on energy. PCAST calls for a new Interagency Working Group on Strategic Energy Cooperation under the National Science and Technology Council, to provide overall coordination and assess agency programs. The Working Group should have an Advisory Board drawn from the private, academic, and NGO sectors. PCAST recommends that the Working Group conduct portfolio assessments to help oversee development of a coordinated Strategic Energy Cooperation Fund, designed to promote and support programs in international energy cooperation.

The Panel concluded:

"The needs and opportunities for enhanced international cooperation on energy-technology innovation supportive of U.S. interests and values are thus both large and urgent. The costs and risks are modest in relation to the potential gains. Now is the time for the United States to take the sensible and affordable steps outlined here to address the international dimensions of the energy challenges to U.S. interests and values that the 21st century will present."

Figure 4: The "technology innovation" pipeline today, with primary Agency supports



The innovation pipeline for energy technology has a significant gap between government programs for R&D and government programs to support successful commercialization. This gap constrains the deployment of innovative technologies. To bridge that gap, PCAST recommends mechanisms for demonstrating technologies, competitively buying-down their price, and for coordinating the work of the technology development, aid, and trade agencies. Agencies involved include the Departments of Commerce, Energy, and State, the United States Agency for International Development, the Environmental Protection Agency, Export-Import Bank, Overseas Private Investment Corporation, and the Trade and Development Agency, among others.

This study responds to President Clinton's request to identify "ways to improve the U.S. program of international cooperation on energy R&D to best support our nation's priorities and address the key global energy and environmental challenges of the next century." A PCAST Panel investigated these issues intensively for 9 months and wrote a comprehensive report. This Panel included fourteen experts drawn from a diverse mix of industry, academic, non-governmental and other organizations, and with a wide variety of backgrounds and perspectives. Despite this diversity, these members were unanimous in making the recommendations in this report, noting that there is a narrow window of opportunity for the United States to respond to the urgent needs they identified (Box 2). The full PCAST has also endorsed this report. The PCAST serves as the highest level private sector science and technology advisory group for the President and the National Science and Technology Council.

The PCAST Panel on International Cooperation in Energy Research, Development, Demonstration, and Deployment

John P. Holdren
Harvard University
PCAST Member
(Panel Chair)

Richard Balzhiser
Electric Power Research Institute

John P. Boright
National Research Council

William Chandler
Battelle Pacific Northwest National Laboratory

John M. Deutch
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Larry T. Papay
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Nathan Rosenberg
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Maxine Savitz
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Bruce N. Stram
Enron Energy Services

Robert Williams
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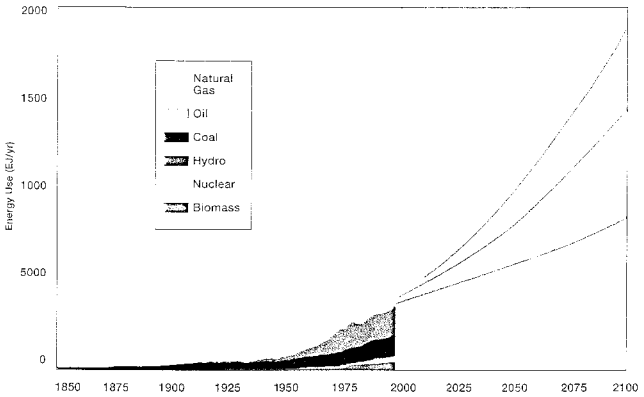
Study Executive Director
Samuel F. Baldwin
National Science and Technology Council

Assistant to the Chair
Paul de Sa
Harvard University

Figure 2: Historical and Projected Energy Use



World energy use is growing rapidly and is dominated by fossil fuels. The future path depends on economic growth, technological change, and investments in energy efficiency. 1 Exajoule = 0.95 Quad = 160 million barrels of oil. Adapted from (3).

Box 1: Global Energy Challenges and the U.S. National Interest

- ***Economic:*** International cooperation provides economic opportunities for U.S. companies to access global energy supply technology markets, worth hundreds of billions of dollars each year. Action now can give U.S. companies access to the best innovative ideas in the world and open doors to these markets, the bulk of which will be outside of the United States in the coming century (Figure 1). Such innovation will also lower the cost of energy for U.S. consumers.
- ***National Security:*** New technology to power vehicles with greater efficiency or with alternative fuels reduces domestic and international dependence on oil supplies from politically volatile regions. Advanced reactor designs can potentially reduce nuclear proliferation risks. Clean energy supplies for economic development enhance the political and economic stability needed for sound markets and international trade.
- ***Environmental:*** Clean, low-carbon sources of energy—renewable, advanced fossil, and nuclear—together with energy-efficient cars, buildings, and industries, can reduce air pollution and greenhouse gas emissions and nuclear reactor waste and safety concerns domestically and internationally. It can also help create a framework for wider cooperation on the energy climate challenge in which developing, transition, and industrialized countries alike will participate.

References:

1. President's Committee of Advisors on Science and Technology, Panel on Energy Research and Development, *Federal Energy Research and Development for the Challenges of the Twenty-First Century*, (Washington, DC: Office of Science and Technology Policy, November 1997), http: www.whitehouse.gov WH EOP OSTP html/OSTP_Home.html

2. President's Committee of Advisors on Science and Technology, Panel on International Cooperation in Energy Research, Development, Demonstration, and Deployment, *Powerful Partnerships: The Federal Role in International Cooperation on Energy Innovation*, (Washington, DC: Office of Science and Technology Policy, June 1999), http: www.whitehouse.gov WH EOP OSTP html OSTP_Home.html

3. N. Nakicenovic, A. Grübler, and A. MacDonald, eds., *Global Energy Perspectives* (Cambridge, U.K.: Cambridge University Press, 1998).

4. World Bank, *World Development Report 1998/99: Knowledge for Development*, (New York, NY: Oxford University Press, 1999).

The cover photo shows electric lights on earth at night, adapted from satellite imagery. Courtesy of NASA.

Initiatives and Budgets (Budgets in Millions of $ Supplemental Spending)

		FY2001	FY2005
FOUNDATIONS OF ENERGY INNOVATION			
Capacity Building	Increase the capacity for energy innovation by investing in education and training programs and supporting regional centers for energy research, development, demonstration, and deployment.	$20M	$40M
Energy Sector Reform	Provide assistance for energy-sector reform that attracts private investment and includes mechanisms to protect the public's interest in energy innovation that reduces environmental impacts, addresses the energy needs of society's poorest members, and provides other societal benefits not captured in markets. Provide assistance in establishing regulatory frameworks for natural gas grids.	20	40
Demonstration and Cost Reduction	Establish an international Demonstration Support Facility to promote pre-commercial, private-sector-sponsored demonstrations of clean and efficient energy technologies. Allow energy-production tax credits for U.S. firms participating in demonstration projects abroad. Promote market-based mechanisms to reduce the difference in cost between advanced and conventional energy technologies by means of the learning that accompanies increased production.	40	80
Financing	Encourage the World Bank and other multilateral development banks to increase financing for clean and efficient energy technologies; provide trust funds to the banks for analytical and assessment activities in support of such lending. Facilitate market-based finance of these technologies by creating a fund administered by the Overseas Private Investment Corporation to mitigate financing risks in private and joint public-private projects of this type abroad.	40	80
A PORTFOLIO OF ENERGY EFFICIENCY RESEARCH, DEVELOPMENT, DEMONSTRATION AND DEPLOYMENT			
Buildings	Reduce energy use of new buildings in developing and transition economies by 50% by 2020 by assisting them to develop efficiency standards, ratings, and labeling for building equipment as well as design tools, energy codes, and standards for building shells. Encourage multilateral development banks and the Global Environment Facility to support such measures.	20	40
Transport	Expand research, development, demonstration, and cost-reduction efforts to achieve inexpensive, efficient, and clean small vehicles and buses. Assist in analysis and implementation of vehicle emissions testing and standards. Engage the multilateral development banks and the Global Environment Facility in support of these measures.	20	40
Industry	Invent the factories of the 21st century through U.S. public/private/foreign partnerships to develop and implement energy-efficient technology roadmaps for energy-intensive industries.	10	20
Combined Heat and Power (CHP)	Maximize CHP's (cogeneration's) share of the market for new power generation in developing countries through collaborative assessments of potential CHP sites, addressing regulatory/market barriers, attracting funding for demonstrations, helping secure financing, and through information and training programs.	10	20
A PORTFOLIO OF ENERGY SUPPLY RESEARCH, DEVELOPMENT, DEMONSTRATION AND DEPLOYMENT			
Renewables	Achieve widespread use of renewables, comparable to fossil fuel use today, by 2025-2050. Conduct research, development, demonstration, and cost-reduction efforts on industrial-scale use of biomass to generate power and coproducts and on integrated renewable energy and hybrid systems for use in rural areas. Accelerate deployment of grid-connected intermittent renewable/hybrid systems.	40	80
Fossil Fuel	Develop economic fossil fuel decarbonization and carbon-storage technologies with near-zero carbon and pollutant emissions, including low-cost hydrogen production and byproduct carbon recovery. Evaluate carbon-reservoir potential.	20	40
Nuclear Energy	Preserve nuclear energy as a 21st century option by expanding the Nuclear Energy Research Initiative with increased international cooperation addressing cost, safety, waste, and proliferation issues for nuclear fission. Increase international cooperation on spent-fuel management and high-level wastes. Pursue new international agreement on fusion R&D.	10	20
A SET OF MANAGEMENT RECOMMENDATIONS			
Agency Management	Establish an interagency working group under the National Science and Technology Council, with an external Advisory Board, to provide strategic vision, interagency coordination, portfolio analysis, and strengthened evaluation. Agencies would use competitive solicitations to identify best approaches. Strengthen agency international capabilities.		
TOTAL	Strategic Energy Cooperation Fund	$250M	$500M

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http://www.whitehouse.gov/WH/EOP/OSTP/html/OSTP_Home.html

Statement of Adam E. Sieminski

for the

U.S. Senate Committee on Governmental Affairs

World Oil Market Outlook

March 24, 2000

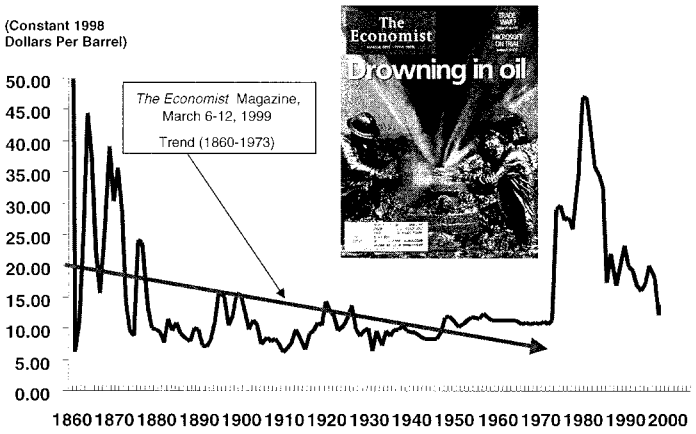
Adam E. Sieminski is a Director and Energy Strategist at DB Alex. Brown LLC.
The opinions expressed in this testimony are those of the author
and do not necessarily reflect the views of Deutsche Bank or DB Alex. Brown

Highlights:

In my view, oil prices are likely to come back down toward $20-$22 WTI but it may take until the second half of 2000 to get there. We do not believe there is a new $25-$30 oil price paradigm now any more than there was a $5-$10 paradigm in 1998. However, **OPEC and Saudi Arabia may not have the desire or the will to bring the oil market quickly back into equilibrium.**

- Markets have been extremely volatile but tend to be self-correcting.
- Current high prices stem from a reaction to a period of low prices caused by an ill-timed OPEC output increase in November 1997. This supplemented rampant quota cheating just as Asian demand plummeted during its contagious financial crisis.
- OPEC has staged a dramatic comeback but it remains highly sensitive to the 1997 failure. It does not want to repeat past mistakes, and is thus being overly cautious, in our view.
- Crude oil and product inventories are low but companies have probably realized efficiency gains that enable them to operate the supply system on lower inventories. The heating oil price spike in late January showed the sensitivity of prices to the low level of inventories. Low gasoline inventories have left the U.S. highly susceptible to a gasoline price spike this spring.
- Although the outlook for Iraqi output is unclear, a recovery from recent lows could occur. Political maneuvering in an effort to gain concessions from the UN may result in lower exports. Alternatively, the need for cash may cause Baghdad to maximize production despite reports of damaged wells following last year's high output levels.
- Substantial disagreement within OPEC has left markets guessing about the level of production increase likely to be agreed by the OPEC ministers at their March 27 meeting. Some countries, namely Algeria, Libya and perhaps Iran, want to extend current output quotas. Saudi Arabia, Venezuela and non-OPEC Mexico support a near-term increase but the volumes are uncertain.
- Longer term, OPEC's agreement on quotas could become more difficult to achieve due to the uneven spread of spare capacity among the cartel members.
- Petroleum demand is definitely rising with higher economic growth. Although the full economic impact of high oil prices won't be known until after the fact, oil is not as influential in the economy now as it was in 1980. And, nevertheless, we expect that there will be some impact on demand from higher prices.
- Although non-OPEC supply has been slow to respond to higher prices, there should be substantial gains in 2000. Higher company spending on exploration and production in this year's second half could impact production in 2001-2002.

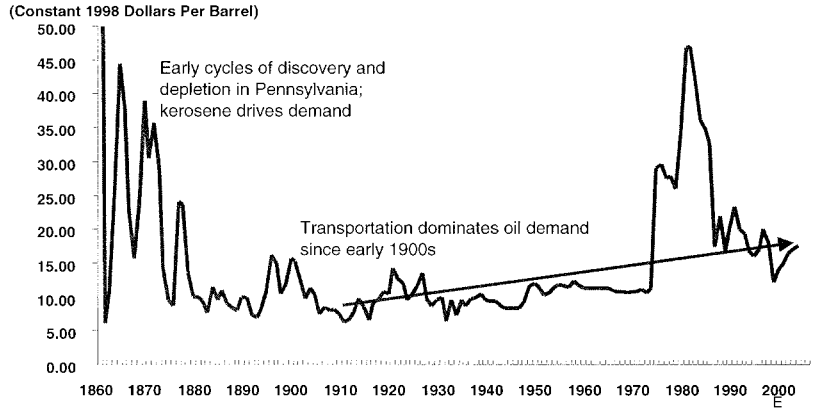
US oil prices since 1860 ...long term decline theory



Source: API, DOE, and Deutsche Banc Alex. Brown estimates

U.S. oil prices since 1860 ...long term decline theory. This chart shows U.S. oil prices since 1860, and was used to illustrates a magazine article in the March 1999 issue of *The Economist* titled "Drowning in Oil." **It seems amazing that less than a year ago, many analysts believed that oil prices were headed down to $5 or $10 a barrel and were likely to stay there for some time.** The long-term decline theory in prices was being influenced by the low prices of 1998. There was a lot of discussion and concern that technology had lowered the cost of finding oil, and that the lack of discipline in OPEC would be impossible to overcome. This combination was seen as virtually "guaranteeing" low oil prices.

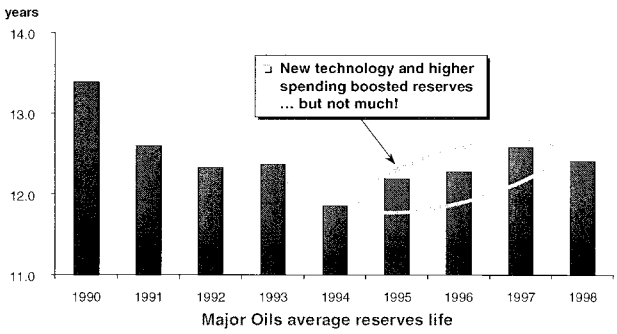
US oil prices since 1860 ...no downward trend in post-1900 data



Source: API, DOE, and Deutsche Banc Alex. Brown estimates

U.S. oil prices since 1860...no downward trend in post-1900 data. It seems to me that there were several things that *The Economist* missed. **The first big mistake was to rely on too much history.** The first 50 years of the oil industry from 1860 to the late 1800s -- when prices were actually quite high in today's dollars -- was the age of kerosene. Oil was being used for lighting. The world entered the transportation age in the early 1900s, and I believe we are still in that mode. Transportation uses dominate current petroleum consumption. In the US, for example, almost 2/3 of oil is used in transport. I think that you could argue just as easily -- looking at the chart since 1900 -- that oil prices have been on a slight rise in real terms rather than on the long-term decline that *The Economist* magazine and others forecast.

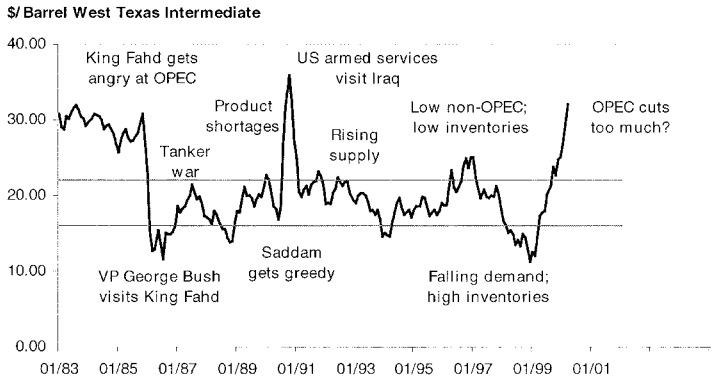
Reserve lives responded only sparingly to new technology and massive spending



Source: Deutsche Bank estimates

The arguments about technology and cost, I think, are quite valid but limited. Technological improvements did lower finding costs, but if you look at production profiles for the companies, as well as reserves and finding rates, the story is less compelling. Over the last decade, producers have been finding and developing more of the oil that was already in place but they have not really been adding to reserves with an overwhelming amount of new discoveries. On the issue of OPEC's discipline, I think that was answered in March of 1999. There is always the potential for OPEC to lose control of the market as they did in 1998. However, the economic losses of the producing countries in 1998 created an enormous incentive to band together and we believe that discipline is still fresh in the oil ministers' minds.

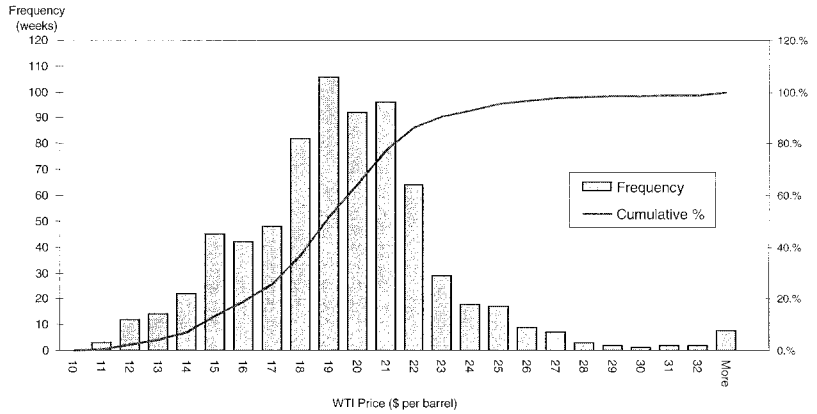
Oil prices 1983-2000: OPEC compliance induces a recovery



Source: NYMEX; Deutsche Banc Alex. Brown

Oil prices 1983-2000: OPEC compliance induces a recovery. This illustration depicts some of the economic and political issues that tend to drive oil prices up and down. The pricing band shown here runs from $16-$22 in nominal terms for WTI. **In my view, prices tend to remain in that band unless there is something extraordinary that drives them out of the range -- Shocks and Counter-Shocks.** In 1998 we had a number of extraordinary developments, and we may be seeing some new ones in 2000.

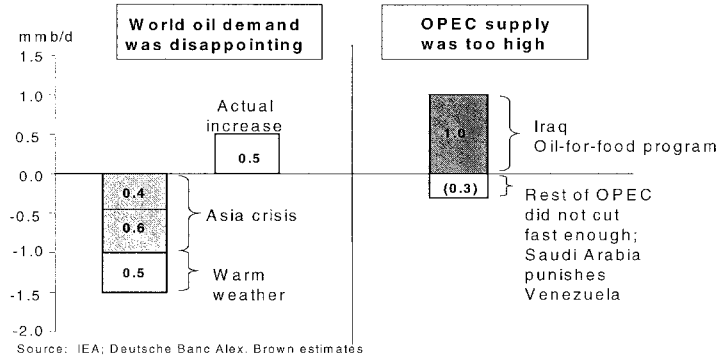
Frequency distribution of crude oil prices (1986-Present)
...the central tendency for oil prices has been $18-$22



Source: NYMEX and Deutsche Banc Alex. Brown

Frequency distribution of crude oil prices (1986-Present). This graph shows the frequency distribution of weekly WTI prices since 1986. We picked 1986 because that is the year the Saudi Arabian government changed its method of oil market management from "price targets first" to "volume targets first." What I find especially interesting about this illustration is that most of the prices fall in the $18-$22 a barrel range, with $19-$21 predominating. **The $18-$22 range was frequently mentioned by the OPEC ministers during much of 1999 as being the oil price target.** Notice that there are few weekly observations below $15 and there are not many over $25. One standard deviation on this data is about $2. WTI at $28 is four standard deviations from the mean and substantially out of the historical range of prices that the market -- and I think Saudi Arabia -- has preferred.

What went wrong in 1998?



What went wrong in1998? Why did oil prices fall so low? **It turns out that 1998 was a very unusual year.** The Asian Economic Crisis took 1 million barrels per day away from demand projections for 1998 made in late 1997. The actual demand decline in Asia during 1998 was something on the order of 400,000 b/d. Prior to 1998, however, it was expected that Asian demand would grow about 1 million b/d. Warm weather took away 500,000 b/d of demand.

The United Nations, at the end of 1997, changed the Oil for Food program and 1 million b/d more Iraqi supply entered the market in 1998. The rest of OPEC did very little in 1998, on balance, to reduce production. During 1998 there was still a major political dispute ongoing between Saudi Arabia and Venezuela over the future of OPEC and the "rights" to the downstream products markets in the United States. It wasn't until the election of Hugo Chavez in late 1998 and his inauguration in February of 1999 that Saudi Arabia and Venezuela struck a political deal. In return for assurances of higher prices, Venezuela agreed to reduce its production. Mexico agreed to a "standstill" on sales to the U.S., and Iran agreed to provide supporting rhetoric in return for a higher quota. It did not help that the ruble crisis encouraged Russia to boost exports in an effort to get hard currency and that China reduced its oil imports in order to conserve its dollar holdings.

Missing Barrels: The Sequel

mmb/d	1998	1999	2000E
Demand	74.0	75.3	76.8
Non-OPEC supply	44.7	44.6	45.6
OPEC NGLs	2.8	2.8	2.9
OPEC crude needed	26.5	27.9	28.3
OPEC crude sold	28.0	26.6	28.0
Implied stock change	1.6	(1.3)	(0.4)
	Shock!	Countershock!	Still not in balance!

Assumes OPEC adds at least 1.6 mmb/d in 1Q00 and 1.0 mmb/d more in 4Q 2000 -- and implies that inventories still decline

Source: IEA and Deutsche Banc Alex. Brown estimates 14-Mar-00

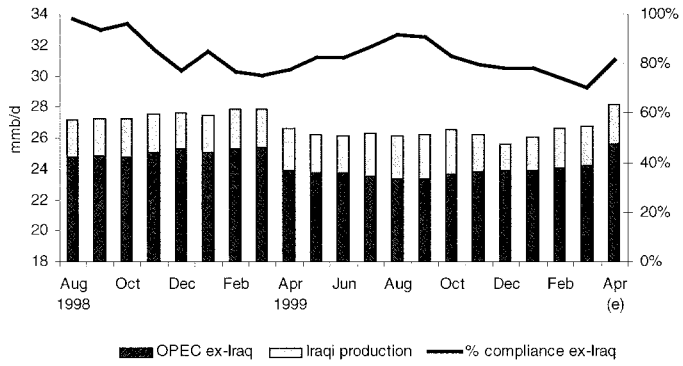
Missing Barrels: The Sequel. In late 1998, the discrepancies between reported high supplies and lower reported demand fueled worries that "Missing Barrels" might flood back into the market at any time and suppress prices. What you can see in these numbers is that in 1998 there was a fairly large build in "implied stocks." The "implied stock change" is derived from the difference between supply and demand estimates. Nothing is put in for actual inventory change or the "balancing item" that is often used by analysts to try to make the supply and demand numbers agree.

In 1999 implied stocks fell. Somewhere in the world, inventories were being drawn down in 1999 by about as much as was built up in 1998 or maybe even a bit more. **The counter-shock that is hitting the system now, in our opinion, is this: Demand is rising in 2000 to about 77.0 million b/d, non-OPEC supply is to rise about 1.1 mmb/d, and OPEC natural gas liquids (NGLs) are somewhat higher than they were in 1999 at 2.9 mmb/d.** All this suggests that the amount of OPEC crude oil needed in 2000 is somewhere near 28.4 mmb/d. The problem is that OPEC is only producing about 26.4 mmb/d.

The total implied stock change for 2000 is about 1.7 mmb/d or over 600 million barrels. In my view, this is a physical impossibility. There is no way that the oil inventory system can supply 700 million barrels. Even if you assumed that some of the hidden barrels that generated such concern in 1998 are still out there and could appear via the balancing item to help align supply and demand -- maybe 400,000 b/d -- that would still leave 1.3 million barrels of stock draw unless OPEC produces more than the 26.6 mmb/d average of 1999. That is simply not workable, in our opinion. OPEC's supply to the oil market must rise.

If OPEC increases production by 1.6 mmb/d in April and another 1.0 mmb/d in October, as some OPEC ministers have suggested may occur, the average output for the year would rise to 28.0 mmb/d. This would come close to balancing the markets – as long as some of the non-OECD inventory (missing barrels) are available. Absent the missing barrels, OPEC's supply increase would have to be 0.4 mmb/d higher or demand would have to be 0.4 mmb/d lower.

OPEC production has declined significantly
...but compliance has slipped as market has tightened



Source: IEA; Deutsche Banc Alex. Brown estimates

OPEC production has declined significantly...but compliance has slipped as the market has tightened. A few months ago I thought compliance was holding somewhere near 90%. But it is apparent now that December production rose in Saudi Arabia and elsewhere following encouragement by the U.S. government, not only because of high prices in early December, but also because of a fear of Y2K shortages. The International Energy Agency has also revised upward some of its earlier OPEC production estimates. **Compliance is now closer to 70%, rather than the 90% we had been assuming earlier.** That's a difference of about 850,000 b/d. This leakage is not enough to destroy current pricing but it could grow and cap prices -- or eventually bring them down.

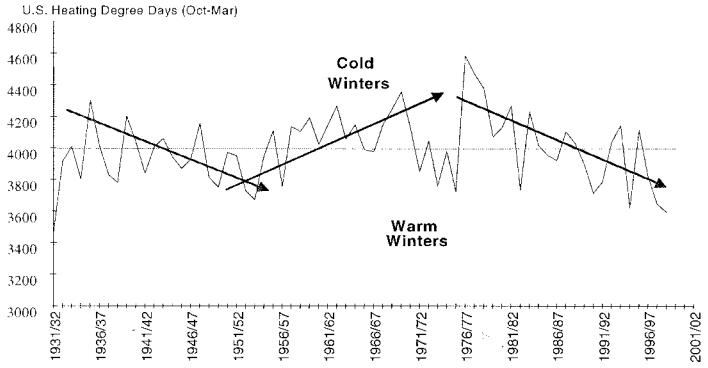
In my view, to get oil prices to really fall from where they are now, OPEC has to add a significant amount of new production on top of this existing level of quotas plus cheating. Our calculations suggest that an increase in actual output of 1.5 to 2.0 mmb/d is necessary to get inventories moving back towards normal levels. **My belief is that this is either going to be done officially at the March 27 meeting -- or in "gray market" cheating by some of the countries that can add production such as Saudi Arabia, Kuwait and the UAE.**

What could go wrong with a forecast that says supply and demand are out of balance? The following factors could influence our forecast the most:

- weather
- the economic outlook
- Iraqi exports
- non-OPEC supply
- OPEC compliance

A Recent Warm Winter Trend?

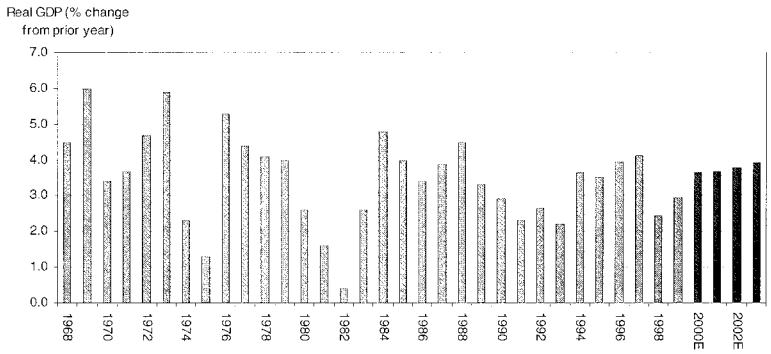
...or are we due for a "countershock" reversion to the mean?



Source: NCDC, Deutsche Banc Alex. Brown

A Recent Warm Winter Trend?...or are we due for a "countershock"? This shows US weather trends. Looking at the October-March heating degree-day data for the United States, it does seem that a warming trend has been underway since the mid-1970s. This is not global warming -- a phenomenon that deals with a gradual warming over a very long-term period (50-100 years). **Rather, it appears to be a cyclical pattern that involved a similar warming trend from the mid 1930s to the early 1950s followed by a cooling trend to the late 1960s.** In fact, there are meteorologists who now believe that temperature cycles may be related to sun-spot activity. Because of the recent warming, the definition of "normal" has been revised to be somewhat warmer than the old values. But even assuming warmer weather, on average, and therefore lower demand, this doesn't seem to be enough to balance the system. In 1998, extremely warm weather cut 500,000 b/d of demand. That's still not enough to balance the supply deficit we have now.

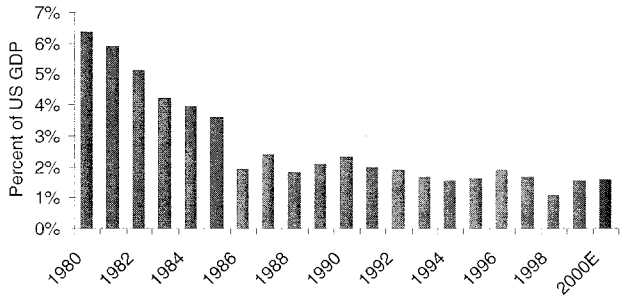
The economic cycle drives demand
...world GDP growth x 0.7 gives estimated oil demand rise



Source : IMF, Deutsche Banc Alex. Brown estimates

The economic cycle drives demand. Could the economy stumble and lead to lower oil demand? That's certainly possible, **but the consensus forecast for 2000 calls for world economic growth of about 3.5%.** The forecast for 2001 is a little higher. We are seeing economic improvement in Asia, Europe is doing okay, and the United States is doing remarkably well. This translates into an oil demand increase of something like 2.5 percent in the year 2000, or about 1.5 million b/d. Oil demand should rise by even more than that in the year 2001.

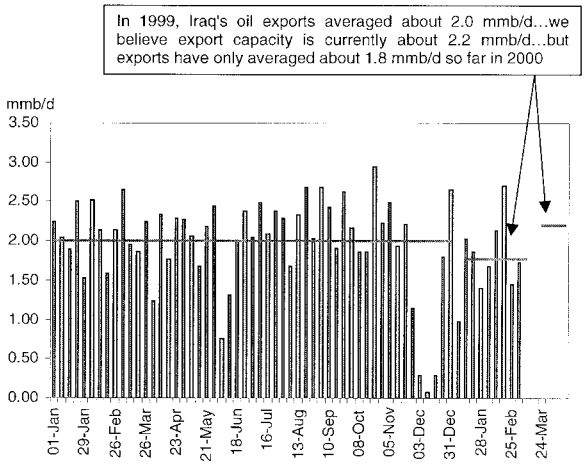
Value of Oil as a Percent of GDP
...oil's importance to the US economy has declined



Source: US EIA/DOE and Deutsche Banc Alex. Brown estimates

Oil's importance to the U.S. economy has declined since 1980. The expansion of the economy -- particularly the expansion of the services sector -- plus the decline of the real cost of petroleum and petroleum products are the major contributing factors to this downward trend. In 1980, the value of oil in real terms amounted to over 6% of GDP. We estimate that figure has dropped to less than 2% at the present time.

Iraq's weekly oil exports since January 1999 (mmb/d)



Source: UN Office of the Iraq Programme; Deutsche Banc Alex. Brown

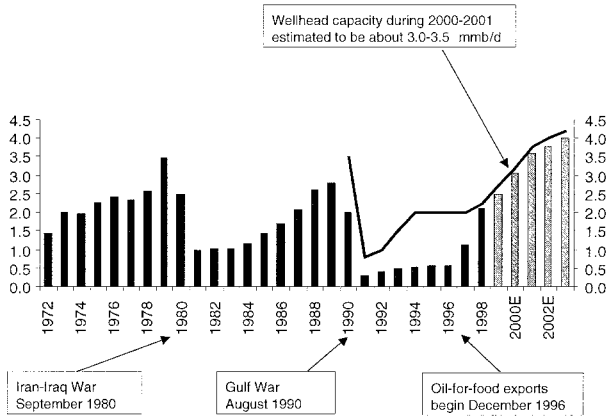
Iraq's weekly oil exports since January 1999. What about Iraq? **Iraqi production could make a sharp comeback.** Iraq has already boosted exports from virtually nothing in mid-1997 to an average of about 2.3 mmb/d in October and November 1999. Production is about 500,000 b/d greater than exports. The United Nations is clearly moving towards allowing more Iraqi oil exports, in my view. However, Iraq itself is not yet cooperating with the UN Security Council's new plan for weapons inspection. Until Iraq complies with this new program, it's going to be very difficult to get the level of foreign capital from the French, the Russians or the Chinese to enable production development to take place along the lines of what is illustrated in this slide.

Iraq's low January output rates seem to stem from a mixture of both politics and technical problems. Technically, Saybolt, the U.N.'s engineering consultant, claims Iraq's wells are severely damaged from last year's high rates. Not surprisingly, Iraq sticks to this line as well. Other signals, however, point toward political gamesmanship. Iraq is annoyed that the UN has put spare-parts contracts on hold. When Iraq projected total production of 3.1 early this year and 3.5 in mid 2000, it was relying on the arrival of spare parts - dehydration and desulfurization units. It could produce 2.6 or so now, the thinking goes, but it does not want to further damage its reservoirs.

Also, another important element is high prices. Although the UN ended the $5.26 billion ceiling on Iraqi exports, Iraq has informally claimed to maintain its adherence to this cap under the theory that acceptance of this change would imply an acceptance of the new resolution in total. If Iraq holds this line, it would bump up against the $5.26 billion ceiling by mid March. An export cut could both buy Iraq time to export through the end of March while simultaneously pressuring the U.S. to allow the procurement of more spare parts.

Other evidence suggests this is simply political gamesmanship. First, there is now no ceiling, regardless of Iraq's acceptance or denial. Second, in its distribution plan, Iraq has already committed to $6.3 bln in sales. Third, Iraq has no say in the rescindance of the resolution. We stress, however, that Iraq has not formally stated a policy of continued obedience to the old export ceiling. Further, the drop in exports in January was caused not by well damage, but a weather- and Y2K-related pipeline problem at Ceyhan in early January, weather at Ceyhan in mid January, and weather at Mina-al-Bakr in late January. In short, Iraq seems to be adopting an intentionally-vague posture during its recent drop in exports to show the world, not just the US, that it needs spare parts.

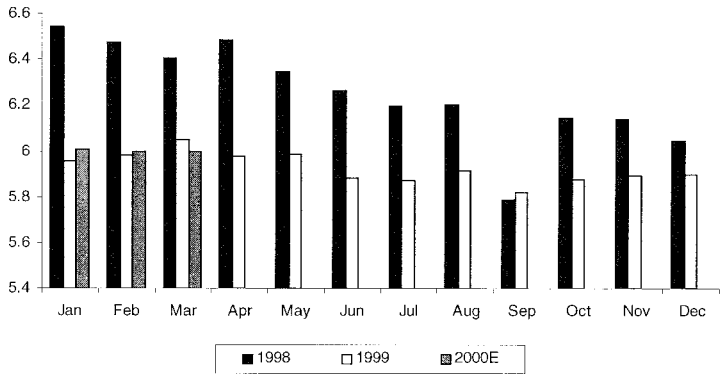
Iraq's production seen moving above pre-war levels
...if investment flows are allowed by the UN



Source: U.S. DOE and EIA; Deutsche Banc Alex. Brown

Right now, with the U.S. presidential elections under way, it would seem that the U.S. government has every incentive to try to remain as tough as it can be on Iraq -- making the regime in Baghdad adhere to weapons inspection before allowing them to push substantially more oil onto the world markets. In the meantime, on a short-term basis, Iraq is capable of exporting 2.3-2.5 million b/d. By the end of this year, it might be able to increase production to 3.5 mmb/d, and thus exports to 3.0 mmb/d, but even this may be a struggle in terms of engineering and repair activity.

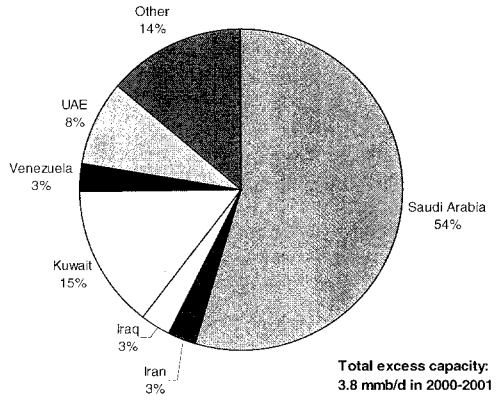
U.S. crude oil production responds to prices
... but DOE reports steadier output recently vs. drop in 1998



Source: U.S. DOE/EIA and Deutsche Banc Alex. Brown estimates

US crude oil production responds to prices. What about non-OPEC production? In this illustration, for example, you see the big decline in U.S. production that took place in 1998 when prices fell. However, in 1999, production flattened out quite a bit. Towards the end of 1999, based on the Department of Energy estimates, U.S. production looks like it actually recovered somewhat from earlier in the year. **In addition to new fields in the Gulf of Mexico, this probably suggests that output from stripper wells and heavy oil in the U.S. does respond to prices.** I would think that there would be a similar response in Canada and some other regions. Eventually, with prices remaining at a reasonable ($20?) level, drilling budgets would undoubtedly rise and overall production would respond.

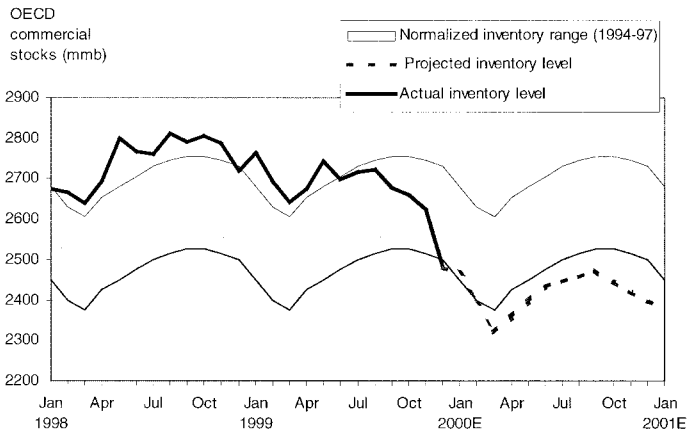
Unevenly spread spare capacity complicates OPEC output increase



Source: Deutsche Banc Alex. Brown estimates

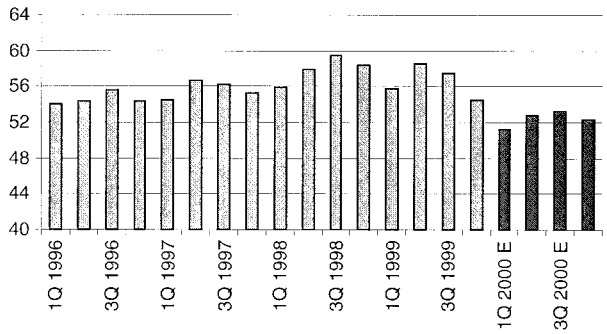
In our opinion, disproportionate spare production capacity may make it politically tough for OPEC to raise output in the timely and sizable manner that markets need. While Saudi Arabia accounts for an estimated 50% of total OPEC spare production capacity of 5 mmb/d, followed by Kuwait at 15%, **other countries would struggle to satisfy even a small quota increase** spread evenly across the cartel above current production levels. Should OPEC go for an incremental approach to output increases throughout the year, as is likely, smaller producers would be hard pressed to meet these new levels later this year, in our view. In our opinion, these varied strategic positions make for political challenges to OPEC's quota policy at the March 27 summit, increasing the possibility that supply remains inadequate to meet demand even in the second quarter, when stocks usually build in preparation for summer demand for transportation fuels among major consuming countries.

OECD inventories remain key to next move in prices
...the base case forecast would push inventories to low levels



OECD inventories remain key to next move in prices. Considering all of these supply and demand factors, what do they say about inventory trends? **As illustrated here, OECD inventories have already declined appreciably and we believe they are headed down further.** On March 10, the International Energy Agency (IEA) reported the January estimate for OECD inventories of 2467 million barrels. By our calculations, that figure will be down closer to 2300 sometime in April or May. And if demand is a little bit stronger or OPEC fails to increase supply by enough -- as I think it should and eventually will -- we could be getting towards the very low end of the absolute inventory range as measured in barrels. In terms of demand coverage, this would be much lower than even the extreme tightness of 1996.

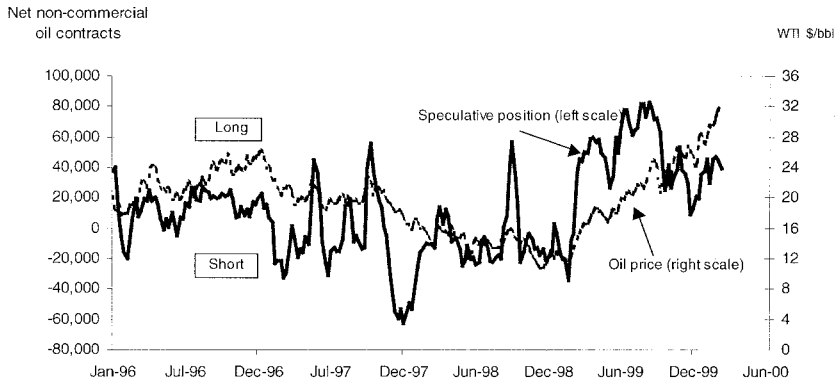
Days supply of OECD industry inventories
...forecast levels headed below 1996 lows



Note: Company-controlled stocks at start of period
Source: IEA and Deutsche Banc Alex. Brown estimates

Days supply of OECD industry inventories...forecast levels headed below 1996 lows. If you do this on a days supply basis (absolute barrels divided by demand) as shown on this graph, the situation looks even tighter. Demand has increased since 1996, so the days of **demand coverage are actually lower right now for the first quarter than they were at the lows in 1996.** And again, this is why oil prices are so high.

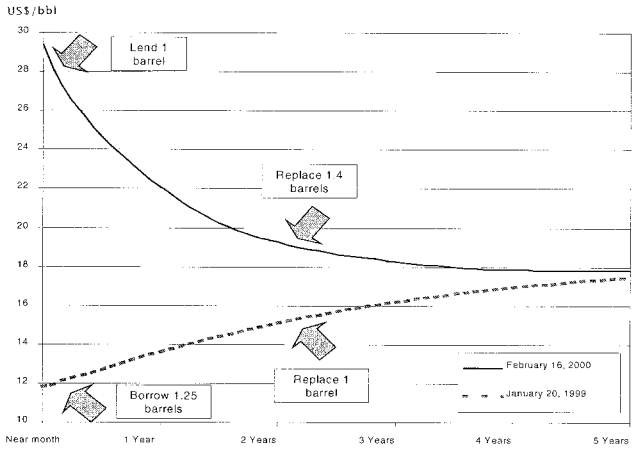
Speculative position of oil traders
…has now fallen well below prior highs



Source: NYMEX; US CFTC

Speculative position of oil traders. There is also the issue of speculative activity. This graph shows the net position of the paper barrel traders on the New York Mercantile Exchange. **At about 40,000 long contracts, as opposed to the 80,000 long contracts last summer, the positions held by NYMEX paper barrel traders, or non-commercial speculators, are actually nearer to a neutral position.** This suggests that the speculators are poised to go either way, buying back into the contract and taking the net speculative position up if they feel the market will remain tight, or possibly selling short if they think OPEC will add a significant amount of production. The level of paper trading, which has grown substantially over the last few years, has added volatility to oil prices.

Two uncommon opportunities to implement SPR "time swaps"
adding oil to the SPR at no cost to the taxpayer



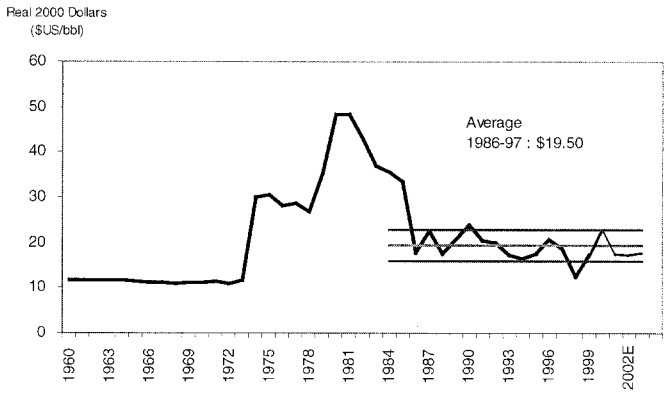
Source: NYMEX; Deutsche Banc Alex Brown estimates

High crude oil prices have sparked a government search for innovative ways to provide consumers relief. Due to the currently steep backwardation - or price premium of contracts for near-month delivery to those for future delivery - on futures exchanges, the U.S. could take advantage of the situation by **lending crude oil now in return for a larger amount later**. This kind of transaction, used successfully by other governments in the past, would put more oil onto the market now, in theory placing downward pressure on prices during this time of tight supply. Completing the swap, the U.S. would take delivery of supplies in the future as payment and thereby support the market at a time when the futures curve implies that demand, and therefore prices, will be lower.

At the same time, since through this time swap it would receive more crude oil in the future than it sells now, the U.S. would be able to **replenish the SPR**, stocks of which currently stand at 568 million barrels, out of 680 million barrels of capacity. In short, by using a combination of the physical and hedging markets, the U.S. could increase its strategic stock levels at no cost to taxpayers.

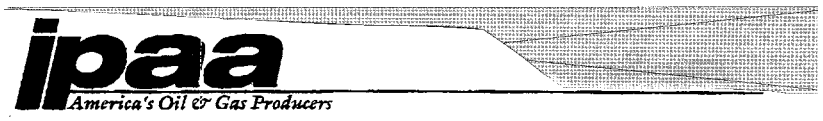
The key to this opportunity comes from the shape of the forward curve. Prompt prices have traded at a 35% premium, or a three-year high, to the year-forward price. The current level of backwardation has only occurred for 20 days in the last seven years. We believe such a discount in the forward price curve provides a rare chance for those with discretionary crude supplies. The swap idea would also work with markets in steep contango,

Oil prices expected to trade near $19.50 RAC ($21 WTI)



Source: US DOE/EIA; Deutsche Banc Alex. Brown estimates

What is OPEC going to do? How is it going to handle this? Clearly there are indications that the Saudis are being pressured to increase production. There is more talk coming from central bankers about the impact of oil prices on inflation, not just in our country but in Europe and in Asia as well. And I think the Saudi government recognizes that. In my view, there will be a decision at some point to add more oil to the markets. That will bring prices back down toward the higher end of the $18-$22 range. In the meantime, I think we are going to see more "gray market" oil. The OPEC compliance estimates are likely to remain relatively low compared to the compliance rates of six months ago. There will be a temptation on the part of the Saudis and a number of the other countries to bleed oil into the market and keep prices from getting too far out of line. If a true emergency occurs, the U.S. Strategic Petroleum Reserve could be used, but this is a sensitive political issue with numerous pros and cons.



March 24, 2000

The Honorable Fred Thompson
Chairman
Senate Govermental Affairs Committee
SD-340
Washington, DC 20510

Dear Chairman Thompson:

The Independent Petroleum Association of America (IPAA) and the National Stripper Well Association (NSWA) are pleased to have the opportunity to submit testimony oversight hearing on rising oil prices, Executive branch policy, and U.S. Security Implications.

IPAA represents the 7,000 independent oil and natural gas producers that drill 85 percent of domestic oil and natural gas wells and produce approximately 40 percent of domestic oil and 66 percent of domestic natural gas. We are 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 businesses operators in the oil and natural gas industry, producers with low volume, high cost stripper or marginal wells. America's 436,000 stripper oil wells make up 79 percent of all U.S. wells and collectively produce 1.2 million barrels per day--as much as we import from Saudi Arabia.

The members of IPAA and NSWA understand the pain that high energy prices can cause, and we sympathize with those who have been shocked by sudden price increases in heating oil and diesel fuel. But it is equally important to understand that a year ago we were watching friends in the oil patch we had known for decades being driven out of business, companies that had been handed down from grandfather to father to son closing their doors forever. Neither situation is acceptable. Dramatic price shifts harm everyone. We need to look for routes to stability for both producers and consumers.

There is another fact that is frequently lost in the debate over high heating oil or diesel prices. Crude oil costs 50 cents per gallon when it is $21 per barrel. At $30 per barrel, it costs about 71 cents per gallon. So, when heating oil or diesel prices soar by $1.00 per gallon in a week, the source of the problem is not the crude oil.

Last month, it was reported that Energy Secretary Bill Richardson said that the Administration was caught napping at the start of the current heating oil crunch in the Northeast. Well if that's true, the Administration must have been hibernating during the 18 months that oil prices dropped to historic lows in 1998 and 1999.

Almost a year ago, the Administration started an analysis under Section 232 of the U.S. Trade Expansion Act to determine whether oil imports pose a national security threat.

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It has yet to be completed.

For the past two years we have heard President Clinton speak repeatedly about his concern for the jobs of 10,000 American steelworkers that were lost due to foreign competition. We have heard nothing about the 65,000 American jobs lost due to low oil prices.

We met with representatives of the president when oil prices were at their depth. We asked that the president state clearly that he understands the value of domestic oil and natural gas production and the importance of maintaining and enhancing it. They are words he has never spoken. This year, as 1997 prices have returned, we now hear voices of complaint. Recently, President Clinton was quoted as saying that he believed oil prices were too high and that it would be in the best interests of OPEC countries to lower prices. It is position echoed by many in Congress.

It is this consistent lack of interest in domestic oil and natural gas production that hurts the nation the most. Few in Washington seem to understand that today's problems result from prior decisions by our government.

Let's review the critical facts facing us today.

One, it is wrong to compare today's crude prices to 1998 and 1999. Those prices were at historic low levels. 1997 is a more appropriate comparison.

Over the past two years the United States lived with unusually low crude oil prices. At the depth of the crude oil price crisis, crude oil was selling at prices – on an adjusted basis – not seen since the Great Depression. These prices were crippling the domestic oil and natural gas exploration and production industry. Over the eighteen-month time frame of low prices, the industry lost 65,000 American jobs. Even after months of higher prices, only about 7,000 of these have been recovered. Eighteen months of low oil prices resulted in devastating reductions in capital investment in the industry both domestically and worldwide. The consequences of this lost investment will take years to measure as existing wells were shut down prematurely and delays in bringing new wells into operation will no doubt limit the potential ability to meet expanding demand. The implications of those Depression-era prices are not just domestic. The lost investment extended to all producer countries.

Thus, if we are to realistically compare today's prices against a past price, we should look to 1997 before the oil price crisis began. Then, the economy was booming as it is now – oil prices were not a constraint.

Two, we now import over 55 percent of our crude oil demand. Like it or not, this is a national security issue. Our economy could well be defined by the decisions of Saddam Hussein in the near future.

There is pending an analysis under Section 232 of the U.S. Trade Expansion Act to determine whether the current level of oil imports presents a threat to national security. This assessment has been made five times before. In each instance the analysis concluded that a threat exists. However, perhaps now more than ever, the

threat is as imposing as it was in 1973 when the Arab Oil Embargo crippled the American and European economies. While that crippling effect required the concerted effort of many Arab countries, today, it could accomplished by just one country – Iraq. Why?

Clearly, Iraq's actions are driven by its own political agenda. As it was prior to the Persian Gulf War, Saddam Hussein's objective is to dominate the Middle East. What he could not achieve militarily in 1990, he now seeks to achieve through the manipulation of other countries. Today, he seeks to rid himself of the UN sanctions, to gain the ability to control his nation's oil resources and spend that wealth how he chooses. He uses the failed UN humanitarian aid process to gain worldwide sympathy for the Iraqi children he prevents from receiving food and medicine that has been purchased for them. He uses the greed of France and Russia and China to restore and improve Iraq's oil fields to weaken UN Security Council resolve. He uses radical Moslems to try to destabilize his Arab neighbors' governments. He will use an oil weapon as soon as it becomes available.

When will that be? How about two months from now.

Today, the world uses about 77 million barrels per day of oil. The oil price crisis of 1998-99 essentially resulted in a lost year of capital investment in maintaining existing oil production and developing new production. As a result the world's excess oil production capacity has diminished. Most of it is controlled by Saudi Arabia, which has long been considered the world's swing producer of crude oil. Estimates of this capacity vary.

Now, OPEC is grappling with increasing its production to accommodate world demand and reaction to higher prices. But, it is walking a dangerous path. OPEC speaks of raising production by 1 million barrels per day beginning in April. Most oil industry analysts argue that the increase needs to be about 2.5 million barrels per day. Some OPEC members argue that no increase is needed now because of traditional demand drops in the second quarter of the year. In reality, many experts question whether all OPEC countries could increase their production consistent with their current quotas. On March 6, both the *Financial Times* and the *Wall Street Journal* ran articles about OPEC capacity. The *Financial Times* questioned Venezuela's production capacity. The *Wall Street Journal* analyzed both Iran and Iraq. The conclusions were similar – the capacity is not there.

So, while it may be possible to increase production by 1 million barrels per day, a 2.5 million barrels per day increase may exceed current capacity – or can only be provided by Saudi Arabia. No one knows for certain. Either case plays into the hands of Saddam Hussein. Iraq currently exports about 2 million barrels per day, sometimes more. In May, the UN again reviews its sanctions policy on Iraq. In the past, Saddam has temporarily withdrawn production to tweak the world markets. But this time he will be in a unique position. This time, if he pulls his oil off the market, the market will be short. This time, it will cause substantial price spikes, perhaps to $50 per barrel. This time, other production cannot be instantly

increased and the world will have to grapple with Saddam's demands to remove UN sanctions and then – maybe – he will return to the oil market.

We hear many argue that we should release oil now from our Strategic Petroleum Reserve. We should not. It is there to respond to supply shortages, particularly politically created supply shortages. If we act now to use the SPR when the issue is price, it won't be available when the true crisis comes.

Three, in 1986 we produced 8.5 million barrels/day of domestic oil; now, production has dropped to below 6 million barrels/day.

Prior to the last oil price crisis in 1986, domestic oil production was about 8.5 million barrels per day. By 1997, domestic production had dropped to about 6.5 million barrels per day – a 2 million barrel per day loss. In 1998, the Clinton Administration's energy strategy called for a 500,000 barrel per day increase in domestic oil production by 2005 – moving to a 7 million barrel per day target. Now, as a result of the 1998-99 price crisis, domestic production has dropped below 6 million barrels per day.

Four, this drop is oil production reflects changes in investment in the United States – a change largely due to the 1986 price crisis as major oil companies shifted their investments out of the U.S. lower 48 states onshore.

The 1986 oil price crisis demonstrated that the United States was the world's highest cost production area. In particular, the lower 48 states onshore is the highest cost area because it is such a mature area compared to the rest of the world. Combined with domestic policy changes, like the 1986 tax reform law that created the Alternative Minimum Tax, the desirability of domestic oil development in the lower 48 states onshore dropped dramatically. As a result, the major integrated oil companies revised their investment strategies. They shifted their investment plans to develop large "elephant" prospects. In the United States these are located offshore or in Alaska – frequently in areas where development has been prohibited. Thus, our own policies led to a shift in capital deployment that encouraged foreign oil development over domestic.

Five, the role of independent producers has steadily increased since the mid-1980s. In the lower 48 states onshore which accounts for 60 percent of domestic oil production, the independent share has increased from about 45 percent to over 60 percent. This shift is irreversible and represents a profound change in the character of the domestic industry. Independent producers are primarily involved only in the upstream part of the industry and do not have the diverse resources of major integrated oil companies. They need different governmental policies.

For independent producers this shift in strategy by major oil companies has opened opportunities throughout the United States. While most of this effort has been in the lower 48 states onshore, independents are also moving aggressively into the offshore. At the same time, for independents to meet the challenge, they must have capital. Independents do not have the diverse resources of majors; they draw their income from the upstream part of the industry: producing oil and natural gas.

Many are small business entities that draw their capital from their current production.

For these companies domestic tax policies – the AMT, limitations on the use of percentage depletion, constraints on intangible drilling costs, and efforts to limit the expensing of delay rental payments and geological and geophysical costs – constrain their capital retention and their ability to increase production. Price stability becomes a more critical concern to generate the ability to attract capital compared to other investments. They differ from major integrated companies and need policy structures that reflect these differences.

Six, independent producers account for 85 percent of wells drilled in the United States and produce 66 percent of the nation's natural gas.

In the United States, independent producers – with the capital to do it and access to the resources – are the aggressive explorationists. Their "wildcatter" image is not without merit. While they use far more sophisticated tools today, independents are still willing to develop new frontiers and rework old ones. They drill the most wells. And, they produce most of the nation's natural gas. So, as natural gas' role increases in the domestic energy supply mix, it is independents who will be the mainstay.

Seven, natural gas cannot economically be supplied to the U.S. market from outside the continental area. If it doesn't come from the U.S., it must come from either Canada or Mexico. Currently, Mexico does not export natural gas.

Natural gas differs from oil in one key respect – transportability. As a liquid, oil can be loaded on ships and sent around the world. Gas isn't as easy to move across oceans. Economically, natural gas must be supplied in large volume in the continental area where it is found. In North America, that means that the supply sources for the United States are domestic production, Canada, and Mexico. Today, U.S. supplies come from domestic production and Canada.

Eight, the National Petroleum Council's Natural Gas *study estimates that domestic natural gas supply must reach 29 trillion cubic feet per year by 2010. Natural gas and crude oil are intrinsically related – they are found together, they are produced together, and they require the same industry. Without a healthy domestic oil industry, we cannot have a healthy domestic natural gas industry, and we cannot meet future needs.*

Natural gas is a key fuel to America's future. All credible energy studies predict the need for increased domestic natural gas use. It is a significant task. Building to a supply level of 29 or 30 trillion cubic feet per year by 2010 requires not just the development of new reserves but the replacement of existing ones. It will require capital, access to resources, technology, and a trained workforce. It will also require a clear understanding that crude oil production and natural gas production are intrinsically related. Physically, they exist together. Physically, they are produced together. Economically, they require the same industry skills, the same capital, the same workforce. We cannot achieve the national goals for natural gas use without a healthy domestic oil industry.

For all these reasons we should be developing national policies to maintain and enhance domestic oil and natural gas production – but we have not. Over the past 15 years this nation has made policy choices that strip capital from domestic oil and natural gas production, limit access to essential resources, aid foreign producers, and under the guise of environmental righteousness limit logical options.

Let me address some of these.

- *The 1986 tax reform act stripped away critical capital after the 1986 oil price crisis through elements like the creation of the Alternative Minimum Tax. Some of this effect was corrected in 1992 amendments. Now Congress has embraced a series of sound modifications to the tax code affecting independent producers. These were included in tax bill passed by Congress last year, but President Clinton vetoed the bill. Congress and the Administration need to act jointly on these issues.*

  Domestic tax policy remains an important component to the maintenance and enhancement of domestic oil and natural gas production. Because domestic production must compete in a world market where foreign producer nations determine the price of oil, domestic producers cannot define the price framework and must operate within the price that exists. At the same time, domestic oil projects must compete for investors against foreign projects and against other investment opportunities. In the 1990's, their rate of return was 6 to 8 percent – paltry given the risk and capital intensive nature of the industry and certainly compared to the returns from many new high technology and Internet companies. Even government-regulated sectors, like pipelines and utilities, have typical returns between 12 and 14 percent.

  It is in this context that one must look at the role of the federal tax code. The tax code determines how much income oil and gas producers will retain and how much capital will be available for reinvestment in maintaining production or developing new production. It influences the rate of return on projects and therefore the appeal of a project to investors. Independent producers typically drill off their cash flow. That is, they must have producing operations generating revenue to maintain and develop properties. Historically, independents have "plowed back" 100% of their after tax revenues into their operations. Thus, when their tax burden is reduced, it means more funding for domestic production of vitally needed oil and natural gas.

  Clearly, at a time when we are trying to improve national security and when our imports of foreign oil already exceed our domestic production, it is counterproductive to tilt the incentives for investment to "push" more investment overseas, or limit its availability in the U.S. Many other countries allow full cost recovery before applying any income tax. The U.S. rules are already more complex and produce an overall higher tax rate on oil and gas development than many if not most foreign countries. Several industry analytic companies have evaluated the investment climate in the U.S. versus foreign countries. On the basis of business and political risk for oil and gas production investment, the U.S. ranked 31st out of 111 countries. On the basis of leasing and fiscal tax policies, in a ranking system

where individual states were compared to countries, the state of Texas ranked 180th. These analyses point to the problems facing investment in domestic oil and natural gas production.

Domestic tax policy needs to be crafted to encourage the maintenance and enhancement of domestic oil and natural gas production. The tax bill passed by Congress last year included five key provisions that would help retain capital for domestic production. These need to be included in the tax code.

Similarly, the National Petroleum Council's *Marginal Wells* study concluded that a marginal wells tax credit would provide countercyclical protection to the vulnerable marginal wells that produce about 20 percent of domestic crude oil and represent this nation's true strategic petroleum reserve. Last year, Congress at least appeared to be moving toward tax policies that would help the investment climate for domestic oil and natural gas production.

But, we must be watchful. Two of the current presidential candidates have proposed tax plans that would attack key elements of the current tax code that provide capital to the independent producer.

- *A linchpin to develop gas supplies consistent with the determinations of the NPC* Natural Gas *study is access to resources. Yet, successive administrations have created offshore moratoriums to prevent environmentally safe development of domestic resources off California, in the Gulf of Mexico and in the Atlantic. The most egregious of these actions was in 1998. After going through the charade of commissioning a study of the risk to the oceans from offshore development – a study that stated unequivocally that offshore development was environmentally sound – President Clinton extended the California offshore moratorium another decade.*

For decades the nation has deliberated the use of its offshore resources with mixed results. In the Gulf of Mexico where drilling and production has been allowed, offshore development has provided substantial oil and natural gas resources to the nation. Offshore production now accounts for roughly 20 percent of domestic oil production and over 25 percent of natural gas production. This production has been both a technological and environmental success story. On the other side of the coin, unreasonable opposition to the offshore development of California and other areas has limited use of these potential resources. Under the guise of environmental righteousness, the nation is denied resources that can be produced in a clearly environmentally sound manner.

During the 1998 Year of the Ocean activities, the Heinz Center for Science, Economics and the Environment analyzed the history and potential of offshore production for the National Oceanic and Atmospheric Administration. It was unequivocal in its conclusions that offshore production can be done and done well. Yet, the Clinton Administration ignored this assessment as it imposed another ten year extension to the California offshore moratorium.

- *For well over two decades we have debated whether to open the Arctic National*

Wildlife Refuge (ANWR) Coastal Plain to oil and natural gas development. It could yield a field on a par with Prudhoe Bay. Development has never occurred under the guise of environmental righteousness. Now, the latest question is whether the Clinton Administration will use the Antiquities Act again to wall off any development.

Debate over the use of ANWR parallels the offshore debate. The nation is losing access to valuable potential resources that can be produced in an environmentally sound manner. The latest question will be whether the Clinton Administration will use the Antiquities Act to designate the area as a National Monument to prevent its development.

- *On a broader scale the Clinton Administration has consistently closed off access to national resources. In addition to offshore moratoriums and opposition to ANWR development, it has initiated policies to prevent access to forestland by preventing road construction. It has denied permits on federal land. It is an attitude that also pervades Congress. For example, the House has passed legislation to prohibit the development of natural gas resources under Mosquito Creek Lake in my home state of Ohio.*

- *IPAA initiated a Section 232 request regarding the level of crude oil imports in 1993. Despite a clear determination that the level posed a threat to national security, the Clinton Administration proposed no concrete policies to enhance or maintain domestic oil production. As mentioned earlier, another Section 232 assessment is pending. It needs to include provisions that are designed to maintain and enhance domestic oil and natural gas production.*

No Section 232 analysis has concluded that oil import levels do not pose a threat to national security. Now is the time to recognize that the while steps to improve energy efficiency, develop alternate fuels, diversify import sources, and other steps are useful, they are worthless without a strong domestic oil and natural gas production industry. Without sound policies that support domestic marginal well production, the nation loses its true strategic petroleum reserve. Without sound policies that support domestic natural gas production, the nation's most plentiful "alternate" fuel will never meet its potential.

- *The Environmental Protection Agency develops policies that undermine the domestic resources. For example, after initially opposing an erroneous court interpretation of the scope of underground injection control under the Safe Drinking Water Act, the EPA now opposes legislation to structure the law as it was originally intended, EPA's original position before the court.*

The 11th Circuit Court of Appeals in the *LEAF v EPA* case erroneously interpreted the scope of the Safe Drinking Water Act's Underground Injection Control (UIC) program. It ruled that the UIC program applied to the injection of fluids for the purpose of hydraulically fracturing geological formations to stimulate reservoirs for oil and natural gas production. EPA argued against this interpretation of the law in the case, a case where no environmental damage was shown. It lost. Subsequently, the State of Alabama was threatened with the loss of its primacy to run the UIC program for coal bed methane operations. EPA compelled Alabama to

require the use of federally certified drinking water in hydraulic fracturing operations at substantial cost with no environmental benefit. However, EPA now opposes legislation that would correct the erroneous court decision.

If this Court interpretation is allowed to stand, it could threaten normal safe hydraulic fracturing operations at all oil and gas operations in all states. Congress must act. LEAF has filed another action in the 11th Circuit Court seeking a review of the EPA action in Alabama.

- *Implementation of the limited emergency oil and gas loan guarantee program has been so constrained that no loan guarantees have yet to be provided. Yet, in 1998 when oil prices were at their lows, the United States was sending funding to Russia and Mexico to develop their oil industries. We have shown more interest in a pipeline across Turkey than preserving domestic resources.*

Last year after considerable delay, Congress passed the Emergency Oil and Gas Loan Guarantee Program. While the congressionally imposed restraints on the program make it complicated to implement, the interpretation of the law by the Loan Guarantee Board has so limited the program that it has scared off many potential banks and producers from seeking the financial assistance. To date the first guarantee has yet to be granted and less than 25 applications have been received.

At the same time many independent producers are frustrated that while Congress was delaying action on this program and making it too constrained, while the Administration was further limiting its application, the United States was sending funding to Mexico and Russia to enhance their oil production operations during the depths of the oil price crisis.

- *The Strategic Petroleum Reserve has been manipulated for budget tricks. Now, there are persistent efforts to use it to influence prices rather than when supplies are in jeopardy.*

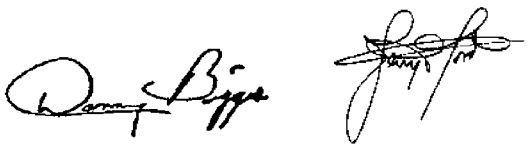
IPAA has consistently sought two objectives with regard to strategic reserves of petroleum. First, the nation needs to recognize the role of its marginal wells as a true strategic petroleum reserve that produces crude volumes approximately equal to imports from Saudi Arabia. Second, the Strategic Petroleum Reserve was created to deal with supply disruptions of crude oil; it should not be used to influence the market. IPAA objects to selling oil for budget purposes or releasing oil to affect prices.

As a nation we must define policies that recognize the ongoing importance of domestic oil and natural gas supplies. We cannot continue the current path of trashing crude oil as environmentally evil and banking on natural gas to meet future fuel needs.

We cannot continue a policy of reliance on foreign oil at prices that destroy the domestic producer. It will place our energy and economic future in the hands of foreign governments – first because we will lose our domestic oil resources, second because we will not be able to develop our domestic natural gas.

Instead, we must work together – both here in the United States and with foreign

producer nations – to develop a stable oil and natural gas development framework. The next several months will test our resolve. Price pressures will continue. The Section 232 action will be completed. Policymakers can establish a sound framework for the future of domestic energy, or they can continue the failed policies of the past. Let's hope for the right choice.



Sincerely,

Jerry Jordan
Chairman,
Independent Petroleum Association
of America

Danny Biggs
President,
National Stripper Well Association

NUCLEAR ENERGY INSTITUTE

Testimony for the Record

Joe F. Colvin
President and Chief Executive Officer
Nuclear Energy Institute

March 31, 2000

United States Senate Committee on Governmental Affairs

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On behalf of the Nuclear Energy Institute (NEI), I am happy to provide the following statement for the record on the value of the more than 100 nuclear power plants providing our nation with vital energy security and environmental protection benefits.

The Nuclear Energy Institute (NEI) coordinates public policy for the U.S. nuclear energy industry. We represent 270 members with a broad spectrum of interests. In addition to representing every U.S. utility that operates a nuclear power plant, NEI's membership includes nuclear fuel cycle companies, suppliers, engineering and consulting firms, national research laboratories, manufacturers of radiopharmaceuticals, universities, labor unions and law firms.

The Government Affairs Committee is holding this oversight hearing on rising oil prices, Executive Branch policy, and U.S. security implications for very good reasons. Oil remains a primary energy source for many industries and a key feedstock for others. A rise in oil prices can have severe negative effects on all aspects of the American economy and way of life. In response, NEI believes that expanded purchasing choices available to the Federal Government through electricity deregulation and environmental procurement policies should be a major force in keeping one of our most effective tools to reduce dependence on foreign oil—nuclear energy—in our energy system today and in the future.

Petroleum products fuel 97 percent of the United States' transportation needs. Fortunately, oil is no longer a mainstay of U.S. electricity supply. At the time of the 1973 oil embargo, approximately 20 percent of United States electricity supply came from oil-fired power plants. In some parts of the nation—the Northeast, for example—the percentage was considerably higher. America's electricity industry responded to the oil shocks of the 1970s by rebalancing its supply portfolio—reducing dependence on oil-fired power plants (to just 3 percent today), and increasing reliance on coal and nuclear energy.

In 1973, a mere 5 percent of U.S. electricity supply came from nuclear power plants. In the subsequent decades, more than 89 new, nuclear units began operating, tripling the amount of electricity Americans received from nuclear energy. Today, more than 100 nuclear units supply approximately 20 percent of annual U.S. electricity. During that time, fuel substitution with nuclear power reduced U.S. oil consumption for electricity production from 1.54 million barrels per day in 1973 to .56 million barrels per day by 1998. Substitution of secure, reliable, nuclear electricity has been one of the most successful energy policy responses to foreign oil dependence.

The years leading up to the 1970s embargo era also saw the development of ambitious regulatory efforts to improve the quality of the nation's air. With the advent of new environmental laws, such as the Clean Air Act, concern over the environment compelled energy choices that protected valuable air quality while

meeting increasing demands for electricity and economic growth. When energy security and environmental policies converged in the 1970s, increased use of non-emitting nuclear energy became an integral element in energy policy decisions designed to further air quality goals.

Although viewed as only affecting emitting sources, air pollution compliance regimes are actually being enforced against the total supply of electricity produced. Both emission caps and permits under ambient air quality standards represent a finite level of pollution permitted for a range of industrial activities including transportation, manufacturing, and electricity production. A state or region can more easily remain within its emission limitations and still meet the energy needs of its population when non-emitting sources are used to satisfy a portion of energy demand. Increased use of nuclear energy over the last three decades provided this additional compliance tool. As concerns about global warming point to possible additional controls of greenhouse gases, nuclear energy will become an even more important element of emission compliance regimes.

The fission process, together with the environmental policies and practices of nuclear plants, have prevented significant harmful impacts to all environmental media, not just air. Nuclear energy generally produces the fewest overall adverse impacts to the environment for any generation source producing the same amount of electricity. Of particular note are the waste management activities that have successfully mitigated the potential impacts from used fuel and operational waste.

Unlike many other forms of electricity, the price of nuclear includes the internalized costs of these successful environmental mitigation practices. Even with these costs, nuclear energy has remained affordable, largely because continued improvements in energy efficiency at the plants have kept costs competitive. In addition, nuclear electricity prices in the market are stable, avoiding the volatility and severe price spikes that we see affecting fuels like petroleum today.

Today, nuclear energy continues to provide its triple benefit to our nation: fuel diversity that reduces foreign oil dependence; price stability; and reliable, environmentally friendly electricity. As this country develops it energy alternatives for the future, government policies must recognize that the expanded use of nuclear energy can enhance the economic and environmental benefits available from this emission-free, secure source. Hydrogen-powered fuel cells—either alone or hybridized with current technology—can be a source of both oil- and emission-free transportation when the hydrogen is produced using nuclear electricity. As we look to reducing our dependence on foreign energy sources for all economic sectors, more—not less—nuclear energy will be needed.

State and federal initiatives are launching a more competitive electricity industry. These competitive energy markets allow the Federal Government to make

electricity purchase decisions that have been unavailable in the past. The Federal Government is the largest consumer of energy in the country. Under Executive Order 12873 and policies established by the Office of Federal Procurement Policy, federal agencies are advised to purchase "environmentally preferable" products wherever possible. Thus electricity purchasing agencies throughout the Federal government can now, or soon will have the ability to, choose suppliers whose portfolios contain nuclear generation as part of their efforts to "green the government."

Unfortunately, nuclear energy was not specifically identified as a clean air option for federal government agencies in Executive Order 12873. Such an omission reduces the government's ability to make informed, cost-effective choices, and creates the illusion that only solar, biofuels and wind energy are forms of generation that can make a beneficial contribution to reducing or preventing pollution. The Congress needs to ensure that when the federal government begins to make competitive electricity purchases, nuclear energy is not denied this fair market access. Nuclear energy purchases can not only help the environment, but reduce foreign oil dependence, and the potential to develop foreign gas dependence as well.

The recent oil supply difficulties serve as a reminder that energy policy decisions taken 30 years ago to diversify electricity sources were correct. The lessons learned from the successful deployment of nuclear energy in the wake of foreign energy dependence makes expanded use of nuclear energy a requirement for the future. By using its status as the country's largest consumer of energy, the Federal Government can set the right example for the rest of the consuming public anxious to protect both the environment and availability of our energy supply—Buy Nuclear.